Bracklyn Wind Farm

Schedule of Mitigation Measures

Bracklyn Wind Farm Limited

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Contents

1.0 Introduction

Galetech Energy Services (GES) has prepared this collated and consolidated Schedule of Mitigation Measures in respect of the proposed Bracklyn Wind Farm.

The proposed development; which comprises a wind farm, its connection to the national electricity grid, and all associated ancillary development, traverses the administrative boundary between County Westmeath and County Meath; and is located c.16km east of Mullingar, c.4km south of Delvin and c.5km north of Raharney.

The proposed development will include:-

- 9 no. wind turbines with an overall tip height of 185m, and all associated ancillary infrastructure;
- Upgrades to the turbine component haul route;
- Construction of a 110kV electricity substation and installation of 6.3km of underground electricity line between the proposed substation and the existing Mullingar-Corduff 110kV overhead electricity line; and
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure.

1.1 Purpose of this Report

This report has been prepared to provide a concise document of all mitigation measures proposed within the proposed Bracklyn Wind Farm Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS).

Article 8(a)(4) of the Environmental Impact Assessment (EIA) Directive 2014/52/EU states:-

> *'...Member States shall ensure that the features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment are implemented by the developer...'*

This document therefore provides a list of all mitigation measures proposed within **Volume I** of the EIAR (**Section 1.3** below), along with those proposed in the NIS (**Section 1.4** below), which will be implemented during the pre-construction, construction, operational and decommissioning phases of the development.

1.2 Mitigation Measures

Bracklyn Wind Farm Limited ('the Applicant') can confirm that all mitigation measures outlined below will be implemented except as may be required in order to comply with conditions of consent.

It should be noted that a number of the below measures will be supervised and overseen by personnel who have not yet been appointed. Such personnel include:-

- Project Supervisor for the Construction Stage (PSCS);
- Civil Works Contractor;
- Electrical Works Contractor;
- Turbine Component Delivery Contractor;
- Ecological Clerk of Works;
- Environmental Manager; and
- Archaeological Clerk of Works.

Prior to the commencement of development, each of the above will be procured by the Applicant who will have ultimate responsibility for the implementation of all mitigation measures.

1.3 Environmental Impact Assessment Report (EIAR) Mitigation Measures

Environmental Impact Assessment Report – Schedule of Mitigation Measures		
Topic	**Mitigation Measure**	**Timing of Implementation**
Description of the Proposed Development	It is proposed that, where possible, concrete, aggregates and other materials for turbine foundations shall be sourced locally, which will reduce the total distance travelled by HGVs drawing construction materials to the subject site (see **Chapter 13**) and associated emissions (see **Chapter 8**).	Construction
Description of the Proposed Development	Peat, soil, subsoil, rock and vegetation removed during construction of turbine foundations will be appropriately stockpiled (see **Chapter 6**) and, in so far as is practicable, re-used to reinstate the foundation and provide additional ballast. Any excess material arising will be utilised for reinstatement purposes (e.g. for landscaping or the creation of trackside berms) elsewhere within the proposed development site or deposited at the dedicated spoil deposition areas.	Construction
Description of the Proposed Development	Access tracks will be unsealed and constructed of crushed stone material to allow for permeability. While initial site investigations do not indicate the presence of any significant volumes of rock on site, any material arising from the excavation of foundations etc. will, where possible, be reused in the construction of access tracks	Construction
Description of the Proposed Development	Where it is necessary for access tracks to cross these drains/watercourses, the relevant bodies (e.g. Inland Fisheries Ireland, Office for Public Works (OPW)) will be consulted prior to construction. As appropriate, a Section 50 Licence application will be made to the OPW prior to the installation of culverts/bridging structures over relevant watercourses.	Construction
Description of the Proposed Development	All on-site electrical and communications cables will be placed underground and be of a solid polymeric construction with either aluminium or copper conductors. All electrical cables will follow the alignment of the on-site access tracks, insofar as is practical. Trenching will be by a mechanical digger. The proposed depth of the cable trench is 1m with a width of 0.5m. The excavated material from the excavation of trenches will be side-cast alongside the trench and reinstated following the laying of cables.	Construction
Description of the Proposed Development	Wastewater from the control building will be stored in a sealed tank and will be tankered off-site as required by a local licensed waste collector.	Construction / Operation
Description of the	Temporary portaloo chemical toilets to be provided for construction staff will be	Construction

Proposed Development	sealed units to ensure that no discharges escape into the local environment. These will be supplied and maintained by a licensed supplier.	
Description of the Proposed Development	Potable water (for drinking, food preparation, hand washing etc.) will be supplied on-site through water dispensers which will also be sourced and maintained by a licensed supplier.	Construction
Description of the Proposed Development	Stormwater which may arise from the roofs of cabins, containers or from sealed bunds will be passed through an oil interceptor prior to being discharged to the local environment.	Construction / Operation
Description of the Proposed Development	The construction compound will be marked out and fenced to prevent encroachment onto non-designated areas. Following the completion of all construction activities, the compound will be decommissioned with all structures removed and fully re-instated. Reinstatement will involve removing crushed stone and underlying geotextile, covering with topsoil and reseeding.	Pre-Construction / Construction / Decommissioning
Description of the Proposed Development	The substation compound will be surfaced with free-draining crushed stone such that rainwater can percolate to ground. Given the nature of the subsoil environment in the surrounding landscape, it is likely that all aggregate material will be imported to the proposed development site from local quarries (see **Chapter 13**).	Construction
Description of the Proposed Development	A rainwater harvesting system will be implemented and wastewater will be stored in a sealed foul holding-tank and removed from site by a local licensed waste collector.	Construction / Operation
Description of the Proposed Development	Launch and receptor pits will be excavated at either side of the crossing (Horizontal Directional Drilling) to accommodate the drilling rig. The bore will be at a depth of 3m to ensure that there are no impacts on the road's structural integrity and stability, and there will be no surface expression following the reinstatement of the launch and receptor pits. Marker posts will be placed at either side of the road to indicate the location and alignment of the electricity line.	Construction
Description of the Proposed Development	Prior to the commencement of drilling operations, the appointed contractor will prepare a detailed method statement outlining the precise methodology to be followed. This statement may be reviewed as necessary by the Local Authority.	Pre-Construction / Construction
Description of the Proposed Development	It is proposed to develop 2 no. spoil deposition areas where excess peat, soil and subsoil which cannot be utilised for reinstatement or is unsuitable for landscaping purposes on site, will be stored permanently. Spoil will be transported to these	Construction

	locations where it will be placed in layers in accordance with best-practice methods, including supervision of the works by a geotechnical engineer or appropriately competent person. Appropriate drainage management measures will be implemented to ensure that the deposited spoil does not become waterlogged.	
Description of the Proposed Development	It is proposed that the smaller (western) deposition area will be used to store peat material while the larger (eastern) area will accommodate soil and subsoil. Facilitating the storage of peat in this way will negate the requirement for transportation off-site to an approved waste disposal facility and reduce the number of vehicle movements associated with the proposed development at the construction phase.	Construction
Description of the Proposed Development	Works at the spoil deposition areas will be monitored, on a weekly basis during the construction phase and monthly for a six month period thereafter, by an appropriately qualified geotechnical engineer.	Construction / Operation
Description of the Proposed Development	The implementation and management of temporary works, which will be fully reinstated following the delivery of turbine components, will be agreed in advance with the relevant local authority prior to the movement of any abnormal loads in the form of a Traffic Management Plan and/or Abnormal Load Permit application, as is the normal course. Should any mature vegetation be removed at any location, it will be replaced with plants of a similar size/maturity to match existing growth.	Pre-Construction / Construction
Description of the Proposed Development	The carriageway structure will be formed, and subsequently paved, using materials approved by the Local Authority and carried out to the required specification. At certain locations along these roads tree pruning will be required. Construction Method Statements for the proposed temporary and permanent works at each location will be prepared prior to the commencement of construction and agreed, in writing, with the Local Authority.	Pre-Construction / Construction / Operation
Description of the Proposed Development	During the delivery of turbine components to site, all HGVs will be accompanied by escort vehicles. An Garda Síochána will also be informed prior to turbine component transportation as, due to proposed HGV manoeuvres (contra-flow and reversing), it will be necessary to temporarily close junctions as the components pass through.	Pre-Construction / Construction
Description of the Proposed Development	Only fully licensed quarries which have been subject to EIA and have appropriate planning permission for the volumes of material to be extracted will be used. Suppliers will be instructed to utilise the extensive national and regional road networks to access the site and to avoid local roads insofar as possible.	Construction

Description of the Proposed Development	Construction works will be carried out in accordance with the 'Land & Soil' and 'Water' assessments and mitigation measures included in the EIAR in order to prevent any likely significant effects on nearby watercourses by debris, silt and hydrocarbons (see **Chapters 6** & **7**). These measures have also been implemented in the Natura Impact Statement (NIS) which accompanies the planning application.	Construction
Description of the Proposed Development	All surface water runoff from stockpiles (including the spoil deposition areas), excavations or from dewatering operations will be passed through an appropriate attenuation train, including silt fences (also known as silt curtains) and silt traps (also known as silt/settlement/sediment/stilling ponds). Other surface water protection measures which may be implemented, as appropriate, include straw bales, silt bags and siltbusters.	Construction
Description of the Proposed Development	Surface water control measures will be implemented as construction progresses through the site; however, prior to the commencement of earthworks, temporary silt/sediment control infrastructure (e.g. straw bales) will be placed in agricultural drains around the site until the full range of construction phase measures are installed.	Pre-Construction / Construction
Description of the Proposed Development	The installation of surface water runoff measures will avoid any discharge of silt or sediment laden waters directly to any surface water feature prior to being fully treated. At the point of discharge, buffered outfalls (or level spreaders) will be installed to ensure that erosion or scouring does not occur.	Construction
Description of the Proposed Development	Stormwater drainage infrastructure will be installed around the control buildings and transformer plinth to capture any runoff from concrete areas, will be passed through an oil interceptor before being discharged to an agricultural drain. Discharge rates will be designed to mimic greenfield runoff rates thus avoiding any long term alteration to the hydrological regime of the proposed development site.	Construction / Operation
Description of the Proposed Development	The construction phase will be supervised by a range of environmental and engineering specialist personnel including a Project Supervisor for the Construction Stage (PSCS), Ecological Clerk of Works (ECoW), Archaeological Clerk of Works (ACoW), among others, who will liaise closely with the appointed Contractor's on-site Environmental Manager to monitor and to ensure that all applicable measures are implemented.	Construction
Description of the Proposed Development	The construction phase of the development will comprise a 6 no. day week with normal working hours from 07.00 to 19.00 Monday to Friday and 07.00 to 13.00 on	Construction

	Saturdays. It may be necessary to undertake works outside of these hours to avail of favourable weather conditions (e.g. during time of low wind speed to facilitate turbine erection etc.) or during extended concrete pours (e.g. where turbine foundation pours must be completed within 24 hours). Where construction activities are necessary outside of the normal working hours, local residents and the Planning Authority will receive prior notification.	
Description of the Proposed Development	A detailed Construction & Environmental Management Plan (CEMP) will be prepared in advance of all construction activities and will incorporate all mitigation measures proposed in the EIAR.	Pre-Construction / Construction
Description of the Proposed Development	The reinstatement of the site entrance will comprise the erection of post and rail fencing, gates and the planting of hedgerows. Hedgerows will be appropriately located to allow for future growth while ensuring, at all times, that appropriate visibility splays are maintained during the operational phase.	Construction / Operation
Description of the Proposed Development	Deliveries of turbine components will take place at times to avoid peak traffic periods, and are likely to occur during night-time hours. All abnormal loads will be accompanied by an advance escort vehicle.	Construction
Description of the Proposed Development	Traffic mitigation measures will be implemented during the construction phase, as follows:- • Signage at site entrances giving access information; • Temporary traffic restrictions kept to minimum duration and extent; • Diversions put in place to facilitate continued use of roads, where restrictions have to be put in place; • Construction traffic management – one way systems where possible and strictly enforced speed limits (particularly along the L1504 and L5508); • Provision of a designated person to manage access arrangements and act as a point of contact to the public; • All temporary road alterations and public road upgrades to be carried out in full consultation with the Local Authority; and • No hedgerows or potential breeding habitats to be removed during the breeding season.	Construction
Description of the Proposed Development	Waste will be generated during the operational phase including, for example, cooling oils, lubricating oils and packaging from spare parts or equipment. All waste will be removed from site and reused, recycled or disposed of in accordance with	Operation

	best-practice and all regulations in a licensed facility.	
Description of the Proposed Development	A Decommissioning Management Plan will be agreed with the Local Authority in advance of decommissioning works. Further details on the decommissioning phase and specific mitigation measures are provided in each chapter of the EIAR as they relate to each environmental topic.	Operation / Decommissioning
Description of the Proposed Development	Topsoil will be removed from the required area and side cast for temporary storage adjacent to the compound area. The compound base will be made up of well graded aggregates, compacted as necessary. A designated waste management area and fuels and chemicals storage area will be provided along with site offices, parking, staff welfare facilities and equipment storage areas. The compound will be fenced with temporary security fencing to restrict access. Following the completion of the construction phase, the temporary construction compound will be fully removed and the compound will be reinstated with excavated material and reseeded.	Construction / Operation / Decommissioning
Description of the Proposed Development	During the construction phase, temporary stockpiles of excavated materials will be stored appropriately in designated areas of the site (a minimum of 50m from nearby watercourses or drains), in order to minimise the risk of silt laden surface water runoff entering surrounding water courses. All surface water runoff from stockpiles, excavations or from dewatering operations will be passed through an appropriate attenuation mechanism, such as a silt trap or stilling pond. Other surface water protection measures which may be implemented as appropriate include silt fences, silt bags and siltbusters. Silt or sediment laden waters will not discharge directly to any surface water features and will be appropriately attenuated before being discharged in a manner which ensures that erosion does not occur, for example via buffered outfalls.	Construction
Description of the Proposed Development	Storage areas for oils, chemicals and fuels will comprise bunded areas of hardstand of sufficient capacity within the temporary construction compound. Bunds will have a watertight roof structure and will be supplied by a licensed manufacturer to enable adequate safe storage for the quantities of material required. An adequate supply of spill kits will be readily available in order to clean up any minor spillages should they occur.	Construction
Description of the Proposed Development	A hydrocarbon interceptor will be installed within the surface water drainage system during the construction phase to trap any hydrocarbons that may be present. A 50m buffer will be observed around all surface water features and no fuel/chemicals shall	Construction

	be handled or stored within this zone.	
Description of the Proposed Development	From the construction compound, fuel will be transported to works area by a 4x4 in a double skinned bowser with drip trays under a strict protocol and carried out by suitably trained personnel. The bowser/4x4 will be fully stocked with spill kits and absorbent material, with delivery personnel being fully trained to deal with any accidental spills. The bowser will be bunded appropriately for its carrying capacity. As above, a 50m buffer will be observed around all surface water features and no refuelling will be permitted within this zone.	Construction
Description of the Proposed Development	Wind turbine foundations shall be grubbed up to a depth of 1m below ground level using conventional mechanical diggers. Exposed rebar and holding down bolts shall be burned off and removed off site to an approved waste handling facility for recycling or disposal. The broken concrete can be processed to provide an aggregate material to be used elsewhere in construction projects. Alternatively it may be used on site as an inert fill to make up levels as part of a wider decommissioning/restoration plan, reducing the need for the importation of additional soil onto the site. Excavations shall be backfilled with excavated material, soiled over and seeded out.	Decommissioning
Description of the Proposed Development	Hardstands shall be grubbed up to a depth of 1m below ground level and the excavated material shall be used to regrade the hardstand area to match existing ground contours and profile. Additional inert material derived from demolition in other areas of the site may be used if sufficient material is available. Once the area has been profiled to match the surrounding ground, 50mm of topsoil shall be spread over the reinstated area. This area shall then be seeded out. If it is decided not to retain the access tracks on site for agriculture purposes, then these shall be removed using a similar methodology.	Decommissioning
Description of the Proposed Development	Excavations shall be carried out to expose any cables buried in trenches to a depth of 1m below ground level and the cable removed. The majority of cables used in wind farm construction contain a core of either copper or aluminium. Both of these materials can be recycled. Any cable off-cuts shall be removed off site to an approved waste handling facility where the cores shall be recycled and the remaining material shall be disposed of at an approved facility. Excavations carried out to expose cables shall be backfilled with excavated material, soiled over and seeded out.	Decommissioning

Description of the Proposed Development	The decommissioning of the meteorological mast will involve the removal of wind measuring equipment, the separation of the lattice mast sections and their removal from site for re-use in other projects or for recycling. The mast foundations shall be grubbed up to a depth of 1m below ground level and the excavated material shall be used to re-grade the area to match existing ground contours and profile. Excavations shall be backfilled with excavated material, soiled over and seeded out.	Decommissioning
Description of the Proposed Development	A monitoring period of 2-years immediately following the decommissioning and restoration activities will be implemented. The monitoring period allows for the subject site to experience seasonal changes and to determine if additional restoration works are required. If, during this time, any failure of works or reinstatements carried out were to occur, they shall be made good using similar methods as described above, or as agreed with the Local Authority.	Decommissioning
Population & Human Health	As identified above, a suite of measures has been agreed with involved landowners regarding the management of agricultural activities during the construction phase. These measures have been incorporated into signed legal agreements and will be implemented in full.	Construction
Biodiversity	Avoidance of sensitive aquatic areas where possible by implementing a 50m construction zone buffer.	Construction
Biodiversity	As described in **Chapter 3** of the EIAR, specific mitigation measures, incorporated into the design of the development and through implementation of best practice methodologies will be employed where work inside buffer zones is proposed.	Construction
Biodiversity	Works for stream crossings will be carried out during the working window for instream works. This working window is defined by Inland Fisheries Ireland (IFI) as July to September to avoid vulnerable spawning salmonids/lamprey that may be present in downstream environments outside of this window. Any works outside of this period would require a derogation under the Local Authorities (Works) Act, 1949.	Construction
Biodiversity	There will be no crossing of rivers or streams by machinery during the construction phase, other than by constructed access routes, and all machinery must remain within the works corridor and utilise designated access routes.	Construction
Biodiversity	There will be no direct dewatering to watercourses during the construction phase. All outflows from drainage associated with construction will be by diffuse overland	Construction

	drainage at appropriate locations and through settlement ponds.	
Biodiversity	For locations where works will be undertaken within water protection buffer zones (i.e. within 50m of watercourses), double silt fences will be installed around the watercourse to prevent sediment/silt infiltration into the watercourse.	Construction
Biodiversity	Cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and will not be permitted to discharge to any waters.	Construction
Biodiversity	Appropriate bunded storage area for storage of fuels/oils, with onsite storage of hydrocarbons to be kept to a minimum.	Construction
Biodiversity	Mobile double skinned fuel bowser will be used for re-fuelling on-site.	Construction
Biodiversity	No refuelling will be permitted at works locations within the 50m hydrological buffer.	Construction
Biodiversity	Spill kits will be readily available to deal with any accidental spillage.	Construction
Biodiversity	There is an outline emergency plan for the construction phase to deal with accidental spillages.	Construction
Biodiversity	Ready-mixed concrete will be brought to site, with no batching of wet-cement products occurring on site.	Construction
Biodiversity	Where possible pre-cast products will be installed, including all watercourse crossings.	Construction
Biodiversity	Use of wet-cement products within the hydrological buffer will be avoided, insofar as possible.	Construction
Biodiversity	Lined cement washout ponds will be used for chute cleaning, with minimal use of water take will imported onto the site.	Construction
Biodiversity	No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be permitted.	Construction
Biodiversity	Wastewater emanating on-site (sewage, waste-water from site office) will be taken off-site for disposal/treatment at controlled facilities. To this effect, welfare facilities for construction site workers will include self-contained port-a-loos with an integrated waste holding tank. No water will be sourced on the site, nor will any wastewater be discharged to the site.	Construction
Biodiversity	A Sustainable Drainage System (SuDS) will be implemented to manage surface	Construction

	water taking account of water quantity (flooding), water quality (pollution) and biodiversity (wildlife and plants). This SuDS will adopt the following elements:- • Open constructed drains for development run-off collection and treatment; • Infiltration interception drains for upslope 'clean' water collection and dispersion; • Flow attenuation and filtration check dams to reduce velocities, with consideration given to gradient with drains to determine spacing requirements; and • Settlements ponds and buffered outfalls to control and store development runoff to allow settlement prior to discharge at Greenfield runoff rates. No outflow will be permitted directly into natural watercourses.	
Biodiversity	The site drainage and attenuation system will be installed prior to the main construction activities, and includes excavation of drainage ditches and installation of settlement ponds and soakaways. The site-specific drainage scheme is required to attenuate, hydraulically (flow) and hydrochemically (pollutants), the projected increase in runoff of c. 20.4 m^3/day (worst-case scenario) that will arise from the creation of additional areas of hardstanding.	Pre-Construction / Construction
Biodiversity	Both proposed spoil deposition areas are located outside the 50m stream buffer zone.	Construction
Biodiversity	Silt fences, straw bales and biodegradable matting will be used to control surface water runoff for deposition areas.	Construction
Biodiversity	Deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff.	Construction
Biodiversity	In order to avoid run-off of silt-laden water impacting upon water quality within surface water features adjacent to the works corridor, reinstatement works including measures to re-vegetate disturbed areas through re-seeding and/or placement of saved turves will be undertaken immediately after construction works.	Construction / Operation
Biodiversity	During construction, turves will be stored separately from spoil (soil/rock). Separate storage of turves will ensure vegetation is not significantly damaged and that turves can be replaced as a top-mat to facilitate rapid re-instatement of the surface vegetation, thereby significantly reducing the likelihood of soil erosion and the likelihood of silt laden surface waters affecting water quality.	Construction

Biodiversity	To ensure control measures are implemented appropriately, an Ecological Clerk of Works (ECoW) and Environmental Manager will be employed for the duration of the construction works.	Construction
Biodiversity	There are 2 no. locations where proposed bat feature buffers would extend into important woodland habitats, including Annex I bog woodland at T10 and oak-birch-holly woodland at T11. However, these areas of woodland will be retained and additional post-construction monitoring for bats will be undertaken at these locations.	Construction / Operation
Biodiversity	For sections of newly proposed access track, a 5m buffer from woodland and treelines has been implemented within which there will be no excavation work, tracking of heavily plant or storage of materials. Measures required to protect watercourses (e.g. erection of silt fence) will be permitted. If for unforeseen circumstances during the course of construction works any of these activities are required to occur within the buffer an appropriately qualified arboriculturist will undertake a pre-construction assessment to ensure impacts to vegetation are avoided. This 5m treeline/woodland buffer will be implemented along sections of access track running in improved grassland to T10/T11 and from T4 to T5.	Pre-Construction / Construction
Biodiversity	To avoid widespread disturbance to habitats, access within the proposed development site will be restricted to the footprint of the proposed works corridor and no access between different parts of the proposed development will be permitted, except via the proposed works corridor.	Construction
Biodiversity	An ECoW will be employed throughout the construction phase to ensure that construction activities do not encroach, unnecessarily, into any important habitats.	Construction
Biodiversity	Best practice guidelines will be employed during construction to ensure that non-native species are not spread and, where feasible, are controlled. In particular, it is proposed to implement measures to control the presence of cherry laurel between turbines T10 and T11. Details of proposed measures to control cherry laurel are provided within the Habitat Management Plan at **Annex 5.6** of the EIAR.	Construction
Biodiversity	To avoid non-native species being introduced to the site, quarry material will be sourced from licensed quarries, and certification that materials do not contain invasive species will be required.	Construction
Biodiversity	A pre-construction walkover survey of the works corridor will confirm the presence of	Construction

	any invasive non-native species that may have escaped into the area since the baseline surveys were conducted.	
Biodiversity	As part of the iterative design process (embedded mitigation), areas of old growth woodland have been avoided and will be retained. These areas were identified as important for woodland birds, especially breeding woodcock as well as a range of Amber listed breeding passerines.	Pre-Construction / Construction / Operation / Decommissioning
Biodiversity	To avoid widespread disturbance to birds, access within the proposed development site will be restricted to the footprint of the proposed works corridor and no access between different parts of the site will be permitted except via the proposed works corridor.	Construction
Biodiversity	Construction will be timed to commence outside the bird breeding season (March to August inclusive). This does not preclude construction continuing during the breeding season, but would allow sensitive bird species to choose nesting sites away from sources of potential disturbance.	Construction
Biodiversity	Where removal of suitable nesting habitat is required to facilitate the works, habitat clearance works will be undertaken prior to the 1st March in the construction year.	Construction
Biodiversity	Vegetation removal required for creation of bat feature buffers around turbines will be undertaken outside the bird breeding season.	Pre-Construction / Construction
Biodiversity	Once vegetation has been removed within the works corridor, these areas will be retained in a condition that limits suitability for nesting birds for the remainder of the construction phase. Any areas of potential cover, particularly cover for ground nesting species, will be rendered unsuitable by cutting vegetation or tracking over with an excavator.	Construction
Biodiversity	Should the clearance of vegetation suitable for nesting birds be required during the bird breeding season, the relevant vegetation will be surveyed in advance by the ECoW (with ornithological survey experience).	Pre-Construction / Construction
Biodiversity	Any construction works proposed during the breeding bird season will be preceded by a survey and will ensure the implementation of buffer zones (if nests/territories are identified) and measures required in order to avoid disturbance. Particular attention will be given to sensitive bird species (including breeding raptors and waders).	Construction
Biodiversity	If works are scheduled to commence in February, a pre-construction visit will be	Pre-Construction /

	required to monitor potential lapwing breeding sites in the tillage fields surrounding T2 and T3, as this species can be present on territories early in the season (late-February/early March).	Construction
Biodiversity	An appropriate 30m standoff will be maintained from the spoil storage and the felling area for T4. Proposed excavation for cabling running along this tree line to the meteorological mast will be buffered by 30m from sett entrances.	Construction
Biodiversity	In order to avoid accidental disturbance during the construction phase, a pre-construction walkover survey of the proposed development site will be undertaken. If any mammal resting places are identified, then appropriate exclusion zone(s) will be implemented and construction activities will be timed to avoid sensitive periods for the species affected, i.e. the breeding season.	Pre-Construction / Construction
Biodiversity	Although during baseline surveys, no mammal resting places were identified within the footprint of the proposed development or proposed felling areas, a pre-construction walkover survey will be undertaken prior to commencement of construction.	Pre-Construction
Biodiversity	Pre-construction/felling surveys will cover all suitable habitat for protected mammals including within 50m of the works corridor for badgers and red squirrel, 100m for pine martin and 150m for otter. The aim of the surveys is to identify the resting sites of protect mammals and implement appropriate exclusion zone buffers, if required.	Pre-Construction
Biodiversity	During the breeding season (December to June inclusive), no construction works should be undertaken within 50m of active badger setts, nor blasting or pile driving within 150m of badger active setts.	Construction
Biodiversity	Out of the breeding season (July to November, inclusive), the following restrictions will apply: • No heavy machinery should be used within 30m of badger setts (unless carried out under licence); • Lighter machinery (generally wheeled vehicles) should not be used within 20m of a badger sett entrance; and • Light work, such as digging by hand or scrub clearance should not take place within 10m of badger sett entrances.	Construction
Biodiversity	Exclusion zones of 30m around all sett entrances will be marked off prior to commencement of construction. Exclusion zones will be appropriately signposted	Pre-Construction / Construction

	and will be marked out using fencing posts and rope.	
Biodiversity	To avoid the period of time when badgers are particularly sensitive to disturbance (birthing and raising young cubs); no heavy construction works, including tree felling will be undertaken during the badger breeding season (December to June inclusive) within 100m. Therefore, all felling and heavy construction works for the proposed electricity substation will be undertaken in July to November inclusive.	Construction
Biodiversity	Other sett identified adjacent to the T2 hardstand and southern-most deposition area were identified as outlier setts (i.e. not maternity setts) and the 30m exclusion zone buffer will be maintained. The status of these setts will be confirmed during pre-construction walkover surveys.	Pre-Construction
Biodiversity	Construction works to be largely limited to daylight hours thus allowing nocturnal animals like badgers and otters to forage through the night.	Construction
Biodiversity	The risk of mammals becoming trapped if falling into excavations will be minimised through the provision of egress points, e.g. placing escape planks or spoil runs.	Construction
Biodiversity	Pre-construction roost surveys will be undertaken to identify and protect any bats occupying roosts in vegetation earmarked for removal.	Pre-Construction
Biodiversity	Any trees identified as supporting moderate to high PRFs within the works corridor will be targeted with further surveys, including emergence/re-entry surveys and/or roost inspections (using endoscopes and thermal imaging cameras). Surveys will determine occupancy, the type of roost (e.g. maternity, hibernation, mating, transitional), species using the roost and the level of occupancy. Surveys will be conducted by appropriately experienced ecologists.	Pre-Construction / Construction
Biodiversity	For any occupied bat roost sites, where vegetation removal is proposed, these surveys will inform a derogation license application process (from the NPWS) to undertake appropriate mitigation actions, as required, to ensure the conservation of bats. Such actions could include measures to exclude bats from potential roost holes prior to vegetation removal and provision of alternative roost sites.	Pre-Construction / Construction
Biodiversity	Trees requiring felling, and identified as having moderate-to-high PRF, where surveying proves inconclusive will be 'soft felled', as outlined in the NRA (2005) guidelines[1]. This procedure must be carried out in suitable weather conditions, at an	Pre-Construction / Construction

1 NRA (2005). Guidelines for the Treatment of Bats prior to the Construction of National Road Schemes. Environmental Series on Construction Impacts, Transport Infrastructure Ireland

	appropriate time of year, and involves:- • Removing the tree in sections, starting with the top branches and then working down the trunk trying to avoid cutting through cavities; • Any sections with PRFs must be lowered with care and laid on the ground with potential entrances to roosts orientated upwards to allow bat to vacate the roost; and • Sections must be left in situ for at least 24 hours in suitable weather conditions to allow any bats to disperse.	
Biodiversity	For any occupied roost sites where vegetation removal is not proposed, an exclusion zone will be implemented to prevent disturbance during times of occupancy. **Error! Reference source not found.** of the EIAR provides optimal time periods for works at different roost types and, therefore, by extension, restrictive periods for construction works during which the exclusion zone for construction work would be applicable. The extent of the exclusion zone can be up to 30m for any notably disruptive works such as piling/rock breaking; however, this measure should be proportional to the disturbance levels emanating from the construction activity.	Construction
Biodiversity	Mitigation measures will be implemented to limit kestrel foraging activity around turbines. This will be achieved through habitat management targeted at reducing prey availability in an area of 80-100m around turbines, as follows:- • Creating a uniformly short/cropped vegetation structure maintained through grazing/mowing will support less prey items (rodents/birds); • Or, alternatively, seasonally uniform vegetation heights can be maintained to facilitate silage production or oil seed rape; • Timber and brashed material resulting from felling for bat feature buffer will be removed. Any remaining tree stumps will be chipped down to ground level; • Finely chipped wood and spoil will, as necessary, be broadcast to create a flat surface for re-seeding; and • Any open field/forestry drains must be piped and filled over.	Operation
Biodiversity	Post-construction monitoring, including turbine searches will be undertaken (see **Section Error! Reference source not found.** of the EIAR) and if golden plover collisions	Operation

- TII (formerly NRA), Dublin. Available at: https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Bats-during-the-Construction-of-National-Road-Schemes.pdf

	are detected, then contingency measures to reduce the attractiveness of the site will be implemented. This will involve limiting the amount of tillage around turbine locations, specifically T2 and T3 under the current management regime.	
Biodiversity	For kestrels the provision of nest boxes is proposed as a compensatory measure to increase productivity in the area and offset the potential negative effects of direct effects during the operational phase. This type of enhancement measure is considered appropriate for kestrels, as this species often struggles with inter-specific nest site competition, e.g. interaction with buzzards. Provision of nest boxes at selected sites around the periphery of the proposed development is proposed to provide this species more nesting options in the area.	Operation
Biodiversity	The habitat enhancement proposed for the area of bog woodland between T10 and T11, will ensure the protection of woodland habitats for breeding woodcock and habitat management measure will improve cover and create foraging opportunities.	Operation
Biodiversity	Overall connectivity between existing woodland and linear features will be retained throughout the operational phase of the proposed development. As detailed at Annex 5.6 re-placement planting of treelines and hedgerows will be undertaken to compensate for length removed during infrastructural felling. Likewise, compensatory measures are proposed to offset loss semi-natural woodland through the enhancement measures in woodland adjacent to the proposed development.	Operation
Biodiversity	The primary mitigation measure employed to avoid collision and barotrauma in bats relates to the design of the proposed development to avoid features utilised by foraging/commuting bats. As recommended by the Natural England (2014) [2] guidelines, which have been adopted by SNH *et al*. (2019)[3], a 50m separation distance from habitat features used by bats and the blade tips of wind turbines must be maintained as the minimum bat feature buffer. Buffers are provided as the distance from turbine towers to the feature, with the separation distance being dependent on feature heights in relation to turbine dimensions.	Construction / Operation
Biodiversity	To implement 50m bat feature buffers, vegetation removal is required at T4, T5, T6, T7, T10 and T11. The proposed felling areas are illustrated in **Error! Reference source not**	Construction / Operation

2 Natural England (2014). *Bats and onshore wind turbines: Interim Guidance* 3rd Ed. Natural England Technical Information Note TIN051, Natural England, Peterborough
3 Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, University of Exeter & Bat Conservation Trust (2019). *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*.

	found. of the EIAR, along with the 83m to 104m bat features buffers to demonstrate that the 50m separation is achievable.	
Biodiversity	In order to avoid affecting important woodland habitats, bat feature buffers will not impinge into areas recognised as Bracklin Wood at T5, Annex I bog woodland at T10 and oak-birch-hazel woodland at T11.	Construction / Operation
Biodiversity	The area where trees/scrub is cleared to create the bat feature buffers will be rendered as unfavourable for bats as possible, and maintained as such over the lifetime of the proposed development. Felled timber and branches will be removed, with stumps brashed to ground level. Any excess spoil from excavation works during construction, which cannot be accommodated within the proposed spoil deposition areas can be broadcast to cover over any ground stumps and create a more homogeneous surface. To prevent the area scrubbing up, a mowing and/or grazing regime will be implemented as part of the Habitat Management Plan.	Operation
Biodiversity	As illustrated in **Annex 5.5** (**Appendix 3**) of the EIAR, Annex I bog woodland, oak-birch-holly woodland and an area of Bracklin Wood within the proposed bat feature buffers for T10, T11 and T5 respectively, will be retained within the buffers.	Operation
Biodiversity	Compensatory planting of hedgerow/treeline habitat will specifically target areas where connectivity will be affected, including the area around T4, T2 hardstand, NW edge of felling area for substation. Options for replacement locations are provided at **Annex 5.6** of the EIAR and the overall length of candidate target section for re-planting amounts to 2,314m.	Construction / Operation
Biodiversity	Areas of commercial forestry which have been felled to accommodate the proposed development (infrastructure) will be replaced by replanting at an alternative site in accordance with the Forest Service's published policy on granting felling licences for wind farm developments.	Construction / Operation
Biodiversity	SNH *et al*. (2019) acknowledge that it is difficult to predict how bat behaviour will change post-construction and this supported by Richardson *et al*. (2021)[4] studying turbine mediated bat fatalities at 23 wind farm sites across the UK. Therefore, further mitigation informed by post-construction monitoring may be required. One such option is smart curtailment, whereby turbines identified in high-risk locations by post-	Operation

4 Richardson, S.M., Lintott, P.R., Hosken, D.J., Economou, T. & Mathews, F. (2021). Peaks in bat activity at turbines and the implications for mitigating the impact of wind energy developments on bats. *Scientific Reports* 11

	construction monitoring are feathered to run at < 2rpm, while optimal flight conditions for bats occurs.	
Biodiversity	Any requirement for smart curtailment, and the parameters that would influence it, must be guided by a coherent and comprehensive post-construction monitoring methodology, which will clarify the bat usage of the site at turbine locations post-construction, the likely relationship with temporal and weather parameters, and will identify any potential collisions (noting the difficulties highlighted above in predicting how bat usage of the site may change post-construction).	Operation
Biodiversity	In order to avoid accidental disturbance to the resting places of protected mammals including badgers, otters, red squirrels and pine martens; construction activities will be preceded by an ecological walkover survey of the proposed works corridor, including the grid connection route and bat feature buffers.	Construction
Biodiversity	In order to limit accidental disturbance to bat roosts during construction; prior to works commencing trees within the works corridor previously assessed as supporting moderate to high PRFs will be re-assessed. Initially this will involve a ground level visual assessment, which will be followed up by inspections under licence and re-entry/emergence surveys, as required.	Pre-Construction / Construction
Biodiversity	Construction works conducted during the bird breeding season will require pre-construction nesting bird surveys to avoid disturbance breeding birds. If nests are identified ongoing monitoring will be implemented to ensure protection measures (exclusion zone buffers) are implemented and to determine when works can proceed, once the breeding attempted is completed.	Construction
Biodiversity	In order to verify the efficacy of pollution prevention and mitigation measures during construction, water quality monitoring will be undertaken in accordance with the proposals enclosed at **Annex 3.8** of the EIAR.	Construction
Biodiversity	Given the presence of Annex 1 habitats within the vicinity of the proposed development, it is deemed to be prudent to undertake monitoring to ensure that construction activities do not adversely impact on the quantity or quality of this habitat.	Construction
Biodiversity	Prior to construction, eight permanent quadrats (10x10m squares) will be set up within the area of Annex I bog woodland between T10 and T11 for long-term vegetation monitoring. To ensure quadrates can be relocated on subsequent visits,	Pre-Construction / Construction

	accurate grid references will be taken and marked. Quadrats will be distributed through the habitat to sample central areas and areas around the edge of the bog woodland.	
Biodiversity	Baseline conditions will be established pre-construction and for each quadrat:- Photographs will be taken to visually document any changes in site conditions over time; Vegetation type will be recorded; • All species present will be listed, together with an indication species abundance, both in terms of % cover and rating on the DOMIN scale; • The presence of both positive and negative indicator species for the habitat type will be noted; • Other factors including peat depth, vegetation height, ground conditions and management will be recorded; and • Assessment criteria for bog woodland will follow those detailed in Cross & Lynn (2013)[5].	Pre-Construction / Construction
Biodiversity	During the construction phase, surveys will be repeated to ensure that the habitat is not impacted by construction works, especially by any drainage in the vicinity of T10 and the access track leading to T11.	Construction
Biodiversity	Post-construction surveys will be undertaken in Years 1, 2, 3, 5 and 10 and surveys will be undertaken by a suitably qualified botanist and at the optimal time of year for surveying bog woodland.	Operation
Biodiversity	The aim for bat feature buffers around turbines is to ensure that habitats are as featureless as possible to discourage foraging bats, as well as potential prey species for kestrels. Initially this will require regular monitoring in Years 1, 2 & 3 to ensure vegetation clearance measures and ongoing management result in the desired habitat conditions. Once the optimal conditions have been created (after Year 3) the habitat will continue to be maintained in this manner.	Operation
Biodiversity	A three-year post-construction monitoring programme is proposed for bats (SNH *et al*. 2019), with monitoring in Years 1, 2 & 3. Monitoring is designed to evaluate the success bat feature buffers at reducing bat activity levels in the vicinity of turbines.	Operation

5 Cross, J. & Lynn, D. (2013). Results of a monitoring survey of bog woodland. *Irish Wildlife Manuals*, No. 69. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

	As detailed at **Annex 5.5** of the EIAR, post construction monitoring will involve bat activity surveys and fatality monitoring, which incorporates turbine searches along with monitoring of scavenger removal rates and searcher efficiency to generate estimates of 'real' rate of bat fatalities for the site.	
Biodiversity	Bat activity surveys will be undertaken in Years 1, 2 & 3 and will include:- • 3 no. seasonal deployments of static bat detectors deployed for a minimum of 10-nights in compliant weather conditions. Detectors will be deployed at each turbine location, with additional units used to gather activity data from the edge of bat feature buffers. The initial focus of the secondary detectors will be to monitor activity at T5, T10 and T11, targeting woodland edge that will be retained within bat feature buffers. Deployments will be set out to cover the following periods:- ○ early May and mid-June; ○ mid-June and mid-August; ○ early September; • A continuously recording bat detector will be deployed on the meteorological mast to simultaneously monitor bat activity at ground level (c. 2m) and at height (c. 50m); and • A fully automated weather station with 3G connectivity will be deployed to generate rainfall, wind speed and temperature data on a real-time basis. This can be supplemented or replaced with wind speed data collected from wind turbines and on-site metrological mast.	Operation
Biodiversity	Fatality monitoring will be undertaken in Years 1, 2 & 3 and will include searches within 65m of each turbine to detect any fatalities (and possibly injured bats) due to collisions/barotrauma events with operational turbines. Currently, there are no standardised methodologies for monitoring of wind farm collisions in Ireland. In the absence of a detailed methodology, a search area of 65m has been selected as studies monitoring collision have found that the core radius around turbines, where the majority of collision casualties fall, is within 50m of turbines (Johnson et al. 2003 & Arnett 2006). This is comparable to the 100x100m suggested by SNH et al. (2019), however it is important to note that flying objects struck by turbines can be thrown and/or blown considerably further. Some monitoring regimes employ search radius equal to the height of the turbines, while for other studies, the area is extended to encompass the maximum theoretical throw distance - approximately 1.5 x the turbine height to tip. Applying this to turbines with max. a tip height is 185 m, would	Operation

	generate a very large, and unnecessary, search (r = 278 m).	
Biodiversity	In Year 1, searches will be conducted at all turbines, with a higher search frequency implemented at turbines where bat feature buffer are required, namely T4, T5, T6, T7, T10 and T11. Lower search frequencies will be employed at T1, T2 and T3. Turbines requiring searches in Years 2 and 3 will be determined by the bat activity levels recorded across the site in Year 1.	Operation
Biodiversity	High search frequencies will involve daily searches at selected turbines (T4, T5, T6, T7, T10, T11), with searches conducted on alternate days for turbines where lower search frequencies are required (T1, T2, T3). Search periods of 10-connective days or 5-alternate days (over 10-days) will be undertaken. The following search periods will be employed in Year 1:- • Spring (May to early June): two search periods of 10 days; • Summer (July): one search period of 10 days; and • Early Autumn (Aug/Sep): two search periods of 10 days. 3 no. of the search periods will be timed to overlap with the deployment of static bat detectors for a minimum of 5 nights at the high search frequency turbines.	Operation
Biodiversity	During the flight period for bats, searches will be undertaken using an appropriately trained dog team. All dog teams will have detection rates tested and scored. Given the diminutive stature of bats, detection rates using human searchers are notably unreliable. Trained wildlife detection dogs have been shown to be significantly more effective than humans in detecting fatalities from collision, especially in detection of bat carcasses.	Operation
Biodiversity	Searches will commence at dawn and the first turbine to be searched on a given survey day will be rotated over the search period/season. The commencement of searches at dawn is done to limit scavenging of any causalities from the preceding night, by diurnal species like hooded crow.	Operation
Biodiversity	Baited wildlife trip cameras will be deployed during each of the 5 no. 10-day search periods to determine scavenger species and how quickly carcasses are removed. A total of 6 no. cameras will be used for each deployment. To emulate bat carcasses, dark coloured mice carcases with be used to bait the camera traps.	Operation
Biodiversity	Post-construction bat monitoring reports will be submitted annually, based on coverage of an active bat season. The Year 3 report will constitute a full review of	Operation

	bat activity on the site, with reference to baseline conditions, and will make recommendations regarding the implementation of turbine curtailment.	
Biodiversity	Ornithological monitoring surveys will commence at the commencement of construction and will continue, post-construction, in Years 1, 2, 3, 4, 5, 10 &15.	Operation
Biodiversity	Surveys will be conducted, in accordance with SNH guidance[6], by a suitably experienced ornithologist and will include the following:- • Vantage point surveys; • Wider area breeding raptors surveys; • Breeding season surveys of 500m turbine buffer; and • Fatality monitoring (to be conducted conjunction with bat fatality monitoring).	Operation
Biodiversity	Prior to the commencement of development, a post-construction ornithological monitoring plan, and associated reporting requirements, will be agreed with the Planning Authority.	Pre-Construction
Land & Soils	The excavation of materials will be completed in accordance with best practice for the management and treatment of such materials.	Construction
Land & Soils	Bog mats will be used, as necessary, to support construction plant and machinery on soft ground, thus reducing the likelihood of peat, soil and subsoil erosion and avoiding the formation of rutted areas. This will substantially reduce the likelihood for surface water ponding to occur.	Construction
Land & Soils	Excavated soil will be side cast and stored temporarily adjacent to excavation areas for use during reinstatement and landscaping. Where material is not required for reinstatement or landscaping, it shall be immediately transported to the spoil deposition areas.	Construction
Land & Soils	Silt fences, and all necessary surface water management measures (including upslope interceptor drains), will be installed around all temporary stockpiles to limit movement of entrained sediment in surface water runoff. All slopes will be sealed with the bucket of an excavator.	Construction
Land & Soils	In order to minimise runoff during the construction phase, works will not take place during periods of intense or prolonged rainfall (to prevent increased silt laden runoff).	Construction

6 Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms.

	Drainage systems, as outlined in **Chapter 7** of the EIAR, will be implemented to limit runoff effects during the construction phase.	
Land & Soils	At the designated spoil deposition areas, material will be placed in layers to ensure stability is maintained and works will be undertaken in accordance with best practice construction methodologies. Works at the spoil deposition areas will be monitored, on a weekly basis during the construction phase and monthly for a 6 no. month period thereafter, by an appropriately qualified Geotechnical Engineer. In the event that any ground stability issues arise, the Engineer will have the power to cease works until such time as remedial works have been completed to his/her satisfaction.	Construction / Operation
Land & Soils	Permanently mounded soils and subsoils; for example, berms surrounding turbines and hardstands, berms located along access tracks and at the spoil deposition areas; will be seeded and grassed over at the earliest opportunity to prevent erosion.	Construction
Land & Soils	The electricity line (grid connection) trench will be reinstated to the required specification and in accordance with landowner requirements and will be reseeded or allowed to vegetate naturally (on agricultural land) or topped with tarmacadam (or similar along public roads) at the earliest opportunity to prevent erosion.	Construction
Land & Soils	Following the installation of the proposed end masts, excavated material will be reinstated, graded to match the surrounding ground profile and reseeded or allowed to vegetate naturally.	Construction
Land & Soils	The volume of fuels or oils stored on site will be minimised. All fuel and oil will be stored in an appropriately bunded area within the temporary construction compound. Only an appropriate volume of fuel will be stored at any given time. The bunded area will be roofed to avoid the ingress of rainfall and will be fitted with a storm drainage system and an appropriate oil interceptor.	Construction
Land & Soils	All bunded areas will have 110% capacity of the volume to be stored.	Construction
Land & Soils	On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled at the temporary compound and will be towed around the site by a 4x4 jeep to where plant and machinery is located. The 4x4 jeep will also be fully stocked with fuel absorbent material and pads in the event of any accidental spillages. The fuel	Construction

	bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations to avoid any accidental leakages.	
Land & Soils	All plant and machinery used during construction will be regularly inspected for leaks and fitness for purpose.	Construction
Land & Soils	Spill kits will be available to deal with any accidental spillages within the temporary construction compound and during re-fuelling.	Construction
Land & Soils	All waste tar material arising from road cuttings (from trenching in public roads and haul route upgrade works) will be removed off-site and disposed of at a licensed waste facility. Due to the potential for contamination of soils and subsoils, it is not proposed to utilise this material for any reinstatement works.	Construction
Land & Soils	An emergency plan for the construction phase to deal with accidental spillages is contained within the Outline Construction and Environmental Management Plan (**Annex 3.8** of the EIAR). This emergency plan will be further developed by the contractor prior to the commencement of construction.	Pre-Construction / Construction
Land & Soils	The substation transformer and oil storage tanks will be located in a roofed concrete bund capable of holding 110% of the stored oil volume. Turbine transformers will be located within the turbines, and any leaks will be fully contained within the turbine thus eliminating any pathway for leakages to affect land and soil.	Operation
Land & Soils	During decommissioning, it may be possible to reverse or at least reduce some of the likely effects caused during construction by rehabilitating construction areas such as turbine foundations and hardstanding areas. This will be done by removing wind farm infrastructure restoring disturbed ground with previously excavated material where possible.	Decommissioning
Land & Soils	Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some of the effects will be avoided by retaining some elements of the proposed development in place where appropriate; for example, access tracks within the site may be retained for agricultural and forestry uses. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.	Construction / Operation / Decommissioning

Land & Soils	During and post-construction all excavated or raised areas (i.e. cut and fill) and reinstated/landscaped ground, including the spoil deposition areas, will be inspected for signs of erosion and instability. These inspections will be undertaken on a weekly basis during the construction phase and monthly, for a six-month period, post construction.	Construction / Operation
Water	All surface water runoff will be directed to specially constructed swales surrounding all areas of ground proposed to be disturbed (including the area for the temporary storage of material).	Construction
Water	The swales will direct runoff into settlement ponds/silt traps where silt/sediment will be allowed to settle.	Construction
Water	Following the settlement of silt/sediment, clean water will be discharged indirectly to the local drainage network via buffered outfalls thus ensuring that no scouring occurs.	Construction
Water	The suite of surface water drainage infrastructure will include interception drains, collector drains swales, sedimats, flow attenuation and filtration check dams, settlement ponds/silt traps, and buffered outfalls.	Construction
Water	The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas where possible by using a 50m buffer. From the constraints map (**Annex 7.2** of the EIAR), it can be seen that apart from some sections of access track, the T7 hardstand, a section of the construction compound along, the north-western corner of the substation along with the watercourse crossing locations, the majority of the proposed development areas (including all turbine locations) are located outside of areas that have been assessed to be hydrologically sensitive. Specific mitigation measures, incorporated into the design of the development and through implementation of best practice methodologies (discussed below) will be employed where work inside buffer zones is proposed.	Construction
Water	Source controls to limit the likelihood for 'dirty water' to occur:- • Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with clean washed gravel, filter fabrics, and other similar/equivalent or appropriate systems; • Small working areas, covering stockpiles, weathering off stockpiles, cessation	Construction

	of works in certain areas or other similar/equivalent or appropriate measures.	
Water	In-Line controls to ensure appropriate management of silt laden water:- • Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems.	Construction
Water	Treatment systems to fully attenuate silt laden waters prior to discharge:- • Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.	Construction
Water	An extensive network of land drains already exists, and these will be integrated and enhanced as required and used within the wind farm development drainage system. The integration of the existing land drainage network and the proposed wind farm network is common practice in wind energy developments and will also result in benefits to surrounding agricultural lands.	Construction
Water	Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the proposed wind farm drainage into the existing site drainage network. This will reduce the likelihood for any increased risk of downstream flooding or sediment transport/erosion.	Construction
Water	Silt traps will be placed in the existing drains upstream of any streams where construction works is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area.	Construction
Water	During the operational phase of the wind farm, runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through stilling ponds and buffered outfalls onto vegetated surfaces.	Construction
Water	Buffered outfalls which will be numerous over the site will promote percolation of drainage waters across vegetation and close to the point at which the additional	Construction

	runoff is generated, rather than direct discharge to the existing drains of the site.	
Water	Drains running parallel to the existing roads that requiring widening will be upgraded. Velocity and silt control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles and silt fences will be used during the upgrade works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.	Construction
Water	A final line of defence can be provided by a water treatment train such as a "Siltbuster", if required. If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train (sequence of water treatment processes) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This water treatment train will apply for the entirety of the construction phase.	Construction
Water	Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be emplaced within drains down-gradient of all construction areas inside the hydrological buffer zones to provide an additional layer of protection in these areas.	Construction
Water	Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats (sediment entrapment mats, consisting of coir or jute matting) placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.	Construction
Water	During the initial placement of spoil in the deposition areas, silt fences, straw bales and biodegradable matting will be used to control surface water runoff. Drainage from overburden deposition areas will ultimately be routed to an oversized swale and a number of settlement ponds and a 'Siltbuster' with appropriate storage and	Construction

	settlement capacity, designed for a '1-in-100 year 6-hour return' period, before being discharged to the on-site drains.	
Water	Spoil deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff. Once re-vegetated and stabilised, soil/peat deposition areas will no longer be a likely source of silt laden runoff. Settlement ponds will be left in place until the areas have stabilised.	Construction
Water	Temporary silt fencing/silt trap arrangements will be placed within existing roadside/field drainage features along the grid connection to remove any suspended sediments from the works area. The trapped sediment will be removed and disposed at an appropriate licenced facility. The bare ground re-seeded/reinstated immediately and silt fencing temporally left in place if necessary.	Construction
Water	The works programme for the initial construction stage of the development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if prolonged or intense rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.	Pre-Construction / Construction
Water	The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities:- • General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates; • Meteo Alarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale; • 3 hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events; • Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3 hour record is given and is updated every 15 minutes. Radar images are not predictive; and,	Construction

	• Consultancy Service: Met Eireann provide a 24 hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.	
Water	Works will be suspended if forecasting suggests either of the following is likely to occur:- • >10 mm/hr (i.e. high intensity local rainfall events); • >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, • >half monthly average rainfall in any 7 days.	Construction
Water	Prior to works being suspended the following control measures will be completed:- Secure all open excavations; • Provide temporary or emergency drainage to prevent back-up of surface runoff; and, • Avoid working during heavy rainfall and for up to 24-hours after heavy events to ensure drainage systems are not overloaded.	Construction
Water	The construction of the site drainage system will be carried out, at the respective location, prior to other activities being commenced. The construction of the drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and functional for all subsequent construction works.	Pre-Construction / Construction
Water	Prior to the commencement of development, a detailed Site Drainage Plan and Surface Water Management Plan (SWMP) will be prepared to detail the siting and composition of the surface water management measures. The respective plans, which will form part of the detailed Construction Environmental Management Plan (CEMP), will be agreed in writing with the Planning Authority.	Pre-Construction
Water	The SWMP will also include a programme for the monitoring of surface waters in the vicinity of the construction site by a designated Environmental Manager. The monitoring programme will comprise field testing and laboratory analysis of a range of agreed parameters. The civil works contractor, who will be responsible for the construction of the site drainage system, and Environmental Manager will undertake regular inspections of the drainage system to ensure that all measures are	Pre-Construction / Construction

	functioning effectively. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.	
Water	Any excess build-up of silt levels that may decrease the effectiveness of the drainage feature, will be removed and disposed of in an appropriate manner.	Construction
Water	Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations, will be put in place.	Construction
Water	The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters to ensure that Greenfield runoff rates are mimicked.	Construction
Water	If required, pumping of excavation inflows will prevent build up of water in the excavation.	Construction
Water	The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit.	Construction
Water	There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur.	Construction
Water	Daily monitoring of wind farm excavations by the Environmental Manager will occur during the construction phase. If high levels of seepage inflow occur, excavation work at this location will cease immediately and a geotechnical assessment undertaken.	Construction
Water	A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as final line of defence if needed.	Construction
Water	The volume of fuels or oils stored on site will be minimised. All fuel and oil will be stored in an appropriately bunded area within the temporary construction compound. Only an appropriate volume of fuel will be stored at any given time. The bunded area will be roofed to avoid the ingress of rainfall and will be fitted with a storm drainage system and an appropriate oil interceptor.	Construction

Water	All bunded areas will have 110% capacity of the volume to be stored.	Construction
Water	On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled at the temporary compound and will be towed around the site by a 4x4 jeep to where plant and machinery is located. No refuelling will be permitted at works locations within the 50m hydrological buffer. The 4x4 jeep will also be fully stocked with fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations to avoid any accidental leakages.	Construction
Water	All plant and machinery used during construction will be regularly inspected for leaks and fitness for purpose.	Construction
Water	Spill kits will be readily available to deal with any accidental spillage.	Construction
Water	All waste tar material arising from road cuttings (from trenching or other works in public roads) will be removed off-site and taken to a licensed waste facility. Due to the potential for contamination of soils and subsoils, it is not proposed to utilise this material for any reinstatement works.	Construction
Water	An outline emergency plan for the construction phase to deal with accidental spillages is contained within the Outline Construction and Environmental Management Plan (**Annex 3.8** of the EIAR). This emergency plan will be further developed prior to the commencement of development, and will be agreed with the Planning Authority as part of the detailed CEMP.	Pre-Construction / Construction
Water	Measures to avoid contamination of ground and surface waters by wastewaters will comprise:-The provision of self contained port-a-loos (chemical toilets) with an integrated waste holding tank will be installed at the site compound, maintained by the providing contractor, and removed from site on completion of the construction works.	Construction
Water	Water supply for the site office and other sanitation will be brought to site and removed after use to be discharged at a suitable off-site treatment location.	Construction
Water	No water will be sourced on the site, nor will any wastewater be discharged to the	Construction

	site.	
Water	No batching of wet-cement products will occur on site. Ready-mixed concrete will be brought to site as required and, where possible, emplacement of pre-cast products, will take utilised.	Construction
Water	All watercourse crossings will utilise pre-cast products and the use of wet-cement products within the hydrological buffer will be avoided insofar as possible.	Construction
Water	Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. Chute cleaning will be undertaken at lined cement washout ponds with waters being tankered and stored in the temporary construction compound, removed off site and disposed of at an approved licensed facility. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.	Construction
Water	Weather forecasting will be used to ensure that prolonged or intense rainfall is not predicted during concrete pouring activities.	Construction
Water	The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.	Construction
Water	Where possible, all proposed new stream crossings will be clear span bridges (bottomless culverts) and the stream beds will remain undisturbed. No in-stream excavation works at the crossing locations are proposed and therefore there will be no impact on the stream at the proposed crossing location.	Construction
Water	Where internal wind farm electrical cabling of grid connection cabling will pass above or below the existing culvert and will not directly interfere with the culvert.	Construction
Water	At the time of construction, all guidance/best practice requirements of the Office of Public Works (OPW) or Inland Fisheries Ireland will be incorporated into the design/construction of the proposed watercourse/culvert crossings.	Construction
Water	As a further precaution, in-stream construction work (if/where required) will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites", i.e., May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff	Construction

	rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI).	
Water	During the near stream construction works (i.e. within the 50m buffer zone), double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase.	Construction
Water	All new or revised watercourse crossings (watercourses mapped on OSI mapping) will require a Section 50 license application to the OPW in accordance with the Arterial Drainage Act 1945. The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.	Construction
Water	Interceptor drains will be installed up-gradient of all infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader.	Operation
Water	Swales/road side drains will be used to collect runoff from access tracks, turbine hardstanding areas and substation compound areas which may contain entrained suspended sediment, and channel it to settlement ponds for sediment settling.	Operation
Water	Transverse drains ('grips') will be constructed, where appropriate, in the surface layer of access tracks to divert any runoff into swales/track side drains.	Operation
Water	Check dams will be used along sections of access tracks drains to intercept silts at source. Check dams will be constructed from a 40mm non-friable crushed rock or similar.	Operation
Water	Settlement ponds, emplaced downstream of track swale sections, turbine locations and the selected substation option, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses.	Operation
Water	Settlement ponds will be designed in accordance the greenfield runoff rate requirements.	Operation
Water	Imported rock for construction purposes and road surfacing will be strong, well-graded limestone which will be resistant to erosion and have a low likelihood to	Operation

	generate fines in hardstand runoff.	
Water	As in the construction phase, temporary surface runoff control measures will again be put in place during decommissioning works. The drainage system will remain operational during the decommissioning phase and will serve to treat any sediment laden surface water run-off due to a renewed disturbance of soils. Following decommissioning, re-vegetation will be implemented as soon as practicable and monitored to ensure vegetation is established.	Decommissioning
Air & Climate	A detailed Dust Minimisation Plan will be formulated prior to the construction phase of the project.	Pre-Construction
Air & Climate	Access tracks and public roads in the vicinity of the site shall be regularly cleaned to remove mud, aggregates and debris and maintained as appropriate. All road sweepers shall be water assisted.	Construction
Air & Climate	Any road that has the potential to give rise to fugitive dust shall be regularly watered, as appropriate, during dry and/or windy conditions.	Construction
Air & Climate	Vehicles delivering material with dust potential shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust.	Construction
Air & Climate	Public roads in the vicinity of the site shall be regularly inspected for cleanliness and cleaned as necessary.	Construction
Air & Climate	In the event of dust nuisance occurring outside the site boundary, movement of materials will be immediately terminated and satisfactory procedures implemented to rectify the problem before the resumption of operations.	Construction
Air & Climate	If issues persist and the above measures are not satisfactorily control dust emissions, a wheel washing system with rumble grids to dislodge accumulated dust and mud prior to leaving the site should be installed.	Construction
Air & Climate	During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.	Construction
Air & Climate	Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.	Construction

Air & Climate	The dust minimisation plan shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.	Construction
Air & Climate	At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.	Construction
Air & Climate	Best practice construction methods including just in time delivery methods to prevent material waste, reuse of on-site materials where possible and the minimisation of fuel use, including generators, will reduce construction related climate emissions.	Construction
Air & Climate	It should be noted that measures implemented during the construction phase are also relevant for the decommissioning phase.	Decommissioning
Landscape	The colour will be industry standard off-white/light grey semi-matt non-reflective finish.	Operation
Landscape	Transmission lines between individual turbines and the substation will be placed underground.	Construction / Operation
Landscape	Special care will be taken to preserve any features, insofar as possible, which contribute to the landscape character of the study area.	Construction / Operation
Landscape	Counter rotation of blade sets will be avoided.	Operation
Cultural Heritage	A post-consent pre-construction archaeological geophysical survey shall be carried out in all areas of land take associated with the proposed turbine bases and crane hardstands. The geophysical survey will be carried out under licence to the Department of Housing, Local Government and Heritage.	Pre-Construction
Cultural Heritage	Post-consent pre-construction test trenching shall be carried out in all areas of land take associated with the proposed turbine bases and hardstands, as well as along the access roads leading to Turbine 3 and Turbine 11. Test trenching will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed	Pre-Construction

	during test trenching. Test trenching will be cognisant of the results of the geophysical survey. Further recommendations, which may include preservation *in situ* or archaeological excavation, may be made on completion of the test trenching programme.	
Cultural Heritage	Archaeological monitoring of all excavations associated with construction of the proposed wind farm shall be carried out. Monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring.	Construction
Cultural Heritage	Archaeological monitoring of all excavations associated with the proposed grid connection shall be carried out. Monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring.	Construction
Cultural Heritage	Archaeological monitoring of all excavations associated with the proposed road upgrades shall be carried out. Monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring.	Construction
Cultural Heritage	Given their proximity to existing heritage features, it is recommended that micrositing should not be considered in respect of Turbine 3 or Turbine T11 should it result in turbines being moved closer to the Recorded Monuments in these two areas.	Construction
Noise & Vibration	Construction activities will be completed in accordance with the provisions, where relevant, of *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise* which offers detailed guidance on the control of noise & vibration from demolition and construction activities.	Construction
Noise & Vibration	The relevant practices to be adopted during construction shall include:- • Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; • Establishing channels of communication between the contractor/developer, Local Authorities and residents; • Appointing a site representative responsible for matters relating to noise and	Construction

	vibration; • Monitoring typical levels of noise and vibration during critical periods and at sensitive locations; and • Keeping site access tracks even to mitigate the potential for vibration from HGVs.	
Noise & Vibration	A variety of practicable noise control measures will be employed. These include:- • Selection of plant with low inherent potential for generation of noise and/or vibration; • Placing of noisy/vibratory plant as far away from sensitive properties as permitted by site constraints, and; • Regular maintenance and servicing of plant items.	Construction
Noise & Vibration	The various contractors involved in the construction phase will be obliged, under contract, to take specific noise abatement measures and comply with the recommendations of *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise*.	Construction
Noise & Vibration	No plant or machinery will be permitted to cause a public nuisance due to noise.	Construction
Noise & Vibration	The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.	Construction
Noise & Vibration	All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.	Construction
Noise & Vibration	Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.	Construction
Noise & Vibration	Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.	Construction
Noise & Vibration	Any plant, such as generators or pumps, which may be required to operate outside of general construction hours will be surrounded by an acoustic enclosure or portable screen.	Construction
Noise & Vibration	During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in **Table 11.6** using methods outlined in *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control*	Construction

	on construction and open sites – Noise.	
Noise & Vibration	The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations, including the delivery of construction materials, shall generally be restricted to between 07:00hrs and 19:00hrs Monday to Friday and between 07:00hrs and 13:00hrs on Saturdays, with no operations on Sundays or public holidays. However, to ensure that optimal use is made of good weather periods, at occasional critical periods within the construction programme (i.e. concrete pours, turbine component deliveries and turbine erection) or in the event of an emergency; activities may be necessary outside out of these hours.	Construction
Noise & Vibration	In the unlikely event that rock is encountered, rock breaking may be employed to utilise this rock in the construction of access tracks or hardstands.	Construction
Noise & Vibration	If rock breaking is required, the following measures will be implemented, where necessary, to mitigate noise emissions:- • Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency; • Ensure all air lines are sealed; • Use a dampened bit to eliminate a 'ringing' sound; • Erect an acoustic screen between compressors or generators and noise sensitive area. When possible, line of sight between top of machine and reception point will be obscured; and • Enclose the breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation.	Construction
Noise & Vibration	The level of vibration from construction activities shall be limited to the values set out in **Table 11.7** (**Chapter 11**) of the EIAR. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.	Construction
Noise & Vibration	Prior to the commencement of development a visual inspection (with photographic record) of all structures (buildings) within 50m of the L1504 and L5508 will be undertaken by a suitably qualified engineer to identify any pre-existing evidence of structural deterioration. A report on the visual inspection of each property will, on completion, be furnished to the respective property owners. During construction, it is	Pre-Construction / Construction

	also proposed to undertake occasional inspections to ensure the early identification of any adverse effects.	
Noise & Vibration	Following the completion of construction, a similar survey shall be completed and if a deterioration is identified and can be directly attributed to the construction of the proposed development, appropriate action will be immediately undertaken in agreement with the property owner and at the expense of the Applicant. The Planning Authority will also be advised of any necessary remedial work.	Operation
Noise & Vibration	As further level of protection to those properties located immediately adjacent to the L5508 (identified as H17, H24 and H77) where it is proposed to increase the width of the existing road carriageway, the following additional mitigation measures are recommended:- • Prior to the commencement of construction, a dilapidation survey of each property will be undertaken. This survey will form the basis of a report (to be furnished to the property owner) providing detailed description of the condition of the property; • Crack 'tell-tales' will be installed on any existing cracks that are of concern. These 'tell-tales' will allow the cracks to be carefully monitored and will indicate whether any movement or opening of the cracks has occurred. The tell-tales will be inspected regularly during construction; • A vibration monitor will be installed at each of the properties and will allow for actual vibration levels to be carefully monitored; ; • A speed limit of 20 km/h will be put in place for all construction traffic using the L5508 within 100m of each of the above dwellings; and • Following construction, a further dilapidation survey of the properties will be undertaken and furnished to the property owners. The results of this survey will be compared to that carried out prior to construction and can be used to determine if any damage has been caused to the properties.	Pre-Construction / Construction / Operation
Noise & Vibration	In the unlikely event that an issue with low frequency noise is associated with the proposed development, an appropriate detailed investigation, by an independent acoustic consultant, shall be undertaken. Due consideration shall be given to guidance on conducting such an investigation which is outlined in Appendix VI of the EPA document entitled *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4) (EPA, 2016). This guidance is based on the threshold values outlined in the Salford University document	Operation

	Procedure for the assessment of low frequency noise complaints, Revision 1, December 2011.	
Noise & Vibration	In the unlikely event that a complaint is received which indicates potential amplitude modulation (AM) associated with turbine operation, an independent acoustic consultant shall be employed to assess the level of AM in accordance with the methods outlined in the IOA Wind Turbine Noise Amplitude Modulation Working Group (AMWG) document *A Method for Rating Amplitude Modulation in Wind Turbine Noise* (IOA, 2016) or subsequent revisions, and suitable measures implemented as necessary.	Operation
Noise & Vibration	The mitigation measures to be implemented during the decommissioning of the proposed development are the same as those proposed for the construction phase of the development.	Decommissioning
Noise & Vibration	Construction phase monitoring of vibration levels will be undertaken in accordance with the methods described above and at **Section 11.6.1.2 (Chapter 11)** of the EIAR.	Construction
Noise & Vibration	Post-commissioning operational noise monitoring will be undertaken to demonstrate compliance with the relevant noise criteria. In relation to the assessment of operational phase wind turbine noise, the guidance outlined in the IOA GPG and *Supplementary Guidance Note 5: Post Completion Measurements* (July 2014) will be followed. Should the assessment identify any exceedances of the appropriate criteria, relevant corrective actions will be immediately implemented by the Applicant. An Outline Noise Monitoring Programme has been prepared and included at **Annex 11.9** of the EIAR.	Operation
Noise & Vibration	Decommissioning phase vibration monitoring will, as required, be undertaken in accordance with the methodology set out above for monitoring during the construction phase.	Decommissioning
Shadow Flicker	The wind turbines will each be fitted with shadow flicker curtailment software, inherent to their design, to facilitate their shut down as required. If the sun is shining, the software will turn off the turbine at the predetermined times when shadow flicker is predicted to occur based on the prediction model. This approach will be implemented, as necessary, to ensure that actual levels of shadow flicker do not exceed either of the relevant limits.	Operation
Shadow Flicker	Within 12-months of the commencement of commercial operations, a shadow	Operation

	flicker survey will be undertaken by a suitably qualified person to verify the results of the prediction model and to ensure the effective operation of the curtailment software. Monitoring will be undertaken when and where the model predicts shadow flicker is expected to occur.	
Shadow Flicker	A site visit will be carried out by a suitably qualified person during each calendar season, to obtain representative samples of year-round conditions, to monitor the site when shadow flicker is predicted to occur to verify the effectiveness of the technological solutions.	Operation
Shadow Flicker	Should any third party complaints be raised in respect of shadow flicker at any time during the lifetime of the proposed development, additional specific monitoring will be undertaken as per the methods described above.	Operation
Shadow Flicker	An Outline Shadow Flicker Monitoring Programme has been prepared and is provided at **Annex 12.4** of the EIAR. This programme will be further developed, and agreed in writing with the Planning Authority, as part of the discharge of pre-commencement conditions process.	Pre-Construction
Material Assets (Transport & Access)	Traffic movements will be limited to 07:00-19:00 Monday to Friday and 07:00–13:00 on Saturdays with no movements on Sundays or public holidays. It may be occasionally necessary to undertake works outside of these hours to avail of favourable weather conditions or during extended concrete pours. Where construction activities are necessary outside of the normal working hours, local residents and the Planning Authority will receive prior notification.	Construction
Material Assets (Transport & Access)	A wheel washing facility will be provided, as necessary, to prevent any debris being transferred from site to the adjacent public roads. All drivers will be required to ensure that their vehicle is free from dirt and stones prior to departure from the construction site. Where conditions exist for dust to become friable, techniques such as damping down of the affected areas will be employed and vehicles/loads will be covered to reduce dust emissions.	Construction
Material Assets (Transport & Access)	A Traffic Management Plan shall be agreed as part of the Construction Environmental Management Plan (CEMP) with the Local Authority prior to the commencement of development. The Traffic Management Plan shall include *inter alia* confirmed details of construction material haul routes; confirmed details of vehicle specifications; a materials delivery programme; traffic management measures including details of 'Stop/Go' systems, signage, road closures and	Pre-Construction / Construction

	diversionary routes; and road reinstatement details.	
Material Assets (Transport & Access)	All works to the public road shall be undertaken in consultation with, and agreed in advance with, the Local Authority.	Construction
Material Assets (Transport & Access)	All reasonable steps shall be taken to ensure that only national and regional routes are used to transport all materials to the site, in so far as is possible.	Construction
Material Assets (Transport & Access)	Prior to, and post, construction; pavement condition surveys and bridge surveys will be undertaken along all non-national access routes. Given the high-quality and well-maintained nature of motorways and national routes, it is not assessed as necessary to carry out surveys of these carriageways or structures along these routes. Following the completion of the pre-construction survey, any works which are assessed as necessary to facilitate the delivery of components and materials to the proposed development site shall be undertaken, while any deterioration of carriageways or structures identified in the post-construction survey shall be put right at the expense of the developer and to the satisfaction of the Planning Authority.	Pre-Construction / Construction / Operation
Material Assets (Transport & Access)	Adequate signage shall be provided at entrances providing access, safety and warning information.	Pre-Construction / Construction / Operation
Material Assets (Transport & Access)	Speed limit compliance; particularly along the L1504, L5508 and L80122; will be emphasised to all staff and contractors prior to the commencement of construction during site induction, and will be strictly enforced throughout the construction phase.	Construction
Material Assets (Transport & Access)	Sufficient car parking spaces will be available at the contractor's temporary depot/storage area during the construction phase. No parking of cars by persons associated with the proposed development will be permitted on any part of the public road that is not closed to traffic. All staff will be instructed to ensure that private entrances remain unobscured (particularly along the grid connection route).	Construction
Material Assets (Transport & Access)	Traffic restrictions shall be kept to minimum duration and extent.	Construction
Material Assets (Transport & Access)	Appropriate traffic management; including maintenance of local access, pedestrian access (where safe to do so) and diversions; shall be implemented to facilitate continued public use of roads where temporary traffic restrictions have to be put in place. Precise details of these measures will be detailed in the Traffic Management Plan to be agreed with the Planning Authority prior to the	Pre-Construction / Construction

	commencement of development.	
Material Assets (Transport & Access)	The timing of oversized loads shall be agreed with the relevant local authorities and An Garda Síochána, and all relevant licenses and permits shall be obtained in advance.	Pre-Construction / Construction
Material Assets (Transport & Access)	Maximum axle loadings for abnormal/oversized loads shall be strictly enforced in accordance with the Road Traffic (Construction and Use of Vehicles) Regulations 2003 (S.I. No. 5 of 2003).	Construction
Material Assets (Transport & Access)	A designated contact point and coordinator will be put in place to manage all access arrangements and to interface with the public and the Local Authority.	Construction / Operation
Material Assets (Transport & Access)	No hedgerows or potential breeding habitats to be removed during the summer breeding season.	Construction
Material Assets (Transport & Access)	The site shall be closed, and strictly secured, to the public during the construction phase.	Construction
Material Assets (Transport & Access)	The proposed turbine delivery and construction material haul routes will be monitored during construction to identify any damage which may have been caused by construction traffic. Where any damage has been caused by traffic associated with the proposed development, it shall be repaired by the appointed contractor as soon as possible.	Construction
Material Assets (Transport & Access)	A post-construction pavement and bridge survey will be undertaken to determine if any deterioration has occurred as a result of construction related vehicles. If a deterioration is identified, repair work shall be undertaken to the satisfaction of the Local Authority.	Operation
Material Assets (Aviation)	A minimum of 30 no. days prior notification will be provided regarding the commencement of crane operations at the proposed development site.	Pre-Construction
Material Assets (Aviation)	As is best practice and implemented as standard, warning lights will be fitted to cranes during the erection of the proposed wind turbines.	Construction
Material Assets (Aviation)	The proposed wind turbines will, as requested by the IAA and Department of Defence in their respective consultation responses, be fitted with aviation warning lighting in accordance with the specification to be agreed with the IAA and the	Operation

	Planning Authority.	
Material Assets (Aviation)	At a maximum of thirty days following the installation of all proposed turbines, 'as-constructed details' will be provided to the IAA to allow for the updating of mapping charts, including:- • The number of wind turbines; • WGS-84 coordinates of each turbine; • Ground elevation of each turbine (Malin Head OD); • Blade tip elevation of each turbine (Malin Head OD); • Height of Turbine; • Contour maps at the requisite scale; and • A note of which turbines have been fitted with obstacle warning lights.	Operation
Material Assets (Aviation)	In the event that the obstacle warning lights fail or if there are plans to withdraw them from use for a period of time, the IAA will be contacted, via AISOPs@iaa.ie, as a matter of urgency, to request that a NOTAM (Notice to Airmen) is issued concerning the absence of obstacle lights. The following information will be provided to the IAA:- • Obstacle ID; • Obstacle type; • Obstacle Position; • Elevation; and • Colour of Light.	Operation
Material Assets (Aviation)	The Department of Defence shall also be notified in the event of a failure of the installed warning lights.	Operation
Material Assets (Aviation)	The proposed wind turbines will be fitted with an uninterruptable power supply (UPS) to ensure that the aviation warning lights remain operational even in the event of a power outage. This UPS is sufficient for a period of twelve hours; after which, the warning lights can be powered by a small generator should the power outage continue.	Operation
Material Assets (Aviation)	Mitigation measures proposed during the construction phase will also be implemented during the decommissioning phase.	Decommissioning
Material Assets (Telecommunications)	While the proposed development is assessed as unlikely to interfere with any microwave links, all operators will be kept informed of any changes to the layout (e.g. micrositing) should these occur to ensure that compliance with	Pre-Construction / Construction

	telecommunications constraints is maintained.	
Material Assets (Telecommunications)	While assessed to be unlikely, if significant signal interference in any form is identified and is directly attributed to the proposed development, appropriate remedial measures will immediately be undertaken. A range of technical measures are available to mitigate any instances of interference including signal amplifiers, active deflectors and relay transmitters, repeater stations, booster units, realignment of domestic aerials, installation of higher quality aerials and the installation of suppression equipment. Remedial works will be promptly undertaken to ensure uninterrupted telecommunication, broadcasting and mobile phone service provision.	Operation
Material Assets (Telecommunications)	During consultation, 2rn recommended that a protocol agreement be entered into to ensure that any complaints received from the local public concerned are appropriately remediated. This is a standard protocol for such development proposals and has been agreed between the parties and is included at **Annex 13.3** of the EIAR.	Pre- Construction

1.4 Natura Impact Statement (NIS) Mitigation Measures

Natura Impact Statement – Schedule of Mitigation Measures			
Topic	**NIS Section**	**Mitigation Measure**	**Timing of Implementation**
Water Quality	8.1.1	Works for stream crossings will be carried out during the working window for instream works. This working window is defined by Inland Fisheries Ireland (IFI) as July to September to avoid vulnerable spawning salmonids/lamprey that may be present in downstream environments outside of this window. Any works outside this period would require a derogation under the Local Authorities (Works) act, 1949.	Construction
Water Quality	8.1.1	There will be no crossing of rivers or streams by machinery during the construction phase and all machinery must stay within the works corridor and utilise designated access routes.	Construction
Water Quality	8.1.1	There will be no direct dewatering to watercourses onsite during the construction phase. All outflows from drainage associated with construction will be by diffuse overland drainage at	Construction

Natura Impact Statement – Schedule of Mitigation Measures			
Topic	**NIS Section**	**Mitigation Measure**	**Timing of Implementation**
		appropriate locations and through settlement ponds.	
Water Quality	8.1.1	There will be no active dewatering of excavations into settlement ponds, with any such dewatering being filtered through 'silt socks'/dewatering bags or a '*Siltbuster*' or similar, prior to diffuse overland discharge at appropriate locations and through settlement ponds.	Construction
Water Quality	8.1.1	For locations where works will be undertaken within water protection buffer zones double silt fences will be installed around the watercourse to prevent sediment/silt infiltration into the watercourse.	Construction
Water Quality	8.1.1	Cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and will not be permitted to discharge to any waters, and control measures to be in place will include: • Appropriate bunded storage area for storage of fuels/oils, with onsite storage of hydrocarbons to be kept to a minimum • Mobile double skinned fuel bowser will be used for re-fuelling on-site • No refuelling will be permitted at works locations within the 50 m hydrological buffer • Spill kits will be readily available to deal with any accidental spillage • There is an outline emergency plan for the construction phase to deal with accidental spillages • Ready-mixed concrete will be brought to site, with no batching of wet-cement products occurring on site • Where possible pre-cast products will be installed, including all watercourse crossings • Use of wet-cement products within the hydrological buffer	Construction

Natura Impact Statement – Schedule of Mitigation Measures			
Topic	**NIS Section**	**Mitigation Measure**	**Timing of Implementation**
		will be avoided, insofar as possible • Lined cement washout ponds will be used for chute cleaning, with minimal use of water take will imported onto the site • No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be permitted.	
Water Quality	8.1.1	Wastewater emanating on-site (sewage, waste-water from site office) will be taken off-site for disposal/treatment at controlled facilities. To this effect, welfare facilities for construction site workers will include self-contained port-a-loos with an integrated waste holding tank. No water will be sourced on the site, nor will any wastewater be discharged to the site.	Construction
Water Quality	8.1.1	A Sustainable Drainage Systems (SuDS) will be implemented to manage surface water taking account of water quantity (flooding), water quality (pollution) and biodiversity (wildlife and plants). This SuDS will adopt the following elements: • Open constructed drains for development run-off collection and treatment; • Infiltration interception drains for upslope 'clean' water collection and dispersion; • Flow attenuation and filtration check dams to reduce velocities, with consideration given to gradient with drains to determine spacing requirements; • Settlement ponds and buffered outfalls to control and store development runoff to allow settlement prior to discharge at Greenfield runoff rates. No outflow will be permitted directly into natural watercourses; • The site drainage and attenuation system will be installed prior to the main construction activities, and includes excavation of drainage ditches and installation of	Construction

Natura Impact Statement – Schedule of Mitigation Measures			
Topic	**NIS Section**	**Mitigation Measure**	**Timing of Implementation**
		settlement ponds and soakaways. The site-specific drainage scheme is required to attenuate hydraulically (flow) and hydrochemically (pollutants) the projected increase in runoff of c. 20.4 m^3/day (worst-case scenario) that would arise from the hardstands created by the proposed development.	
Water Quality	8.1.1	Measures to ensure adequate management of soil/peat deposition areas in order to avoid impacting on water quality include: • Both proposed spoil deposition areas are located outside the 50 m stream buffer zone • Silt fences, straw bales and biodegradable matting will be used to control surface water runoff for deposition areas • Deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff.	Construction
Water Quality	8.1.1	In order to avoid run-off of silt-laden water impacting upon water quality within watercourse adjacent to the works corridor, reinstatement works including measures to re-vegetate disturbed areas through re-seeding and/or placement of saved turves will be undertaken immediately after construction works.	Construction
Water Quality	8.1.1	During construction turves will be stored separately from spoil (soil/rock). Separate storage of turves will ensure vegetation is not significantly damaged while stored and that turves can be replaced as a top-mat to facilitate rapid re-instatement of the surface vegetation, whereby avoiding the risk of silt laden surface waters impacting on water quality.	Construction
Water Quality	8.1.1	To ensure control measures are implemented appropriately an Ecological Clerk of Works (ECoW) and Environmental Manager will be employed for the duration of the construction works.	Construction

Natura Impact Statement – Schedule of Mitigation Measures			
Topic	**NIS Section**	**Mitigation Measure**	**Timing of Implementation**
Water Quality	8.1.1	Monitoring of water quality during construction will be undertaken.	Construction
Water Quality	8.1.2	Up-gradient interceptor drains, with water re-distributed over the ground by means of a level spreader.	Operation
Water Quality	8.1.2	Swales/road side drains to collect runoff from operational infrastructure, including transverse drains ('grips') to direct water to swales and check dams to intercept silts at source, with water channelled to settlement ponds.	Operation
Water Quality	8.1.2	Settlement ponds will be designed in accordance the greenfield runoff rate requirements and will buffer volumes of runoff discharging from the drainage system during periods of high rainfall.	Operation
Water Quality	8.1.2	Overall, the site-specific drainage scheme is required to attenuate the projected increase in runoff of c. 20.4 m^3/day (worst-case scenario) that would arise from the hardstands created by the proposed development.	Operation
Water Quality	8.1.2	Site water runoff quality will be monitored during the operational phase of the Development. the early stages of the operational phase will require a relatively high frequency of monitoring, however the frequency of monitoring can gradually reduce thereafter – presuming there are no issues with the quality of discharging water at that point in time.	Operation