APPENDIX 5-1

Mitigation Measures

Mitigation Measures

This Appendix describes the mitigation measures that were implemented as part of the Meenbog Wind Farm, to mitigate any potentially harmful or negative effects associated with the Meenbog Wind Farm and the identified KERs. These mitigation measures are described in the preceding sections, and in **Section 6.5** of the submitted EIAR for Meenbog Wind Farm.

Mitigation by Avoidance

The Meenbog Wind Farm was designed to avoid ecologically sensitive areas where possible and has been constraint from the initial design phase. As such, Meenbog Wind Farm is located primarily within coniferous forestry and follows existing tracks where possible. All major infrastructure such as turbine bases, borrow pits, sub stations and construction compounds were located at a distance of over 50 meters from any watercourse. The requirement for any in-stream works in relation to any element of the Meenbog Wind Farm has been entirely avoided.

The project design has followed the basic principles outlined below to eliminate the potential for ecological effects on KERs where possible, and to minimise such effects where total elimination was not possible.

The Meenbog Wind Farm has been designed to avoid any direct impacts on European or Nationally Designated Sites by firstly ensuring that they are outside the boundary of the Meenbog Wind Farm and secondly ensuring that all major infrastructure is located at a distance where there was no potential for such effects.

The Meenbog Wind Farm has been specifically designed to minimise the potential for impacts on watercourses in any form as these provide a direct pathway for effect to downstream European Sites and other sensitive aquatic receptors.

The Meenbog Wind Farm has been designed to minimise effects on habitats that correspond to those that are listed on Annex I of the EU Habitats Directive outside of the European and Nationally Designated Sites.

The Meenbog Wind Farm has been specifically designed to avoid instream works to ensure no net loss of fish habitat or reduction in the ability or potential for fisheries and aquatic habitat to maintain fish stocks or the food of fish. There was no impediment to fish passage in any watercourse. The watercourse crossings proposed as part of the Meenbog Wind Farm allowed for fish movement upstream of the works. Any watercourse crossings required were installed outside of the salmonid spawning season, October to June in any year, in accordance with Inland Fisheries Ireland best practice (IFI, 2016). This ensured there was no potential for impacts on salmonid spawning habitat.

Whilst all major infrastructure is located over 50 meters from any watercourse, there were requirements for bankside works and the crossing of some watercourses with the site roads and the grid connection. When working in close proximity to any watercourses, the methods that were followed prevented any disturbance to the bankside habitats or the potential for any silt laden run off or other pollutants to enter any watercourse. The design of all infrastructure in areas close to watercourses provided for the continued passage of wildlife along the river corridors and thus avoided habitat fragmentation.

Mitigation through Best Practice

The project design of the Meenbog Wind Farm set out very clearly how the wind farm including the grid connection was constructed and operated in accordance with best industry practice to avoid any significant effects outside the site including the prevention of impacts on watercourses. Some of the key features of the environmental management strategy are provided below:

- A Construction and Environmental Management Plan (CEMP) has been prepared and is included as Appendix 3-2 of the rEIAR. The CEMP was in implemented prior to the start of the construction phase and was a working document. Best practice measures which form part of the design of the Meenbog Wind Farm are included in Chapter 3 of the submitted EIAR for the Meenbog Wind Farm.
- Machinery and materials were either parked/stored in the specified compound areas. Wherever possible, vehicles were refuelled off-site in designated areas. This was the case for regular, road-going vehicles.
- On-site refuelling of machinery was carried out using a mobile double skinned fuel bowser at dedicated locations away from watercourses.
- The fuel bowser, a double-axle custom-built refuelling trailer was towed around the site by a four-wheel drive jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that were used during the construction of the Meenbog Wind Farm. The jeep also carried fuel absorbent material and pads in the event of any accidental spillages.
- The fuel bowser was parked on a level area in the construction compound when not in use.
- Refuelling operations were carried out only by designated trained and competent operatives.
- Mobile anti-pollution measures such as drip trays and fuel absorbent mats were used during all refuelling operations.
- Materials excavated (e.g. peat, soil, gravel, or rock) during construction of the turbine bases, electrical sub-station, or during construction of new roadways or the upgrading works on existing roadways were reused within the site.
- Re-use of these materials within the site occurred under conditions where there was no possibility of the material becoming mobile in the environment and entering either surface or ground waters.
- The CEMP also provided for the appointment of a Site Supervisor/Construction Manager and/or Environmental Manager to maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. In addition, an Environmental Clerk of Works or Project Ecologist, Project Hydrologist, Project Geotechnical engineer visited the site regularly and reported to the Site Environmental Office. This structure provided a “triple lock” review/interaction by external specialists during the construction phase.

Flora and Fauna Mitigation Strategy

The site-specific mitigation strategy described in the sections below ensured compliance with legislation and national guidance. The study area is dominated by plantation forestry and mammal activity was generally low, with red deer the most commonly recorded mammal species during site visits.

Removal of Vegetation

In accordance with Section 40 of the Wildlife Acts 1976-2021woody vegetation removal was conducted outside the bird breeding season which runs from the 1st of March to the 31st of August inclusive. It should be noted that the provisions of Section 40 do not relate solely to birds, but a range of biodiversity that contributes to food chains and wider ecosystems.

Pre-construction Mammal Surveys

In accordance with NRA Guidance, pre-construction mammal surveys were undertaken to identify evidence of protected mammals (e.g. in particular Otter holts and Badger setts) within the works areas associated with the Meenbog Wind Farm. The survey was undertaken to ensure that such protected species have not taken up residence within or close to the Meenbog Wind Farm. If breeding or resting places were recorded in the pre-construction surveys a site-specific mitigation plan was prepared and agreed with the NPWS prior to the commencement of works. It was not anticipated that any protected mammal breeding/resting places were to be encountered or require to be excluded as part of the Meenbog Wind Farm based on the findings of the extensive surveys undertaken. However, if any breeding/ resting places were encountered during the pre-construction surveys, it was subject to exclusion procedures as outlined in the TII/ NRA guidelines (2006B).

Bats

Buffer Distances

Habitats within the Meenbog Wind Farm have limited value for bats. However, the Meenbog Wind Farm construction created linear features and spaces around each turbine, which may have provided favourable conditions for flying insects and foraging bats. Forest clearing was, at a minimum, observed at a 50m buffer distance as recommended by Natural England (2014). These vegetation-free areas will be maintained during the operational life of the Meenbog Wind Farm.

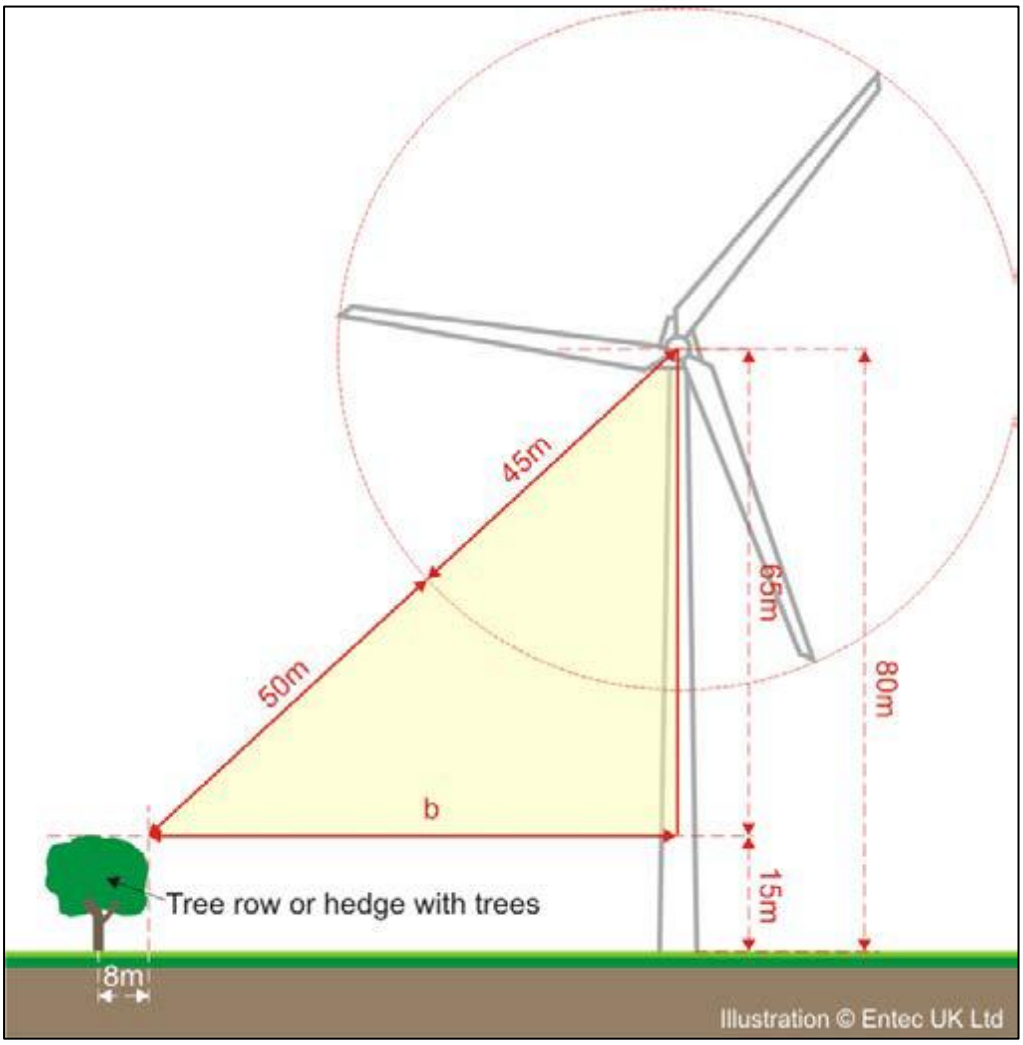

Figure 6.7: Calculation of buffer distances (from Natural England, 2014)

To minimise risk to bat populations our advice is to maintain a 50m buffer around any feature (trees, hedges) into which no part of the turbine intrudes. This means the edge of the rotor-swept area needs to be at least 50 m from the nearest part of the habitat feature. Therefore, 50m should be the minimum stand-off distance from blade tip to the nearest feature.

It is incorrect to measure 50 m from the turbine base to habitat feature at ground level as this would bring the blade tips very close to the canopy of a tall hedgerow tree and potentially put bat populations at risk. Instead, it is necessary to calculate the distance between the edge of the feature and the center of the tower (b) using the formula:

$$b = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

where: bl = blade length, hh = hub height, fh = feature height (all in metres). For the example above, b = 69.3 m (Figure 6.7).

Noise Restrictions

During the construction phase, noise limits, noise control measures, hours of operation and selection of plant items were considered in relation to disturbance of bats. In addition, plant machinery was turned off when not in use and all plant and equipment for use complied with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).

Lighting Restrictions

Lighting was avoided wherever possible. Where lighting was required, directional lighting was used to prevent overspill on to forestry edges. This was achieved through the use of lighting accessories, such as hoods, cowls, louvers and shields, to direct the light to the intended area only.

Mitigation to Protect Water Quality

It was noted that many of the identified KERs are aquatic in nature and the only pathway for effects that exists was via the potential for the Meenbog Wind Farm to result in effects on surface water. As such, the Meenbog Wind Farm has been designed to avoid such effects. All large-scale infrastructure such as turbines, site compound and borrow pit were located as far from watercourses as possible (mimimum of 50 m). The Meenbog Wind Farm site track layout was also designed to use existing forestry access tracks, thereby minimising the need for new watercourse crossings through the use of existing bridges. The best practice construction measures were designed to avoid impacts on watercourses both within the site and downstream. The Meenbog Wind Farm has been designed to maintain a drainage neutral situation to avoid drainage related impacts. The drainage management plan and all associated measures to minimise and prevent impacts on aquatic habitats are provided in Chapter 9 of this EIAR - Hydrology and Hydrogeology and also in the CEMP.

The Meenbog Wind Farm includes a detailed drainage plan that is included in full in Chapter 9 of the EIAR. This plan and all the associated measures have been taken into account in this assessment but are not included in full (to avoid repetition). The drainage design philosophy overall was to minimise surface water runoff arising on site, to adequately control and manage surface water runoff containing suspended solids and to ensure that the hydrological function of the watercourses on the site and wider catchment were not affected by the Meenbog Wind Farm. This philosophy including all associated mitigation measures to protect local surface water quality are fully described in Section 3.6 of Chapter 3 (Description of the Meenbog Wind Farm) and Chapter 9 (Hydrology & Hydrogeology) of this EIAR. The plan followed the detailed methods that were described in the CEMP in Appendix 3-4 of the EIAR. The detailed drainage plan covers all aspects of the Meenbog Wind Farm including the cable route and all stages of Meenbog Wind Farm from site clearance and tree felling through to decommissioning. A detailed surface water monitoring programme is included in the CEMP. The monitoring programme that is set out within the CEMP was designed to act as an early warning system to safeguard against failure of the mitigation to operate as anticipated. It was therefore designed to prevent any impacts occurring as a result of the failure of the prescribed mitigation.

The NRA *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes* and the Scottish Natural Heritage (SNH) *Good Practice During Wind Farm Construction* was implemented in the construction phase of the Meenbog Wind Farm.

The following measures have been implemented in the Meenbog Wind Farm to prevent the transportation of silt laden water or pollutants from entering the wider environments including downstream watercourses.

- Short sections of trench were excavated at any one time and backfilled at the end of each day to avoid large areas of unconsolidated soil around the works area at any one time. The works area was reinstated in sections as the Meenbog Wind Farm moves along.
- Excavated material were either stored in a neat pile adjacent to the trench or removed using a trailer to a suitable stockpile site that is located where there was no potential for run off to a watercourse.

- Upon filling the trench, the surface was reinstated either with a road surface or grass verges, was sown with grass seed to consolidate the soil and prevent run off.
- When working in any area where there is the potential for run off of pollutants/silt to an adjacent watercourse, a silt fence was constructed in order to prevent the pathway for any such run off.
- There was no release of suspended solids to any watercourse as a direct or indirect result of the Meenbog Wind Farm.
- No watercourse was interfered with as part of the Meenbog Wind Farm. No temporary instream crossings or temporary culverting took place. Instream works did not take place.
- During periods of heavy precipitation and run-off, works were halted or working surfaces/pads were provided to minimise soil disturbance.
- Any requirement for temporary fills or stockpiles were covered with polyethylene sheeting to avoid sediment release associated with heavy rainfall.
- Directional/horizontal drilling was only necessary at four crossings. Turbidity was monitored upstream and downstream of the crossing points and all drilling works ceased if there was a 20% variance between the upstream and downstream readings.

Mitigation to Prevent the Spread of Invasive Species

Rhododendron was recorded within the survey area. Due to the legislative requirements to control the spread of noxious weeds and non-native invasive plant species, it was important that any activities associated with the planning, construction and operation of wind farm developments complied and will comply with the requirements of the Wildlife Acts, 1976-2012. Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) (S.I. 477 of 2015) include legislative measures to deal with the dispersal and introduction of Invasive Alien Species (IAS), which are listed in the Third Schedule of the regulations.

Regulation 49 deals with the prohibition on introduction and dispersal of certain species while Regulation 50 relates to prohibition on dealing in and keeping certain species (Regulation 50 has not yet been commenced). Invasive species are listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) (S.I. 477 of 2015).

The introduction and/or spread of invasive species such as Himalayan Balsam, Giant Rhubarb or Rhododendron for example, could result in the establishment of invasive alien species and this may have negative effects on the surrounding environs. Appropriate spread prevention measures have been incorporated into the design of the project and are described in the following subsections.

Control Measures for the Management of Invasive Species

The following measures addressed the potential effects associated with the construction phase of the project:

- An outline Invasive Species Management Plan is presented in Section 4.9 of the CEMP. This was further developed following a preconstruction invasive species survey of the Meenbog Wind Farm. This report described the best practice measures to be adhered to during the laying of the cable route in proximity to identified stands of invasive species. Good construction site hygiene was employed to prevent the introduction and spread of invasive alien plant species (e.g. Himalayan balsam, Japanese knotweed etc.) by thoroughly washing vehicles prior to leaving any site.
- All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) was thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species.
- All washing was undertaken in areas with no potential to result in the spread of invasive species. This process is detailed in the contractor's method statement.
- Any soil and topsoil required on the site was sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.
- All planting and landscaping associated with the Meenbog Wind Farm avoided the use on invasive shrubs such as Rhododendron.