

# NON-TECHNICAL SUMMARY

## Introduction

This Environmental Impact Assessment Report ('EIAR') has been prepared by McCarthy Keville O'Sullivan Ltd ('MKO'). on behalf of Planree Ltd., which intends to apply to An Bord Pleanála ('the Board') for planning permission, in accordance with Section 37(e) of the Planning and Development Act 2000, (as amended), to construct a wind energy development and all associated infrastructure in Meenbog and adjacent townlands, listed in Table 1.1 below, in County Donegal.

The proposed development site is located approximately eight kilometres south west of the towns of Ballybofey and Stranorlor and approximately seventeen kilometres northwest of the town of Castlederg, Co. Tyrone. This EIAR will accompany the planning application for the proposed development to be submitted to the Board. The planning application will also be accompanied by a Natura Impact Statement ('NIS')

**Table 1.1 Townlands containing proposed infrastructure.**

Townland	
Current Planning application - Proposed Wind Farm & Amenity Area Development	Meenbog
	Croaghonagh
	Cashelnavean
Grid Connection Route (not part of this planning application)	Tawnawully Mountains
	Keadew Upper
	Friarbush
	Ardinawark
	Keadew Lower
	Cullionbuoy

On the 11th September 2017, the Board determined that the proposed development met the requirements for Strategic Infrastructure Development (SID) under Section 37 A(2)(a) and 37b of the Planning and Development Act, 2000 as amended.

The applicant for the proposed development is Planree Ltd. Planree Ltd is a subsidiary company of Enerco Energy Ltd., which is an Irish-owned, Cork-based company with extensive experience in the design, construction and operation of wind energy developments throughout Ireland, with projects currently operating in Counties Kerry, Cork, Limerick, Clare and Galway.

Since the decision of the Board to refuse the 2015 Application for the original Carrickaduff Wind Farm development, MKO, on behalf of the applicant, has taken a number of steps to rectify and address the reasons for the decision to refuse the 2015 Application in the context of this new application for the proposed development.

Article 5 of the EIA Directive as amended by Directive 2014/52/EU provides where an EIA is required, the developer shall prepare and submit an environmental impact assessment report (EIAR) previously referred to as an Environmental Impact

Statement ('EIS'). The information to be provided by the developer shall include at least:

The proposed development comprises the construction of a wind farm comprising 19 wind turbines and all associated works. The proposed turbines will have a maximum blade tip height of up to 156.5 metres. The application is seeking a ten-year planning permission. The full description of the proposed development, as per the public planning notices, is as follows:

- i. Up to 19 no. wind turbines with a generating capacity in excess of 50MW, maximum overall ground to blade tip height of up to 156.5 metres;
- ii. 1 no. permanent Meteorological Mast up to a maximum height of 110 metres;
- iii. 1 no. 110kV Electrical substation with 2 no. control buildings with welfare facilities, associated electrical plant and equipment, security fencing and waste water holding tank;
- iv. Internal wind farm underground cabling;
- v. 110kV underground grid connection cabling;
- vi. Upgrade of access junctions;
- vii. Upgrade of existing tracks, roads and provision of new site access roads and hardstand areas;
- viii. 3 no. borrow pits;
- ix. 2 no. temporary construction compounds;
- x. Recreation and amenity works, including marked trails (upgrade of existing tracks and provision of new tracks), picnic, amenity and play areas, car parking and vehicular access;
- xi. Site drainage;
- xii. Forestry Felling;
- xiii. Permanent signage;
- xiv. All associated site development and ancillary works

The layout of the proposed development has been constraints-led, thereby avoiding the environmentally sensitive parts of the site. The roads layout for the proposed development makes use of the existing onsite access roads and tracks where possible, with approximately 14.5 kilometres of existing roadway/ tracks requiring upgrading. Approximately 7.7 kilometres of new access road is also proposed to be constructed.

The site of the proposed development measures approximately 4,400 hectares. Where the 'site' is referred to in this EIS, this means the study area for the Environmental Impact Statement. The proposed permanent footprint of the proposed development measures approximately 28.5 hectares, which represents approximately 2.9% of the primary study area.

The purpose of this EIAR is to document the current state of the environment in the vicinity of the proposed development site and to quantify the likely significant effects, if any, of the proposed development on the environment. The compilation of this document served to highlight any areas where mitigation measures may be necessary in order to protect the surrounding environment from the possibility of any negative impacts arising from the proposed development.

The objective of this process is to facilitate the most efficient and positive design of the proposed development in order to enable the development to be incorporated into the surrounding landscape insofar as possible and to plan for the identified effects so that measures are in place to ensure the environment is protected before any negative impacts are allowed to occur.

## Background to the Proposed Development

The Background to the Proposed Development chapter presents information on Energy and Climate Change policy and targets, the strategic planning context for the proposed development, a description of the proposed development site and its planning history, scoping and consultation, and the cumulative impact assessment process.

### Energy and Climate Change Targets

Renewable energy development is recognised as a vital component of Ireland’s strategy to tackle the challenges of combating climate change and ensuring a secure supply of energy. Ireland is heavily dependent on the importation of fossil fuels in order to meet its energy needs, with imported fossil fuels accounting for 85% of all energy consumed in Ireland in 2014, at an estimated cost of €5.7 billion (*Energy Security in Ireland: A Statistical Overview* (SEAI, January 2016).

In 2016, the EPA published an update on Ireland’s Greenhouse Gas Emission Projections to 2020. Ireland’s target is to achieve a 20% reduction of non-Emissions Trading Scheme (non-ETS) sector emissions, i.e. agriculture, transport, residential, commercial, non-energy intensive industry and waste, on 2005 levels, with annual binding limits set for each year over the period 2013 – 2020. The EPA report states that *“Failure to meet 2020 renewable and energy efficiency targets will result in Ireland’s emission levels moving even further from its emission reduction targets”*. The report also concludes:

- The latest projections estimate that by 2020 non-ETS emissions will be at best 11% below 2005 levels compared to the 20% reduction target. Emission trends from agriculture and transport are key determinants in meeting targets, however emissions from both sectors are projected to increase in the period to 2020.

It is clear that Ireland faces significant challenges in meeting emission reduction targets for 2020 and beyond (EPA, 2016, *Greenhouse Gas Emission Projections to 2020 – An Update*)

### Scoping and Consultation

A comprehensive scoping and consultation exercise was undertaken during preparation of this EIAR. This included:

- Circulation of a Scoping Document and the final proposed turbine layout to statutory and non-statutory consultees;
- Pre-planning meetings with An Bord Pleanála, Donegal County Council and National Parks and Wildlife Service;
- Public consultation including house-to-house calls and a series of public information sessions;
- Ongoing consultation with the Meenbog Community Group and
- Circulation of newsletters;

### Cumulative Effects

This EIAR also considers the potential for cumulative effects from the proposed development with other key existing, permitted or proposed projects. Cumulative effects are addressed in each chapter of the EIAR, under the relevant environmental heading.

## Site Selection and Alternatives

This Chapter provides a description of the site selection process and outlines the alternative site assessments that were carried out in order to identify the most appropriate site in South Donegal to accommodate the wind farm grid connection.

### Site Suitability

The process of identifying a suitable wind farm site is influenced by a number of factors. While wind speeds, the area of suitable or available land, and planning policy are all very important, a wind farm project must be commercially viable, to ensure it will attract the necessary project finance required to progress to construction. The grid connection, or the method by which a proposed wind farm is connected to the national grid to export electricity from the site is of critical importance.

Seven sites were identified as part of the site selection process and all of the sites were identified as being appropriate locations for the provision of wind farms. i.e. “Open to Consideration” in the CDP. Equally, all areas contain some degree of a close proximity to ecologically designated areas or Especially High Scenic Amenity areas. Furthermore, the recent adoption of Variation no. 2 of the County Development Plan which requires a ten times tip-height separation distance to be provided between a proposed turbine and residential properties or other centre’s of human habitation has had a significant impact on the suitability of the identified sites in terms of being able to comply with policy requirements

A detailed site selection exercise was undertaken in order to identify the optimum site for the proposed development. Candidate sites were assessed in relation to the key criteria of: grid access/capacity, County Development Plan designations, proximity to houses, environmental sensitivity and delivery site and access. The site assessment scores for each criterion were determined and a shortlist of sites deemed suitable for a large-scale wind energy development was compiled. Of these sites, Meenbog emerged as the optimum site to provide for the proposed development. The proposed development site is located in an area designated as ‘Open to Consideration’ by the Donegal County Council Development Plan 2012 – 2018.

The EIAR also contains a description of the alternatives that were considered for the proposed development (i.e. alternative design, access, and supporting infrastructure arrangements).

The proposed wind farm has been designed to cater for the grid connection capacity that has been secured by the applicant for connection into the existing Clogher substation. Having regard to the available wind resource and the selected power output for the proposed wind farm, it is proposed to install 19 turbines with a maximum tip height of up to 156.5 metres which will have a generating capacity in excess of 50 MW. 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 turbine layout selected for the site has the smallest development footprint of the other alternatives considered, while still achieving the required output at a more consistent level than would be achievable using different turbines.

The proposed turbine layout takes account of all site constraints and the distances to be maintained between turbines and constraints such as houses and watercourses as well as considering the requirements of the County Development Plan. The layout is based on the results of all site investigations that have been carried out during the EIAR

process. As information regarding the site of the proposed development was compiled and assessed, the number of turbines and the proposed layout have been revised and amended to take account of the physical constraints of the site as well as the requirement for buffer zones and other areas in which no turbines could be located.

The development of the final proposed wind farm layout has resulted from feedback from the various studies and assessments carried out as well as ongoing negotiations with property owners. There were several reviews of the specific locations of the various turbines during the optimisation of the site layout. The adjustments made entailed placement changes to turbines following on-site geotechnical, archaeological, hydrological, ecological, visual and other studies.

## **Description of the Proposed Development**

This section of the Environmental Impact Assessment Report (EIAR) describes the development and its component parts which is the subject of a proposed application for planning permission to An Bord Pleanála in accordance with Section 37(e) of the Planning and Development Act 2000, (as amended) ('the Proposed Development'). All elements of the Proposed Development, including grid connection, forestry felling and replanting and any works required on public roads to accommodate turbine delivery, have been assessed as part of this EIAR.

The layout of the Proposed Development has been designed to minimise the potential environmental effects of the wind farm, while at the same time maximising the energy yield of the wind resource passing over the site. A constraints study has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the site. The overall layout of the Proposed Development is shown on Figure 4.1 of the EIAR. This drawing shows the proposed locations of the wind turbines, electricity substation, borrow pits, construction compounds, internal roads layout and the main site entrance. Detailed site layout drawings of the Proposed Development are included in Appendix 4.1 to this EIAR.

The 203,889 MWh of electricity produced by the Proposed Development would be sufficient to supply 48,545 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity (this latest figure is available from the March 2017 CER Review of Typical Consumption Figures Decision).

The 2016 Census of Ireland recorded a total of 84,785 households in Co. Donegal, including vacant houses. Per annum, based on a capacity factor of 35%, the Proposed Development would therefore produce sufficient electricity for the equivalent of 57% of all households in Co. Donegal.

To provide access within the site of the Proposed Development and to connect the wind turbines and associated infrastructure existing tracks will need to be upgraded and new access roads will need to be constructed. The road construction preliminary design has taken into account the following key factors as stated in the AGEC's *Peat & Spoil Management Plan* in Appendix 4.2:

1. Buildability considerations
2. Serviceability requirements for construction and wind turbine delivery and maintenance vehicles
3. Minimise excavation arisings
4. Requirement to minimise disruption to peat hydrology

It is proposed to develop 3 No on-site borrow pits as part of the Proposed Development. It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the proposed development from the on-site borrow pits. All 3 No borrow pits are located adjacent to existing site roads. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations. Once the required volume of rock has been extracted from the borrow pit areas, it is intended to reinstate these areas with peat and overburden excavated from the works areas of the Proposed Development. Post-construction, the borrow pits areas will be permanently secured and a stock-proof fence will be erected around the borrow pit areas to prevent access to these areas. Appropriate health and safety signage will also be erected on this fencing and at locations around the fenced area. Hardcore materials will be extracted from the borrow pit, principally by means of rock breaking. Depending on the hardcore volume requirements, blasting may also be used as a more effective rock extraction method, capable of producing significant volumes of rock in a matter of milliseconds. Blasting will only be carried out after an appropriate method of notifying any potentially sensitive local residents has been submitted to and agreed with the Planning Authority.

It is proposed to construct one onsite electricity substation, including two control buildings, within the site of the Proposed Development as shown in Figure 4.1 of this EIAR. The proposed substation site is located within an area of forestry and includes a perimeter landscaped berm, which will screen it from view from the N15 National Primary Road, located approximately 1,180 metres west of the substation at its nearest point.

Each turbine will be connected to the on-site electricity substation via an underground 20 or 33 kV (kilovolt) electricity cable. Fibre-optic cables will also connect each wind turbine to the wind farm control building in the onsite substation compound. The electricity and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts approximately 1.3 metres below the ground surface, along the sides of roadways. The route of the cable ducts will follow the access track to each turbine location.

A connection between the site of the Proposed Development and the national electricity grid will be necessary to export the electricity generated. The planning application for the Proposed Development includes permission for 110kV grid connection cabling, as shown in the site layout drawings in Appendix 4.1. It is intended that the Proposed Development will connect to the national grid via the existing Clogher 110 kV Electricity Substation (Clogher Substation), located in the townland of Cullionboy, Co. Donegal. The Clogher Substation is located approximately 6.2 kilometres southwest of the proposed development at its closest point.

One permanent anemometry mast is proposed as part of the Proposed Development. The anemometry masts will be equipped with wind monitoring equipment at various heights. The mast will be a slender structure up to 110 metres in height. The mast will be a free-standing structure. The mast will be constructed on a hard-standing area sufficiently large to accommodate the crane that will be used to erect the mast, adjacent to an existing track.

Two temporary construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors during the construction phase of the proposed development. One of the construction compounds will be repurposed as an amenity area once the construction phase has been completed.

The majority of the site of the Proposed Development site currently comprises a commercial coniferous forestry plantation, with approximately 91 percent of the site under commercial forestry. As part of the Proposed Development, tree felling will be required within and around the development footprint to allow the construction of turbine bases, access roads and the other ancillary infrastructure. Along sections of access road in forested areas, an area of approximately three times the width of the access road will be felled. Turbulence felling will also be required in the vicinity of turbine locations, the purpose of which is to avoid turbulence that can be created by the forest canopy and which can affect the performance and efficiency of the turbines.

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for turbine bases, access roads, and any other wind farm-related uses will have to be replaced by replanting at an alternative site. Four potential replanting areas, across Counties Clare and Cork, have been identified for assessment purposes, with a combined availability of 48.35 hectares. These lands have been granted Forest Service Technical Approval for afforestation, and these or similarly approved lands will be used for replanting should the proposed wind farm receive planning permission.

All proposed activities on the site of the Proposed Development will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Development and is included in Appendix 4.4 of this EIAR.

It is proposed to access the site of the Proposed Development via the N15 National Primary Route and an existing quarry and forestry road in the townland of Croaghonagh. This entrance will be widened to facilitate the delivery of the construction materials and turbine components.

The Proposed Development has the potential to have significant benefits for the local economy, by means of job creation, landowner payments and commercial rate payments. An important part of wind farm development which Planree Ltd. has been at the forefront of developing is its Community Benefit Package. The concept of directing benefits from wind farms to the local community is promoted by the National Economic and Social Council (NESCC) and the Irish Wind Energy Association (IWEA) among others. While it may be simpler and easier to put a total fund aside for a wider community area, Planree Ltd. is endeavouring to develop new ways to direct increased gain towards the local community with particular focus on those living closest to the Proposed Development.

The Proposed Development and all its associated infrastructure creates a unique opportunity to develop a safe, family-orientated, off-road recreation and amenity area for use by members of the local and wider community alike. Parts of the site of the Proposed Development and proposed infrastructure will be developed and promoted for use as a cycling, walking, picnicking and trail-running activities. This proposal is based on the ideas brought forward from discussions with the Meenbog Community Group. The site's proximity to Donegal Town, Ballybofey/Stranorlar and Letterkenny, and the N15 public road puts a very large potential user group within easy access of the proposed site. A portion of the overall Community Gain Fund, will be dedicated to the provision and promotion of the recreational and amenity proposals on completion of the wind farm infrastructure works.

The recreational and amenity proposals for the site of the Proposed Development follow an emerging international trend to make wind farm sites accessible to the

general public by providing recreation opportunities that complement the wind farm development. Although the site consists of a commercial forestry plantation, the site has a secluded and isolated feel, which adds to the attractiveness and potential of the area as a recreation location.

The recreation and amenity facilities proposed for the Proposed Development are intended to appeal to walkers, cyclists, trail runners and other recreational users, and are outlined in Section 4.6 of the EIAR.

Drainage water from any works areas of the site of the Proposed Development will not be directed to any natural watercourses within the site. Two distinct methods will be employed to manage drainage water within the site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release.

It is estimated that the construction phase of the Proposed Development will take approximately 12-18 months from starting on site to the commissioning of the electrical system. The construction phase can be broken down into three main phases, 1) civil engineering works - 10 months, 2) electrical works - 6 months, and 3) turbine erection and commissioning - 8 months.

The Proposed Development is expected to have a lifespan of approximately 30 years. Planning permission is being sought for a 30-year operation period commencing from the date of full operational commissioning of the wind farm. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction.

Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully. The onsite substation will remain in place as it will be under the ownership of the ESB/EirGrid.

## **Human Beings**

One of the principle concerns in the development process is that people, as individuals or communities, should experience no diminution in their quality of life from the direct or indirect impacts arising from the construction and operation of a development. Ultimately, all the impacts of a development impinge on human beings, directly and indirectly, positively and negatively. The key issues examined in this section of the EIAR include population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, shadow flicker, noise and health and safety.

Information used in this study was sourced from the Census of Ireland 2011 and 2016, which is the most recent census, the Census of Agriculture 2010 and from the CSO website, [www.cso.ie](http://www.cso.ie). Information has also been sourced from the Northern Ireland Census 2011 and the Northern Ireland Statistics and Research Agency (NISRA) website, [www.nisra.gov.uk](http://www.nisra.gov.uk). Census information is divided into Republic of Ireland, Northern Ireland, Donegal, District Electoral Division (DED), Super Output Area (SOA) and Small Area (SA) level. Where possible, comparisons were made between DEDs in



the Republic and SOAs in the North of Ireland, SOAs were used for comparison where data was unavailable at SA level. All data that is specific to the human beings study area refers to the 2011 census data, as this allows a more relevant comparison between the Republic of Ireland DEDs and Northern Ireland SOAs/SAs. The 2016 census data for the republic of Ireland was consulted as part of the assessment process, and upon comparison with the relevant 2011 data, were found to be consistent.

The main wind farm site is located in southeast Co. Donegal, approximately 8.0 kilometres to the southwest of the twin towns of Ballybofey & Stranolor and approximately 30.0 kilometres to the northeast of Donegal town. In order to make inferences about the population and other statistics in the vicinity of the main wind farm development site, the Study Area for the Human Beings & population section of this EIAR was defined in terms of the District Electoral Divisions (DEDs) within Donegal and the SAs and/or Electoral Wards/SOAs within Tyrone. The site of the proposed wind farm development lies within Goland DED and is adjacent to the Glenderg Ward SOAs. Glenderg Ward SOA is comprised of six small areas, numbered N00004484 to N00004489. The proposed development site forms a boundary with Glenderg Ward N00004485 only. The total Study Area (for the purposes of the Human Beings assessment) has a combined population of 2,983 persons, and comprises of a total land area of 213 square kilometers.

In order to assess potential impacts on Human Beings and human health along the grid connection route, a review of properties and planning applications in the vicinity of the proposed works was carried out, with the majority of developments along the route comprising single houses. The land-use along the grid connection comprises mainly transport, and surrounding land use is mainly agriculture with some areas of peat harvesting and forestry.

The population density of the Study Area recorded during the 2011 Census was 24.2 persons per square kilometre. The number of households in the Study Area are in line with that observed in the Republic, Northern Ireland and County Donegal during the 2011 census period. The proportion of the Study Area population within each age category is similar to those recorded in the Republic and Northern Ireland and County level. Within the Study Area, the highest population percentage occurs within the 25-44 age category. The lowest population percentage occurs in the over 65 age category, which is consistent with the data from the Republic of Ireland, Northern Ireland and County level. Overall, the principal economic status of those living in the Study Area is broadly similar to that recorded in the Republic of Ireland, Northern Ireland and County level. Employment in the study area falls mainly under employer/manager, non-manual and skilled manual, with a variety of sectors contributing to employment.

The total area of farmland within the Study Area for the Human Beings assessment measures approximately 10,550 hectares or 49.7% of the Study Area, according to the CSO Census of Agriculture in Ireland 2010 and the Department of Agriculture and Rural Development Farm Structure Survey in Northern Ireland 2010. There are 244 farms located within the Study Area, with an average farm size of 43.2 hectares. This is marginally above the average farm size of 30.0 hectare for County Donegal as a whole. Within the Study Area, farming employs 300 people, and the majority of farms are family-owned and run.

The nearest settlement to the site of the Proposed Development is Ballybofey, located in the Finn valley, in which the main services are located. The nearest primary school

to the boundary of the site of the Proposed Development is St Mary's National School, Ballybofey, Co Donegal located approximately 11 kilometres to the northeast of the Proposed Development. The closest secondary school to the site of the Proposed Development is St Columba's College, which is located approximately 13 kilometers to the northeast of the site boundary. The majority of amenities and community facilities, including GAA and other sports clubs, youth clubs and recreational areas available in the area are located in the centers of settlement throughout the wider area. Retail and personal services within the vicinity are provided in the larger settlements such as Ballybofey, Stranorlar and Castlederg.

Ireland is divided into eight tourism regions. The Border region, in which the site of the Proposed Development is located, comprises County Cavan, Donegal, Leitrim, Monaghan, Sligo and Louth. This Region benefited from approximately 6.1% of the total number of overseas tourists to the country and approximately 6.2% of the total tourism income generated in Ireland in 2016. A small section of The North-West Cycle Trail runs through the north of the study area. The North-West Cycle Trail is a 326 kilometre circular cycle route running through Counties Donegal, Tyrone, Fermanagh, Leitrim and Sligo. There are no other tourist attractions pertaining specifically to the site of the Proposed Development. The nearest tourist centers to the Proposed Development site are within Ballybofey, Stranorlar and Castlederg towns, located approximately 8-17 kilometres northeast and east of the site. Tourist attractions within these centers include the round tower in Ballybofey, salmon fishing on the River Finn, Castlederg Castle and Trusk Lough.

While there are anecdotal reports of negative health impacts on people who live very close to wind turbines, peer-reviewed research has generally not supported these statements. There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects. The main publications supporting the view that there is no evidence of any direct link between wind turbines and health are summarised in Chapter 5 of this EIAR.

Although there have been no empirical studies carried out in Ireland on the impacts of wind farms on property prices, it is a reasonable assumption based on the available international literature that the provision of a wind farm at the proposed location would not impact on the property values in the area.

Shadow flicker is an impact that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker is an indoor phenomenon, which may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Outside in the open, light reaches a viewer (person) from a much less focused source than it would through a window of an enclosed room, and therefore shadow flicker assessments are typically undertaken for the nearby adjacent properties around a proposed wind farm site. Both the Northern Ireland and Republic of Ireland recommend that shadow flicker at dwellings within 500 metres of a proposed turbine location should not exceed a total of 30 hours per year or 30 minutes per day. Shadow flicker occurs only under certain, combined circumstances, as detailed in Chapter 5 of this EIAR. Where shadow flicker does occur, it is generally short-lived. The occurrence of shadow flicker can be precisely predicted using specialist computer software programmes specifically developed for the wind energy industry. The computer modelling of the occurrence and magnitude of shadow flicker is made possible by the fact that the sun rises and sets in the same position in the sky on every day each year.

There is a total of 4 No. buildings including occupied and unoccupied, located within a distance of 10 rotor diameters (assumed at 1,260 metres) from the proposed turbine locations. Of the 4 No. buildings, 3 are dwellings and 1 is derelict. There were no non-residential buildings to be included in the shadow flicker assessment. All 4 No. properties modelled may experience daily shadow flicker in excess of the DoEHLG guideline threshold of 30 minutes per day. This prediction is assuming worst-case conditions (i.e. 100% sunshine on days where the shadow of the turbines passes over a house, wind blowing in the correct direction, no screening present, etc.). These conditions are therefore likely to occur only very rarely, if ever. Of these, three are occupied by consenting landowners, and the remaining property is derelict. When the regional sunshine average (i.e. the mean amount of sunshine hours throughout the year) of 30% is taken into account, the DoEHLG total annual guideline limit of 30 hours is predicted to be exceeded at a single property. This property is occupied by a consenting landowner.

Impacts on human beings during the construction and operational phases of the proposed development are described in Chapter 5 of this EIA in terms of health and safety, employment and investment, population, land-use, noise, dust, traffic, tourism, shadow flicker, renewable energy production and reduction in greenhouse gas emissions, shadow flicker and interference with communication systems. Where a negative impact was identified, the appropriate mitigation measure is also described in this section of the EIA and will be put in place to ensure that there will be no adverse impacts on human beings within the Study Area. A cumulative impact assessment was also carried out.

Following consideration of the residual effects (post-mitigation), the proposed development will not result in any significant effects on human beings, population and human health. Provided that the proposed wind farm development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant effects on human beings, population and human health are not anticipated at international, national or county scale.

## **Flora and Fauna. Biodiversity**

Between 2013 and 2017, a range of specialist ecological survey work has been undertaken to provide comprehensive information on all ecological aspects of the location of the Proposed Development and the surrounding area. These surveys included detailed assessment of the site in terms of protected habitats and species. Aquatic assessments, bat surveys, mammal surveys (including Otter and Badger) and protected flora surveys were all undertaken. The studies and survey work undertaken provide a comprehensive inventory of the flora and fauna of the study area.

A desk study was undertaken for this assessment and included a thorough review of available ecological data pertaining to the site. Field surveys were undertaken throughout the survey period with general ecological walkover surveys and dedicated surveys for habitats and species including peatlands, aquatic and fisheries habitats and species, protected floral species, otter, badger, bats, and freshwater pearl mussel. Any potential impacts on flora and fauna were assessed following standard and recognized methodologies.

The desk study revealed that the site of the Proposed Development is located within an area that is dominated by upland forestry with some peatland and woodland habitats in the area also. The watercourses that arise in or pass through the site flow into sensitive watercourses that are designated for conservation as the Lough Foyle and

tributaries SAC and the River Finn SAC. These European Sites are designated for the protection of habitats and species including [3260] *Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation*, Salmon and Otter that are known to occur downstream of the site of the Proposed Development.

In addition, the cable route is located adjacent to the Lough Eske and Ardnamona Wood SAC. The SAC is situated downstream of the proposed works via the Lowerymore River. Freshwater pearl mussel are listed as a species of Qualifying Interests of the SAC. However, the population of freshwater pearl mussels is known to occur within the River Eske. The nearest record for pearl mussel is 4.4 km downstream (hydrological distance) of the Proposed Development at its closest point.

Although there are habitats of ecological significance within the study area, the development footprint is dominated by habitats considered to be of low ecological value such as Conifer Plantation (WD4), Wet grassland (GS4), Scrub (WS1) and Spoil and bare ground (ED2). A small percentage of the development footprint is located on peatlands of a higher ecological value. Works within watercourses are avoided entirely. Peatland and aquatic habitats were identified as key ecological receptors.

No otter breeding sites or holts were observed. The watercourses in the study area offer potential foraging and commuting habitat for the species. Low levels of bat foraging activity were recorded at the site of the Proposed Development. The watercourses within and downstream of the study area provide suitable habitat for Atlantic salmon. Freshwater pearl mussel was not recorded during the surveys that were undertaken in the Lowerymore River but are known from downstream in the Eske catchment. Otter, Atlantic salmon, freshwater pearl mussel, bats and other aquatic species were identified as key ecological receptors.

The potential for impacts on all key ecological receptors including designated sites was assessed and it was found that the proposed development in the absence of mitigation, has the potential to result in a number of negative impacts on the KERS. None of the impacts were assessed to be significant but the potential for moderate impacts on water quality was identified in the absence of mitigation.

A comprehensive suite of mitigation is proposed to minimise or avoid any impacts on any of the Key ecological receptors. The effects of the Proposed Development on the identified KERS following the implementation of mitigation were assessed. As per EPA 2002 criteria, effect significance of greater than Slight was not identified for any KER.

A review of other plans and projects that may have the potential to result in additional cumulative impacts on the identified KERS was undertaken. No connection between the proposed development and any other project or plan that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the proposed Meenbog Windfarm.

Taking into consideration the reported residual effects from other plan and projects in the area and the predicted effects with the current proposal, no residual cumulative effects have been identified with regard to any KER.

Following consideration of the residual effects (post-mitigation) it is noted that the Proposed Development on its own, will not result in any significant effects on any of the identified KERS. No significant effects on receptors of International, National or County Importance were identified.

The proposed wind farm development will be constructed and operated in strict accordance with the design, best practice and mitigation that is described within this application and as such, significant effects on ecology are not anticipated at any geographical scale on any of the identified KERs.

## **Ornithology**

This chapter assesses the likely significant effects that the proposed development may have on bird species. Firstly, a brief description of the proposed development is provided. This is followed by a comprehensive description of the methodologies that were followed in order to obtain the information necessary to complete a thorough assessment of the potential effects of the proposed development on bird species. The survey data is presented in full in the EIS/EIAR Appendices, with a summary of the information presented within this chapter. An analysis of the results is then provided, which discusses the ecological significance of the birds recorded within the study area. The potential effects of the proposed development are then described in terms of the construction, operation and decommissioning phases of the development. An accurate prediction of the effects is derived following a thorough understanding of the nature of the proposed development along with a comprehensive knowledge of bird activity within the study area.

The assessment of effects and the identification of Key Ornithological Receptors followed a precautionary approach. Bird populations of greater than Local and County importance were not identified.

The potential for effects designated sites is fully described in the Natura Impact Statement that accompanies this application. The findings presented in the NIS are that the proposed development, by itself or in combination with other plans and projects, in light of best scientific knowledge in the field, will not adversely affect the integrity of the relevant European sites and no reasonable scientific doubt remains as to the absence of such effects.

Based on the detailed assessment, it is considered that the potential effects of the proposed development upon birds will not be significant. Effects associated with habitat loss and fragmentation, disturbance, displacement, collision risk and cumulative effects have been assessed to be no greater than Long-term slight negative effect (EPA, 2002). Magnitude of potential effects for key avian receptors has been assessed as negligible to low significance while overall effect significance has been assessed as very low to low (Percival, 2003).

The implementation of the prescribed mitigation measures will render any potential effects on avian receptors to low significance. In conclusion, no significant effects as a result of the proposed development are foreseen on key ornithological receptors of the study area.

## **Soils and Geology**

The geology of the windfarm site predominately comprises peat over bedrock, weathered bedrock or very thin subsoils. Bedrock was found to directly underlie the peat at 12 of the 19 no. proposed turbine locations.

The peat depths recorded at 17 of the 19 no. turbine locations varied from 0 to 2.7m with an average depth of 1.3m. At the remaining 2 no. turbines T3 and T15 maximum peat depths of between 4.5 and 4.7m were recorded. With respect to the existing access roads peat depths are typically less than 2m with localised depths of up to 3.5m

recorded. With respect to the new proposed access roads, peat depths are typically less than 1.5m with localised depths of up to 5.8m.

Construction of the wind farm infrastructure will require the removal of peat, soil and rock to competent foundation. Excavation of bedrock from 3 no. proposed on-site borrow pits will provide material for access road, turbine bases and general hard-standing construction. Removal of soil, peat and bedrock represents a permanent direct impact on the geology of the site which is considered to be an acceptable part of economic progression and development.

During the construction phase sources of contaminants (such as oil based substances or other hazardous chemicals) will not be stored at the site except where this is done within safely bunded areas that safely contain all spillages and prevent the migration of contaminants into soil, peat and bedrock. Refueling will be done with a double skinned bowser with spill kits on the ready in case of accidental spillages. The risk is considered to be low once mitigation measures are implemented.

The peat stability assessment undertaken at the windfarm site shows that the site has acceptable risk with respect to peat movement/failure. A number of control measures are given in the peat stability assessment to manage all risks associated with peat instability that will make the site acceptable for wind farm development.

A Peat Management Plan has been prepared for the development which details management of peat during construction works and long term storage thereafter. Peat removed during the excavation works will be deposited in the proposed on-site borrow pits and also used for landscaping around the site. These methods will reduce the requirement for stock piling and prevent potential slope failure and erosion. Drainage and erosion prevention measures will be put in place at the peat storage areas. Overburden excavated along the grid connection route will be reinstated and tarmac cuttings will be removed off-site to a licenced waste facility.

A cumulative impact assessment with respect of the windfarm, its grid connection, its tree replanting site and other local developments was undertaken and no significant effects were identified and this largely due to the localised nature of the works and the fact that grid connection, the windfarm site and tree replanting site are located within three separate catchments.

With respect to potential health effects, wind farms are not a recognized source of pollution and so the potential for effects during the construction, operational and decommissioning phase are negligible.

No significant impacts on the soil and geological environmental are anticipated during the construction, operation or decommissioning of the proposed development.

## **Hydrology and Hydrogeology**

In terms of regional surface water catchments the windfarm site is located within the Mourne River catchment and a section of the grid connection cable route is also located within the Lough Eske catchment.

In terms of local hydrology the windfarm site is situated within the Mourne Beg River catchment, Glendorgan River catchments, River Derg catchment and the Lowerymore River catchment with the latter catchment only containing the grid connection cable.

Along with the local internal stream network, there are numerous manmade drains that are in place predominately to drain the forestry plantations. The integration of the proposed wind farm infrastructure with the existing forestry drainage in a manner that avoids water quality impacts in downstream water bodies is a key component of the wind farm design. The proposed grid connection follows existing roads and therefore no in-stream works are required where the route crosses a stream or river.

The bedrock underlying the site is classified as poor in terms of well water yield potential. The bedrock has little or no open cracks which means groundwater movement within the aquifer is very localised. Groundwater at the site can be classed as sensitive in terms of potential impacts from the proposed development. However, the majority of the bedrock is covered in peat which acts as a protective cover to groundwater quality. The low potential for pollutant travel within the bedrock groundwater makes surface water bodies such as streams more sensitive to pollution than groundwater at this site. There will be no impact on private wells as a result of the development.

Designated sites that receive surface water runoff from the proposed wind farm development or grid connection route include Lough Eske and Ardnamona Wood SAC and the River Foyle and Tributaries ASSI and SAC. These designated sites can be considered very sensitive in terms of potential impacts. Comprehensive surface water mitigation and controls are proposed to ensure protection of all downstream receiving waters. Any introduced drainage works at the site will mimic the existing drainage regime thereby avoiding changes to flow volumes leaving the site.

Due to the nature of wind farm developments, being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risk to groundwater at the site would be from hydrocarbon spillage and leakages at the borrow pits or during refueling. These are common potential impacts to all construction sites (such as road works and industrial sites). These potential contamination sources are to be carefully managed at the site during the construction and operational phases of the development and measures are proposed within the EIS to deal with these potential minor local impacts.

Two methods will be employed to control drainage water within the site during construction, thereby protecting downstream surface water quality and aquatic habitats. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt, to allow settlement and cleaning prior to its release. During the construction phase all runoff will be treated to a high quality prior to being released. There will be no risk of increased flooding down-gradient of the site as a result of the proposed development due to these drainage measures. Impacts on water quality during the construction phase of the wind farm will be imperceptible to none. A surface water monitoring programme will be put in place during the construction phase.

During the operational phase drainage control measures will ensure that surface runoff from the developed areas of the site will continue to be of good quality and will therefore not impact on the quality of down-stream rivers and streams. The present drainage regime of the site will not be altered in any way. No impacts on surface water quality are anticipated during the operational phase.

With respect to potential health effects, wind farms are not a recognized source of pollution and so the potential for effects during the construction, operational and decommissioning phase are negligible.

## **Air and Climate**

Due to the non-industrial nature of the proposed development and the general character of the surrounding environment, air quality sampling was not deemed to be a necessary part of the EIAR. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the immediate vicinity of the site.

The Proposed Development is unlikely to have a negative effect on local air quality. In fact, the production of energy from wind turbines has no direct emissions as is expected from coal- or oil-based power stations. Harnessing more energy by means of wind farms will reduce dependency on oil, gas and coal power stations, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment. Some minor indirect emissions associated with the construction of the wind farm include vehicular and dust emissions.

Emissions from energy production account for 23% of Ireland's greenhouse gas emissions, which is higher than the percentage produced by any other sector. By 2020, it is foreseeable that energy production emissions could be between 50% and 60% above 1990 Kyoto levels. The National Climate Change Strategy states that electricity generation from renewable sources provides the most effective way of reducing the contribution of power generation to Ireland's greenhouse gas emissions. The proposed development will generate energy from renewable technologies and assist in reducing carbon dioxide (CO<sub>2</sub>) emissions, thereby having a positive impact on climate.

The proposed wind farm development will give rise to total losses of 125,678 tonnes of carbon dioxide. This carbon dioxide will be lost to the atmosphere due mainly to the construction and operation of the proposed development. In terms of carbon savings, 145,696 tonnes of carbon dioxide will be displaced per annum from the largely carbon-based traditional energy mix by the proposed wind farm. Over the proposed twenty-five year lifetime of the wind farm, therefore, 2,798,370 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The 125,678 tonnes of CO<sub>2</sub> that will be lost to the atmosphere due to the construction and operation of the proposed development will therefore be offset by the proposed development after 16 months of operation.

## **Noise and Vibration**

AWN Consulting Limited has been commissioned to conduct an assessment into the likely noise & vibration impact of the proposed Meenbog wind farm development.

The existing noise climate has been surveyed for a minimum of two weeks at locations representative of the nearest noise sensitive properties and typical background noise levels for day and night periods at various wind speeds have been derived using best practice guidance. Prevailing noise levels are primarily due to local road traffic noise and other agricultural and anthropogenic sources in the area.

When considering a development of this nature, the potential noise & vibration effects on the surroundings must be considered for each of two distinct stages: the short-term construction phase and the longer-term operational phase.



Subject to good working practice during the construction phase and not exceeding any limits proposed within the Noise and Vibration chapter of the EIAR, it is anticipated that for most of the construction phase the associated noise and vibration will not cause any significant effects. During the construction of the grid connection there is the potential for some moderate effects that would be temporary in nature at noise sensitive locations near the proposed works.

Based on detailed information on the site layout, turbine noise emission levels and turbine height, noise levels have been predicted at the relevant noise-sensitive locations for a range of operational wind speeds. These predicted levels have been compared against the derived day and night time noise criteria that are based on the prevailing background noise levels in the area and best practice guidance. The assessment here considers the cumulative impact of other wind energy developments in the study area. The predicted noise levels associated with the operation of the proposed development is within the relevant best practice guidance noise criteria curves.

No significant vibration effects are associated with the day to day operation of the site.

In summary, the noise and vibration impact of the proposed development is not significant in light of current national guidance.

## **Landscape**

The Proposed Development has been designed to minimise landscape and visual effects as far as possible. Issues identified by the Planning Inspector and Donegal County Council have been taken account of where relevant.

With regard to landscape effects, direct changes to landscape fabric would only occur within the Site boundary, and would be of a moderate/minor level which would not be significant.

With regard to effects upon landscape character, whilst in the immediate vicinity of the site there would be a large scale change to the landscape over a limited area, the overall magnitude of change within LCA 40 Cashelnavern Border & Uplands would be moderate, resulting in a moderate – moderate / minor effect upon the LCA which would not be significant. The scale, location and design of the Proposed Development would not give rise to any community barrier effect. There would not be any significant effects upon any other landscape character areas.

The closest Area of Especially High Scenic Amenity to the Site covers the Bluestack Mountains and is located to the west of the site. Due to the limited potential for visibility of the Proposed Development from the AEHSA, and its location away from the focus of policy protection, the Proposed Development would not result in any significant effects upon the protected AEHSA. No significant effects would occur from any of the other smaller AEHSA within the study area.

The design process for the layout focussed on maintaining a clear separation between the protected view and the turbines, and also creating a simple and legible composition when viewed from the N15. A robust method based on best practice guidance has also been used to define what is within the protected view from the N15 across Lough Mourne to the Barnesmore Gap. Consequently, the proposed turbines would not detract from the protected view towards the Gap. They would not compete with the drama of the Gap or the scale of the enclosing hills. The setting and integrity of the

protected views towards the Barnesmore Gap, Lough Mourne and its hinterland would remain intact.

With regard to other visual effects, whilst the turbines would be visible from dwellings in the local area, effects would be mitigated by distance, the orientation of dwellings, the presence of screening, the relationship between the turbines and expansive scale of the landscape, and the context of more distant existing turbines within which they would be seen.

Considering the detailed assessment undertaken, the overall residential visual amenity of the local area would not be significantly affected, and the turbines would not appear visually obtrusive.

No significant visual effects would occur for road users or users of the recreational routes passing through the study area.

No significant cumulative effects would occur upon landscape character, the AEHSA or the protected view from the N15 across Lough Mourne towards the Barnesmore Gap.

Meenbog would not result in any significant cumulative effects for visual receptors in the study area due to the separation distance, intervening high ground and forestry between Meenbog and the operational, consented and proposed turbines.

Overall the extent of significant landscape and visual effects is very limited considering the scale of the proposal. The significant effects are fully reversible; when the wind farm is decommissioned at the end of the operational life, the turbines will be removed or replaced following a revised assessment of the impacts.

The changes arising from a proposed development may engender positive or negative responses depending on individual perceptions regarding the merits of wind energy development. The same project may be seen by some as attractive, acceptable and contributing to the well-being of the natural environment, while others may take a negative stance regarding the wind farm. The assessment has taken a precautionary approach in considering that all effects on the landscape and on views which would result from the construction and operation of the Proposed Development would be adverse, however not all people would consider the effects to be adverse and this may not be the case in every landscape situation

## **Cultural Heritage**

This report comprises an assessment of the potential impact of the proposed turbines and associated infrastructure, substation, and borrow pits, including proposed underground grid connection. The potential impacts on the surrounding archaeological, architectural and cultural heritage landscape were assessed. The assessment was based on desktop research, GIS analysis, view shed analysis to assess impacts on setting and detailed field survey. Through a detailed examination of the baseline data available and a detailed site inspection, it was concluded that the archaeological potential of the EIS study area boundary is low with no Cultural Heritage assets therein. No new sites were noted within the areas proposed for development, nor are any recorded archaeological or architectural assets located therein. Direct impacts to known assets such as recorded archaeological monuments and architectural heritage structures as a result of the proposed turbines, substation, associated infrastructure and borrow pit have not been identified.

Where potential impacts are possible such as effects on as yet unknown sub-surface features, appropriate mitigation measures have been recommended in order to minimise any such impacts. Recommended mitigation includes archaeological monitoring during the construction stage of the project in terms of potential direct impacts on sub-surface features (if present). Mitigation measures were also proposed along the grid connection route where the monuments may require fencing off during construction and monitoring of the cable route in the vicinity of monuments nearby.

Indirect impacts or effects on setting in the wider landscape will result in negligible, slight – negligible and slight to moderate the latter being the worst case scenario. Field assessment, GIS analysis, consultation with the ZTV and viewshed analysis was undertaken to assess impacts on setting. No significant negative effects on setting were identified. The significance of the impacts depends on factors such as the survival or otherwise of the monuments, their distance to the turbines being proposed as well as existing topography. An assessment of cumulative impacts was also undertaken and cumulative impact on setting is likely to increase when considering the proposed and operational wind farms together.

## **Material Assets**

### **Traffic and Transportation**

An assessment of the traffic effects of a proposed Wind Farm development, consisting of 19 turbines, located to the south of Balleybofey in County Donegal, was undertaken for both the construction and operational stages of the development. The assessment considered the impact that the traffic generated by the proposed development would have on the local highway network, and also an assessment of the route geometry with respect to being able to accommodate the abnormally large vehicles required to deliver the turbine plant.

The optimum route to the site was established to be by sea to the port of Killybegs, followed by road from Killybegs via the N56 National Secondary Road and the N15 National Primary Road. The site will be accessed from an improved existing junction on the N15 that provides for an existing quarry, located approximately 15 kms northeast of Donegal Town.

The types of vehicles that will be required to negotiate the local network will be up to 67.6 metres long with a blade length of 61.7 metres. A detailed assessment of the geometric requirements of the delivery vehicles was undertaken. Locations where it was established that the existing road geometry will not accommodate all of the vehicles associated with the proposed development are highlighted, with the extent of remedial works indicated on the route, and at the N15 access junction. In addition to the assessment presented, it is recommended that a dry run is undertaken by the transport company to check vertical and horizontal clearance on the transport route prior to construction.

In terms of daily traffic flows the impact of the development traffic will be as follows:

- During the 19 days that the concrete foundations will be poured at the same time as general site works are undertaken, it is forecast that traffic volumes will increase by 5.2% on the N15. During this period the effects on the network will be moderate and will be temporary.
- During the remainder of the site preparation and groundworks stage, traffic volumes will increase by 1.1% on the N15. During this stage the effects will be slight and will be temporary lasting for 363 days.

- On the 34 days that the wind turbine plant is delivered to the site 5 abnormal loads will travel on the network, which should be undertaken during night-time hours to avoid short period delays. On these days traffic volumes on the N15 will increase by 2.0. The effects will be slight (if undertaken during the night) to moderate (if delivered during the day) and will be temporary.
- For an additional 19 week days, an additional 60 PCU's will be generated on the study network increasing traffic volumes on the N15 by 0.8%. The traffic impact will be minimal on these days with the effects imperceptible.

Once the facility is operational the traffic impact created by the 2 permanent employees will be negligible.

## **Telecommunications and Aviation**

Wind turbines, like all large structures, have the potential to interfere with television or radio signals by acting as a physical barrier to microwave links.. The most significant effect however, at a domestic level, relates to a possible flicker effect caused by the moving rotor, particularly on television signals. The most significant potential effect occurs where the wind farm is directly in line with the transmitter radio path.

No interference issues or negative impacts on telecommunications were identified during the process of scoping and consultation.

## **Interaction of the Foregoing**

Chapters 5 to 14 of this EIA identify the potential significant environmental effects that may occur in terms of Human Beings, Population and Human Health, Biodiversity, Flora and Fauna, Birds, Land, Geology and Soils, Hydrology and Hydrogeology, Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage and Material Assets, as a result of the proposed wind farm development ('Proposed Development'). All of the potential significant effects of the Proposed Development and the measures proposed to mitigate them have been outlined in the preceding sections of this EIA. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them, or have a neutral effect.

A matrix is presented in Section 15 of the EIA to identify interactions between the various aspects of the environment already discussed in the EIS. The matrix highlights the occurrence of potential positive or negative effects during both the construction and operational phases of the Proposed Development. Interactions have been identified between effects on Population and Human Health with effects on Air and Climate, Hydrology and Hydrogeology, Material Assets and Landscape. Interactions have been identified between effects on Flora and Fauna with effects on Soils and Geology, Hydrology and Hydrogeology, Air and Climate and Landscape. Interactions have been identified between effects on Soils and Geology with effects on Hydrology and Hydrogeology, Air and Climate and Landscape. Where any potential interactive effects have been identified, appropriate mitigation is included in the relevant sections (Sections 5-14) of the EIA.