

MWP

Chapter 17 Schedule of Mitigation

Ballycar Wind Farm

17. Schedule of Mitigation Measures

17.1 Introduction

This Schedule of Environmental Mitigation summarises and sets out an implementation for all environmental mitigation measures recommended in the **Environmental Impact Assessment Report (EIAR)** for the proposed Ballycar Wind Farm project in Ballycar, County Clare. The full project description is provided in **Chapter 2 Description of the Proposed Development**.

17.2 Methodology

The schedule on the following pages is structured in accordance with the following project phases:

- Prior to Commencement of Construction
- During Construction Phase
- Post Construction/Operational Phase
- Decommissioning



The schedule is presented in a Table format which outlines, for each of the project phases:

- I. the environmental aspect or resource for which mitigation is required,
- II. the required or proposed mitigation measure to undertake/implemented,
- III. the persons responsible for implementing the recommended mitigation
- IV. the relevant actions, procedures and plans relating to implementation of the mitigation

Table 17-1 Schedule of Environmental Mitigation Measures

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>A Construction Environmental Management Plan (CEMP) (Appendix 2A) has been prepared for the project and will be implemented during construction in order to ensure that the project is constructed in accordance with best practice, with the minimum effect on the surrounding environment. The implementation of proposed mitigation measures, environmental commitments of the project and the monitoring and supervision of these measures will be managed through the CEMP. It includes, but is not limited to, measures to control/manage various elements of the development including the following:</p> <ul style="list-style-type: none"> • Management of Excavations • Surface Water Management and Run-off Control (Sediment and Erosion Control) • Fuels and Oils Management • Management of Concrete • Construction Noise Management • Construction Waste and By Product Management Plan • Wheel Wash Management Procedure • Construction Traffic Management • Construction Dust Management • Construction Noise Management • Archaeological and Heritage Protection • Ecological Management Plan for the Protection of Habitats and Fauna • Management of invasive Species • Management of Material Assets • Landscape and Visual Management • Land and Soil Management • Emergency Response Plan • Site Environmental Training Awareness • Monitoring and Auditing • Environmental Accidents, Incidents and Corrective Actions <p>Construction Environmental and Management Plan (CEMP)</p>	<p>Developer</p> <p>Principal Contractor and Responsible personnel identified in the CEMP</p>	<p>Chapter 2 Description of the Proposed Development</p> <p>Appendix 2A CEMP</p> <p>To be communicated to Principal Contractor and incorporated into final CEMP.</p> <p>Chapters 5 to 16</p> <p>NIS</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Construction Environmental and Management Plan (CEMP)</p> <p>The EIAR CEMP will be updated to align with the conditions of the planning permit and any other licenses needed, and finalized by the appointed Contractor in advance of works commencing and will be submitted to the local authority(s) for approval. Construction method statements will be prepared prior to commencement of construction and incorporated into the CEMP.</p>	<p>Principal Contractor and Responsible personnel identified in the CEMP</p>	<p>Develop Final CEMP and submit to planning authority for comment.</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Traffic Management Plan (TMP)</p> <p>A final TMP will be prepared by the Principal Contractor. It will take account of the measures specified in the TMP submitted with the planning application, and any measures agreed with the relevant authorities.</p>	<p>Principle Contractor</p>	<p>Develop final CTMP and submit to planning authority for comment.</p>

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<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Best Practice</p> <p><u>Environmental Manager / Ecological Clerk of Works (ECoW)</u></p> <p>A suitable qualified and experienced Project Ecologist/ECoW will be employed during the construction phase of the project. Duties will include the review of all method statements, delivery of toolbox talks, undertaking of all required pre-construction surveys for protected species, clearance works, and monitoring of works throughout the construction phase to ensure all environmental controls and EIAR mitigation is implemented in full. As part of toolbox talks, contractor staff and other site personnel, as relevant, will be made aware of the procedure to follow if a protected species or their resting or breeding site, is encountered.</p> <p>The Project Ecologist/ECoW will be awarded a level of authority and will be allowed to stop construction activity if there is potential for adverse environmental effects other than those predicted and mitigated for in the EIAR. The project ecologist/ECoW will be responsible for pointing out boundaries of exclusion zones as per below.</p> <p>The appointed Project Ecologist/ECoW will have demonstrated professional experience in managing large-scale construction works affecting ecological receptors identified within the EIAR.</p>	<p>Developer</p> <p>Principal Contractor</p>	<p>Chapters 5 to 16</p> <p>Appendix 2A CEMP</p> <p>Appoint Project Team</p> <p>NIS</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Biodiversity - Mitigation by Design</p> <p>Site design was carried out with cognisance to ecological features to minimise the impact of the Proposed development on Biodiversity. Consultation between the design team (Project Manager, Project Engineers, and Project Ecologists) and the developer was conducted on an ongoing basis during the design phase, in order to formulate a project design which would avoid, prevent and/or minimise any significant adverse ecological effects, in so much as was practicably possible. A considerable effort was spent by the project ecologists and engineers on avoiding or minimising ecological effects and this has been constraint led throughout the design process.</p> <p>The project has been designed to minimise the footprint of the Proposed development on more ecologically sensitive habitats. This has been achieved in collaboration with engineering constraints, for example by taking account of peat location, habitat value and areas potentially impacted. The project design has followed the basic principles outlined below to reduce/eliminate the potential for significant effects on ecological receptors:</p> <ul style="list-style-type: none"> • Intensive site investigations were undertaken to ascertain a detailed understanding of the site’s peat profile to inform the optimum wind farm design by avoiding peat areas. • A detailed habitat constraints map was generated to minimise habitat loss (e.g. hardstanding areas designed to the minimum size necessary), ensuring avoidance of ecologically-sensitive habitats such as peatlands (e.g. re-locating of T1 further north-eastwards to avoid an area of wet heath/upland blanket bog in the north-west of the site, the placement of minimal infrastructure on other sensitive habitats (e.g. re-locating T12 to avoid loss of broadleaved woodland) and the placement of maximum infrastructure in conifer plantation, farmland and other ecologically lower-value habitats. • This has resulted in proposed infrastructure being primarily sited in conifer plantation and agricultural grassland, using existing access tracks wherever possible. • Hydrological buffers were applied to all rivers/streams. • The proposed project has avoided the requirement for any in-stream works. • Avoidance of wildlife refuge sites (e.g., waterbodies) insofar as possible. • The grid connection route and internal access tracks were selected to utilise existing built infrastructure for the majority of their lengths (i.e., cables to be laid within existing tracks). • Cables will be laid underground to minimise effects on hedgerows and disturbance to fauna. 	<p>Design Team and project ecologists/ Developer Project Manager</p> <p>and/or</p> <p>Appointed Project Contractor</p>	<p>Chapter 6 Biodiversity</p>

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	<p>Biodiversity Non-volant mammals (Badger and Otter) - Pre-Construction survey</p> <p>Pre-construction surveys for non-volant mammals, such as badger and otter, will be undertaken prior to the commencement of any construction activity to identify any changes within the site with regard to protected mammals. The pre-construction surveys should be undertaken no more than 10-12 months in advance of construction. The surveys are to be supplemented by an additional survey immediately prior to site works commencing.</p>	Project Ecologist	Chapter 6 Biodiversity
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	<p>Biodiversity Bats – Pre-construction Surveys</p> <p>A number of trees were identified as Potential Bat Roosts (PBRs) within the Proposed Development site and along the grid route and TDR.</p> <p>Pre-construction roost surveys of structures and trees will be carried out at the project site, including along the route of the proposed grid connection in advance of construction commencing. Emergence/re-entry surveys may be required at structures/trees, pending the results of the surveys.</p> <p>Prior to the felling of any trees identified as PBRs, detailed physical inspections of the trees Potential Roost Features (PRFs), using endoscope and high-powered torch, and/or dusk/dawn surveys will be undertaken at each affected tree to determine if roosting bats are present.</p> <p>In the event that a bat roost is identified, mitigation will be recommended by the Project Ecologist/ECOW, as required, and will follow best practice guidance as per:</p> <ul style="list-style-type: none"> • Bat Mitigation Guidelines for Ireland Ver 2. Irish Wildlife Manuals, No 134 (Marnell et al., 2022); • Bats and onshore wind turbines – survey, assessment and mitigation. (SNH, 2021); • Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, undated); • Guidelines for the treatment of bats during the construction of National Road Schemes (NRA, undated). <p>All bats, and their roosts, are afforded legal protection by the Wildlife Act 1976 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). In the event that any active roosts are identified which it is proposed to remove, it will be necessary to submit an application for a Derogation Licence (issued under Regulation 54 of the Habitat Regulations). Strict criteria must be met before such a licence can be approved by the Minister who can only issue such derogation licences in very limited circumstances.</p>	Project Ecologist	Chapter 6 Biodiversity
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	<p>Biodiversity Amphibians – Pre Construction Survey</p> <p>Amphibian surveys will be carried out by an ecologist in advance of construction works. These surveys will focus on breeding areas potentially used by amphibians. Methodology for frog surveys will follow Reis et al. (2013). In the event that there is a requirement to disturb breeding frogs, frog spawn and/or spawning habitat, appropriate actions will be followed by the project ecologist to ensure their preservation.</p>	Project Ecologist	Chapter 6 Biodiversity
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	<p>Biodiversity Marsh Fritillary</p> <p>Suitable habitat for marsh fritillary, as per habitat criteria as set out by the NBDC as ‘Good Condition Habitat’, was identified within the study area, however outside the development area for the proposed Ballycar Windfarm and marsh fritillary were confirmed present in these areas (please see Appendix 6D of this EIAR). Areas of suitable marsh fritillary habitat identified within the study area will be marked and fenced off prior to the commencement of works. This will ensure no inadvertent loss or disturbance from machinery or storage of materials or equipment.</p> <p>This species has a meta-population structure. The extent and magnitude of these populations is dependent on the suitability of habitat patches and the topography of the landscape. While the proposed development has avoided, as</p>	Project Ecologist	Chapter 6 Biodiversity

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	<p>part of design, areas identified as good habitat for marsh fritillary, the remaining surveyed areas, determined to be 'Unsuitable Habitat' at the time of baseline surveys, have the potential to become more favourable for marsh fritillary should existing land management practices change in the intervening period between the baseline surveys and construction.</p> <p>Given the presence of a confirmed population of marsh fritillary, outside but in close proximity to the proposed development site, on a precautionary basis, it is recommended that pre-construction larval web surveys for marsh fritillary are undertaken in potentially suitable habitat by a suitably qualified ecologist, in line with NBDC guidance, prior to construction works commencing, in order to identify any areas additional to those mapped in the Marsh Fritillary Survey Report.</p> <p>In the event that marsh fritillary are discovered within the proposed development site, the Project Ecologist/ECoW will advise on appropriate mitigation measures, in line with NPWS guidance, where required.</p> <p>Where suitable marsh fritillary habitat occurs in close proximity to the proposed infrastructure, side casting of material will be to the opposite side of the proposed infrastructure to where the suitable habitat occurs. This will ensure that there is no potential for direct or indirect impacts on marsh fritillary habitat. This measure will also protect existing suitable habitat for other Lepidoptera/pollinator species of local importance.</p>		
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>A pre-construction survey for invasive species will be conducted and will include the proposed wind farm site and the grid connection route. Should invasive species be recorded at works locations along the grid connection route or within the development footprint, other than those species/infestations already documented as part of baseline ecology surveys, the ISMP will be updated accordingly, prior to construction works commencing.</p> <p>All areas where invasive species occur will be identified during the pre-construction surveys. All areas will be demarcated prior to commencement of construction.</p> <p>Treatment and management of Japanese knotweed and Himalayan balsam on-site is to follow Best Practice Management Guidelines produced by NRA (2010), and Invasive Species Ireland (Kelly et al., 2008a, and 2008b), as relevant.</p> <p>For more information, please see the ISMP for the Proposed Development, which can be found in Appendix 6F of this EIAR, which details containment and eradication measures.</p> <p>Biosecurity</p> <p>Prior to being brought onto site, all plant, equipment and PPE will have to be clean and free of soil/mud/debris or any attached plant or animal material. Prior to entering the site, all plant and equipment will be thoroughly cleaned down using a power washer unit to prevent the spread of IAS. All plant/equipment will be visually inspected to ensure all adherent material and debris has been removed.</p> <p>Prior to being brought to site, certification is to be obtained from suppliers that all raw materials including soil, fill, sand, gravel and landscaping materials to be imported are free from IAS. Locations for supply e.g. quarries etc., are to be assessed for the presence of IAS prior to materials being brought to site.</p> <p>All footwear/waders and/or equipment that is to be used within the aquatic environment should be treated to prevent foreign flora/fauna entering the water, and again after use, to prevent spread to other catchments.</p>	<p>Project Ecologist</p>	<p>Chapter 6 Biodiversity</p>

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	<p>Non-native species control will be implemented and managed according to the following IFI document, noting that some works components are located at/near watercourses 'IFI Biosecurity Protocol for Field Survey Work' (IFI, 2010).</p> <p>For more information, please see the ISMP for the Proposed Development, Appendix 6F of this EIAR , which outlines all mitigation measures in relation to biosecurity on-site.</p>		
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Water</p> <p>A programme for water monitoring will be prepared in consultation with Inland Fisheries Ireland prior to the commencement of the construction of the wind farm. The plan will include monitoring of water during the pre-construction, throughout construction and in the immediate post construction phases.</p> <p>Further baseline water quality monitoring of all streams near the development site will be undertaken prior to construction to confirm existing conditions at the time of construction. This baseline data will include the main components of a full hydrograph for the streams including both high spate flow and base flow where possible.</p>	<p>Project Ecologist/EC OW</p>	<p>Chapter 6 Biodiversity</p> <p>Chapter 8 Water</p> <p>SWMP</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Ornithology Pre-Construction Bird Survey</p> <p>Pre-construction breeding surveys will take place within suitable habitat for the following species:</p> <ul style="list-style-type: none"> • Hen harrier • Sparrowhawk • Buzzard • Peregrine • Kestrel <p>The purpose of the surveys is to establish the breeding status of these species, which could be affected by disturbance during the construction phase. The surveys will take place within distances from work areas presented in Section 7.5.1.2 of Chapter 7 Ornithology.</p> <p>Survey will be carried out by a qualified and experienced ornithologist following standard methods. It is noted that the surveys will be in the period prior to any tree-felling on Site.</p> <p>Following on from the surveys, guidance will be provided to the contractor on where restrictive zones may be required during the bird nesting season.</p>	<p>Developer Project Manager</p> <p>and/or</p> <p>Appointed Project Contractor</p>	<p>Chapter 7 Ornithology</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Blasting – Pre-Construction Notification and Blast Management Plan</p> <p>To mitigate against the risk of excessive dust within the vicinity of the borrow pit, the blast areas will be lightly sprayed with water prior to blasting. A Blast Management Plan will ensure compliance with Explosives Act 1875 and related Legislation and BS 7385 in relation to blasting. Clare County Council, An Garda Síochána, and adjoining landowners will be notified in advance of any blasting activities on the site. The Blast Management Plan will be prepared by the appointed contractor prior to the construction phase and in consultation with Clare County Council, An Garda Síochána and adjoining landowners. Blasting will not occur at the same time as blasting at the adjoining quarry.</p> <p>Residents will be notified in advance of any blasting. Given the advance warning and infrequency of occurrence, i.e., once or twice a month, the impact is not considered significant. Blasting will be coordinated with the neighbouring quarry to ensure that blasts do not coincide.</p> <p>The blast management plan will set out noise and vibration limit values set out in the Environmental Protection Agency's, Environmental Management in the Extractive Industry in addition to the mitigation measures described.</p>	<p>Appointed Project Contractor</p>	<p>Chapter 5 Population and Human Health</p> <p>Chapter 9 Land and Soil</p> <p>Chapter 10 Noise and Vibration</p>

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	<p>Wherever possible the contractor will inform residents where appropriate of the proposed blasting times and any deviation from this programme in advance. Where blasting takes place, it will be restricted to regular times. Each blast will be carefully designed to maximise its efficiency and reduce transmission of noise. These details will be finalised by the appointed contractor in agreement with the local authority and design team prior to any blast taking place and documented in a Blast Management Plan. The Blast Management Plan will include full details of the locations of the bores for the blasts, the types of materials to be used, details of the necessary controls and responsibilities, and compliance with the relevant safety legislation.</p>		
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Land and Soils</p> <p>The primary mitigation measure employed has been the design of the wind farm in terms of locating the turbines, access tracks, and other proposed infrastructure in order to reduce the effects on land and soils.</p>	<p>Appointed Project Contractor</p>	<p>Chapter 9 Land and Soil</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Material Assets</p> <p>Haulage Route Network – Pre-Construction</p> <p>Pre-Construction surveys will be carried out to ensure the structural integrity of the proposed haulage route road network. Repairs will be carried out on the public roads, as necessary, during the construction phase, to ensure that the condition does not deteriorate below a standard that could affect the use of the site, as required.</p>	<p>Appointed Project Contractor</p>	<p>Chapter 15 Material Assets</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Water Quality</p> <p>Pre-Construction Baseline Monitoring</p> <p>Pre-baseline construction monitoring will be carried out at locations which drain the proposed development. These locations are identified as part of the Aquatic Ecology and Fish Survey report, Appendix 6C and summarised in Table 4 of the SWMP, Appendix 2B.</p> <p>The baseline water quality monitoring will be required to be updated for each proposed monitoring location prior to commencement of the proposed development. Water quality field testing and laboratory analysis will be undertaken prior to commencement of felling and construction at the site. The monitoring programme will be subject to agreement with Clare County Council but will be based on the planning stage programme already outlined in the EIAR and CEMP.</p>	<p>Developer Project Manager</p> <p>and/or</p> <p>Appointed Project Contractor</p>	<p>Chapter 8 Water</p> <p>SWMP</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Water Quality</p> <p>Drainage System – Pre-Construction</p> <p>A robust drainage system, based on the design principles outlined in Section 3 of Chapter 8 Water and the SWMP, will be put in place including maintenance and enhancement of existing drainage, as well as new systems, to minimise sediment release during construction. The existing drainage system will be retained and improved where required. Along new access tracks, interceptor drains and silt traps will be put in place simultaneously with the construction of site access tracks and turbine base construction, such that excavation works and any constructed hard surface or mineral soils storage areas will have a functioning drainage system in place in advance of the main construction activity.</p> <p>All water quality control measures identified on drainage design drawings including swales, culverts, check dams, settlement ponds, etc. will be installed, as appropriate either in advance or in conjunction with track construction works in order to ensure that no section of the works is left exposed to potential sediment run-off at any stage of the works.</p> <p>Water quality control measures identified on the drainage design drawings including track side swales, culverts, check dams, settlement ponds etc. will be installed, as appropriate, either in advance or in conjunction with the construction of the crane hardstanding area in order to ensure that no section of the works is left exposed to potential sediment run-off at any stage of the works. It is anticipated that the construction of the crane hardstanding and all water quality</p>	<p>Appointed Project Contractor</p>	<p>Chapter 8 Water</p> <p>SWMP</p>

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	<p>control measures associated with both the crane hardstanding and turbine foundation will be completed prior to commencement of the excavation and construction works for the turbine foundation.</p> <p>Water quality control measures identified on the drainage design drawings including swales, culverts, check dams, settlement ponds, etc. will be installed, as appropriate, either in advance or in conjunction with the substation compound construction works in order to ensure that no section of the works is left exposed to potential sediment run-off at any stage of the works.</p>		
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Landscape and Visual</p> <p>Turbines are large structures in the landscape and not easily screened, except where possible with siting. Mitigation by design is carried out where possible, with regard to the guidance in the DoEHLG (2006) and the Draft (2019).</p> <ul style="list-style-type: none"> Mitigation measures by design which were applied include a choice of appropriate grey or off white turbine colour, sensitive siting and design of the turbines and associated elements, minimising vegetation removal such as hedgerows and trees, and avoiding sensitive elements on the site such as the archaeological monuments to the north-west of the site . 	<p>Developer Principal Contractor</p>	<p>Chapter 12 Landscape and Visual</p>
<p>PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS</p>	<p>Cultural Heritage</p> <p>Exclusion zones (reflecting RMP’s zones) will be physically established on the ground by archaeologists before the construction phase, around all five monuments: CL052-064001, CL052-064002, CL052-064003, CL053-040, CL053-049. No ground disturbance will be undertaken within the zones. The ground works in the vicinity of all monuments will be archaeologically monitored during construction.</p>	<p>Project Archeologist</p>	<p>Chapter 13 Cultural Heritage</p>
<p>DURING CONSTRUCTION</p>	<p>Material Assets – Transport Infrastructure</p> <ul style="list-style-type: none"> The appointed contractor will liaise with An Garda Síochána and Clare County Council during the construction phase. The appointed contractor will recognize that other external factors such as severe weather events can affect traffic flow close to the project and will endeavour to minimise the effect of the works on traffic in the planning of and programming of the works at construction stage. Heavy vehicles traffic volumes generated by the proposed development construction could result in damage to existing and proposed road pavements on public roads, including at vehicle turning, accelerating and decelerating locations. Road pavements will be regularly monitored and reinstated in accordance with the requirements of Clare County Council. A strict protocol will be ensured for HGV drivers to follow the designated haulage route and timing restrictions, as detailed; Haulage traffic will share the same route with local residents, tourists, and other road users, which would present risks. Advance warning will be given to the local residents and other users (i.e. cyclists) for specific times when large volumes of HGV traffic may occur; All signage relating to the proposed construction traffic routes for construction traffic will be agreed with Clare County Council; A well planned and executed delivery programme avoiding peak traffic on typical days will be ensured (i.e. local school start and finish times); 	<p>Developer Principal Contractor</p>	<p>Chapter 15 Material Assets</p>

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	<ul style="list-style-type: none"> Adequate parking will be provided on site for both employees and visitors to ensure parking will not occur on the public road; A road sweeping vehicle will be provided as required to remove any mud that is deposited on the local road in the vicinity of the site access; and <p>Wind turbine loads will be delivered in consultation with Clare County Council and An Garda Síochána, during off-peak traffic periods.</p>		
DURING CONSTRUCTION	<p>Material Assets – Forest Resources</p> <p>The effect of the wind farm on forest operations and the potential effect of forestry felling on the environment will be controlled as it currently is, by strict environmental controls, practices and guidelines as described by the relevant Forest Service Guidelines. Any tree felling required to facilitate the construction and operation of the wind farm will be kept to a minimum and under the terms of felling licences. Obligations to replant clear-fell areas will be fulfilled.</p> <p>The proposed project will not result in any significant adverse effects on forest resources requiring additional mitigation.</p>	Developer Principal Contractor	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>Material Assets – Grid Capacity & Electrical Infrastructure</p> <p>The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.</p> <p>All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.</p>	Developer Principal Contractor	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>Material Assets – Aviation</p> <p>Ballycar Green Energy Ltd. will agree an acceptable aviation obstacle warning lighting scheme with the Department of Defence and the Irish Aviation Authority (IAA) ahead of turbine construction and will supply the coordinates and elevations for built turbines, as is standard for wind farm developments.</p> <p>To prevent any interference to surveillance radar to Woodcock Hill MSSR and the Shannon Airport PSR mitigation measures outlined in the Aviation Impact Assessment & Mitigation report will be applied, refer to Appendix 15A.</p>	Developer Principal Contractor	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>Material Assets – Television and Telecommunications</p> <p>In the event of interference to television and telecommunication services arising from the wind farm development, Ballycar Green Energy are committed to work with telecommunication providers to remedy any issues of interference to affected communication links.</p> <p>Contractors will be obliged to adhere to good practice measures outlined in the CEMP to prevent any impacts to television and telecommunication services during the construction phase.</p>	Developer Principal Contractor	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>Material Assets – Waste Management</p> <p>Resource efficiency will form part of the construction resource efficiency methods and thus comply with Circular Economy And Miscellaneous Provisions Act 2022. In the event that there is a requirement for soil to be exported from site, this will be treated as an Article 27 by-product (a non-waste) where practicable or treated to comply with Article 28 and recycled if possible.</p> <p>Where waste is created, it will be managed in accordance with the waste hierarchy in Council Directive 2008/98/EC on waste and section 21A of the Waste Management Act 1996, as amended, as follows: (a)Prevention; (b)re-use; (c)Recycling; (d)Other recovery (including energy recovery); and (e) Disposal.</p>	Developer Principal Contractor	Chapter 15 Material Assets

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	<p>All waste for offsite treatment/disposal will be stored temporarily in appropriate dedicated storage areas. The areas in which wastes are stored on site will be segregated to prevent material and contaminated surface water runoff entering local surface water drains.</p> <p>All chemical, hydrocarbon or other controlled wastes will be stored in designated areas in appropriate approved containers within bunds or on spill pallets, as required.</p> <p>All waste to be removed from site will be undertaken by authorised waste contractors and transported to an authorised facility in accordance with best practice and the site waste management plan as discussed in the CEMP, as included in EIAR Volume III Appendix 2A.</p>		
DURING CONSTRUCTION	<p><u>Project Ecologist/ECOW</u></p> <p>A suitable qualified and experienced Project Ecologist/ECOW will be employed during the construction phase of the project. Duties will include the review of all method statements, delivery of toolbox talks, undertaking of all required pre-construction surveys for protected species, clearance works, and monitoring of works throughout the construction phase to ensure all environmental controls and EIAR mitigation is implemented in full. As part of toolbox talks, contractor staff and other site personnel, as relevant, will be made aware of the procedure to follow if a protected species or their resting or breeding site is encountered.</p> <p>The Project Ecologist/ECOW will be awarded a level of authority and will be allowed to stop construction activity if there is potential for adverse environmental effects other than those predicted and mitigated for in the EIAR. The project ecologist will be responsible for pointing out boundaries of exclusion zones as detailed in Chapter 6 Biodiversity.</p> <p>The appointed Project Ecologist/ECOW will have demonstrated professional experience in managing large-scale construction works affecting ecological receptors identified within the EIAR.</p> <p><u>Site Environmental Manager</u></p> <p>Routine inspections of construction activity will be carried out on a daily basis by the Site Environmental Officer and/or appointed contractor staff to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place. Environmental inspections will ensure that the works are undertaken in compliance with the CEMP and that the requirements of the Conditions of Planning and associated documentation are being adhered to during construction. Only suitably trained staff will undertake environmental site inspections.</p>	Developer Principal Contractor	Chapter 6 Biodiversity CEMP
DURING CONSTRUCTION	<p><u>General Protection of Habitats</u></p> <p>The area of proposed works will be kept to the minimum necessary to minimise disturbance to habitats and flora. The footprint of the development area and construction area will be clearly marked prior to commencement of construction with secure posts and high visibility tape. These areas will be marked out with reference to design drawings, under the supervision of the project engineer and Project Ecologist. There will be no removal of habitat, movement/storage of construction machinery or any other construction related activities permitted outside the proposed development area.</p> <p>Vegetation removal will be minimised. Habitat disturbance will be limited by controlling the movement of plant, machinery and personnel.</p>	Project Ecologist/ECOW Appointed contractor	Chapter 6 Biodiversity CEMP Biodiversity Enhancement Plan

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
	<p>Regarding tree, hedgerow and scrub habitats, including mature trees within linear habitat features, within the site that are not proposed to be removed as part of the works, these will be retained, and all possible measures will be taken to protect vegetation and/or the habitat feature from damage or disturbance. Such impacts may arise from physical damage to individual trees and shrubs, damage/alteration of the surrounding ground such as compaction of soil and/or changes in ground levels due to excavation. Any works in proximity of these areas will be undertaken in line with the advice of the Project Ecologist/ECOW and with regard to 'Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub, Prior, During and Post Construction of National Road Schemes' (NRA, 2006).</p> <p>Exclusion Zones</p> <p>Areas of ecologically sensitive habitat will be marked by secure posts and robust high visibility tape under the supervision of the Project Ecologist/ECOW and with reference to planning drawings. This will ensure that sensitive areas of the site and wider area, identified during the ecological constraints study, are excluded from any works activity or disturbance. Machinery will not be permitted to breach these exclusion zones, and there shall be no side casting of material or any other construction-related activity within these areas.</p> <p>For example, the area of wet heath/upland blanket bog located in the north-west of the site, although currently degraded to some extent, was constrained out of the potential developable area during constraints analysis. This area will be encompassed within an exclusion zone to reduce any potential impacts.</p> <p>Removal of Vegetation (excluding conifer plantation)</p> <p>In accordance with Section 40 of the Wildlife Acts, vegetation removal, including hedgerow and tree removal, will be conducted outside of the restricted bird nesting period (March 1st to 31st August). The provisions of Section 40 of the Acts do not relate exclusively to birds, but a range of biodiversity, the protection of which will contribute to local food chains and ecosystem functioning.</p> <p>Forestry Felling</p> <p>Overall, felling of appropriately 15.97 ha of commercial forestry will be required.</p> <p>All tree felling will be undertaken in accordance with the conditions attached to the tree felling licence and in accordance with Forest Service Guidelines.</p> <p>Hedgerow and Treeline Reinstatement</p> <p>Where hedgerow and treeline removal are required within the proposed development site, these areas of loss will be fully reinstated within the proposed wind farm site with native hedgerow and tree species. Appropriate planting of native trees and shrubs will be carried out along suitable stretches of the access tracks. Planting will comprise a mix of semi-mature specimen trees, immature trees and pollinator-friendly hedgerow species. Planting of species will be staggered to achieve structural heterogeneity, avoid excessive shading and promote natural diversity as the field and shrub layers establish over-time. Fast-growing species such as willow (<i>Salix</i> spp.) and alder (<i>Alnus glutinosa</i>) will be used, along with other native hedgerow species such as whitethorn (<i>Crataegus monogyna</i>), blackthorn (<i>Prunus spinosa</i>), elder (<i>Sambucus nigra</i>), holly (<i>Ilex aquifolium</i>), rowan (<i>Sorbus aucuparia</i>), bramble (<i>Rubus fruticosus</i>), birch (<i>Betula</i> spp.) and hazel (<i>Corylus avellana</i>).</p>		

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	<p>Reinstatement will ensure that there will be no net loss of these habitats. Please refer to the Biodiversity Enhancement Management Plan (Appendix 6E) for details of proposed for reinstatement of hedgerow and treeline habitats.</p> <p>Woodland/Scrub Habitat Reinstatement</p> <p>Where there will be unavoidable removal of areas of semi-natural woodland as well as scrub, these areas of loss will be fully reinstated within the site with native tree and shrub species of a similar composition to affected areas.</p> <p>The Project Ecologist will advise on the appropriate species and planting requirements to be implemented in line with the species composition of the existing semi-natural habitats in the area.</p> <p>Any reinstated vegetation will be monitored by the Project Ecologist. Spraying of vegetation using pesticides (herbicides, fungicides and insecticides) will not be permitted at any stage of development. Refer to the Biodiversity Enhancement Management Plan for areas proposed for reinstatement of woodland/scrub habitats.</p> <p>Regarding removal of semi-natural grassland habitats, topsoil will be retained for use during reinstatement. A layer of topsoil will be spread evenly, as required, over the affected area under the supervision of the Project Ecologist. These areas shall then be temporarily fenced off and allowed to regenerate naturally. No fertiliser or herbicide shall be applied. These areas shall be monitored by the Project Ecologist for potential encroachment of invasive species. Where vegetation is slow to regenerate naturally, planting of native plant species will be undertaken. The Project Ecologist will advise on the use of appropriate species and planting requirements in line with the species composition of the existing semi-natural habitats in the area.</p> <p>Habitat reinstatement will commence at construction stage. The success of any habitat reinstatement measures will be monitored by the Project Ecologist throughout the construction phase and continue into the operational phase.</p> <p>Where habitat reinstatement measures are successfully implemented, monitoring of habitats can cease, as directed by the Project Ecologist. Where required, periodic management measures (e.g., checking of drains, removal of invasive species) will be implemented. Where required, alteration and/or additional enhancement measures will be implemented. This will be overseen by the Project Ecologist and monitored on an on-going basis.</p> <p>Further details on habitat management and reinstatement measures to be undertaken are included in Appendix 6E.</p>		
<p>DURING CONSTRUCTION</p>	<p>General Protection of Fauna</p> <p>The following general measures will be implemented during construction:</p> <ul style="list-style-type: none"> Habitat disturbance to fauna will be limited by controlling the movement of plant, and vehicles. Construction vehicles will not encroach onto habitats beyond the proposed project footprint. Unless permitted by the planning authority the duration of construction activities will be restricted to between 7am and 7pm, Monday to Friday and between 7am and 2pm on Saturdays, but not during darkness, unless in exceptional circumstances to reduce potential disturbance to fauna. Should the resting or breeding place of any protected species be discovered within the site prior to or during construction works, any works in the vicinity will cease immediately, the area will be cordoned off and advice will be obtained from the Project Ecologist/ECoW and NPWS, where required. The Project Ecologist/ECoW will 	<p>Project Ecologist/ECoW</p> <p>Appointed Contractor</p>	<p>CEMP</p> <p>Chapter 6 Biodiversity</p> <p>Chapter 7 Ornithology</p> <p>Chapter 8 Water</p>

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	<p>implement relevant mitigation and protection measures, as required (i.e. setting up an exclusion zone). Any additional site-specific mitigations deemed required by the Project Ecologist/ECOW will be prepared in agreement with NPWS. Such mitigations may include obtaining a derogation licence where protected species, frog for example, may require translocation.</p> <ul style="list-style-type: none"> • All construction activity and site works will be undertaken in accordance with relevant best-practice guidance. • The mitigation measures for bats will follow: <ul style="list-style-type: none"> ○ Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, undated); ○ Guidelines for the treatment of bats during the construction of National Road Schemes (NRA, undated); ○ NPWS Irish Wildlife Manuals, No. 25: Bat Mitigation Guidelines for Ireland (Kelleher & Marnell, 2006); ○ Scottish Natural Heritage (SNH). Bats and onshore wind turbines – survey, assessment and mitigation (2021). • Mitigation measures for birds involves avoiding works on nesting habitats during the nesting season (March – August inclusive) and avoidance of such habitats insofar as possible (see Section 6.5.1 and Chapter 7 Ornithology for more detail). 		
	<p>Badger and Otter</p> <p>A number of badger setts were identified during baseline ecology surveys, at least one of which was confirmed active at the time of surveys. These setts will be retained. None of the identified setts are within 30 m or 50 m of a proposed turbine location or access track; however, badgers move between setts and can excavate new setts.</p> <p>No otter holts were identified, and no evidence of otter was found during the baseline ecology surveys.</p> <p>Pre-construction surveys for non-volant mammals, such as badger and otter, will be undertaken prior to the commencement of any construction activity to identify any changes within the site with regard to protected mammals. The pre-construction surveys will be undertaken no more than 10-12 months in advance of construction. The surveys will be supplemented by an additional survey immediately prior to site works commencing.</p> <p>Where areas of dense vegetation are to be removed, the Project Ecologist/ECOW will be present to oversee removal of vegetation and ensure any necessary mitigation measures are in place in the event that a previously unknown breeding or resting site of any protected mammal species e.g., badger sett, are encountered during the works.</p> <p>If any badger setts are discovered, then all works within a 30 m buffer (50 m buffer during the breeding season) will cease. NPWS will be contacted, and the necessary mitigation implemented.</p> <p>Surveys and implementation of best-practice guidelines for badger and otter will be overseen by the Project Ecologist/ECOW and in accordance with NRA/TII Guidelines ‘Guidelines for the Treatment of otters prior to the Construction of National Road Schemes’ (NRA 2008) and ‘Guidelines for the Treatment of badgers prior to the Construction of National Road Schemes’ (NRA, 2008).</p> <p>Where relevant, mitigation for badger and otter will be carried out under in full accordance with NRA/TII Guidelines.</p>		

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	<p>Red Squirrel, Pine Marten and Irish Stoat</p> <p>Where possible, felling of forestry will be limited to periods outside of when red squirrel and pine marten are likely to have young in dreys/dens (peak period January to March for red squirrel, March and April for pine marten). If felling of forestry during these time periods is unavoidable, then the area to be cleared will be surveyed by a suitably-qualified ecologist to search for the presence of breeding sites. The general avoidance of removal of vegetation during the bird-nesting period (March to August, inclusive) will avoid disturbance to stoat during their peak breeding season.</p> <p>Where any breeding sites will be disturbed, mitigation will be carried out under approval from NPWS as necessary and in full accordance with NRA/TII Guidelines.</p>		
	<p>Irish hare, Hedgehog and Pygmy Shrew</p> <p>These species are mobile and so are expected to disperse from the area; however, young are vulnerable to impacts during vegetation clearance and/or during periods of hibernation, in the case of hedgehog. Prior to any vegetation clearance, the area to be cleared will be checked by a suitably-qualified ecologist to check for the presence of young mammals, or hibernating hedgehog, as appropriate.</p>		
	<p>Bats - Pre-construction Surveys</p> <p>A number of trees were identified as Potential Bat Roosts (PBRs) within the Proposed development site and along the turbine delivery route.</p> <p>Pre-construction roost surveys of structures and trees will be carried out at the project site, including along the route of the proposed grid connection in advance of construction commencing. Emergence/re-entry surveys may be required at structures/trees, pending the results of the surveys.</p> <p>Prior to the felling of any trees identified as PBRs, detailed physical inspections of the trees Potential Roost Features (PRFs), using endoscope and high-powered torch, and/or dusk/dawn surveys will be undertaken at each affected tree to determine if roosting bats are present.</p> <p>In the event that a bat roost is identified, mitigation will be recommended by the Project Ecologist/ECow, as required, and will follow best practice guidance as per:</p> <ul style="list-style-type: none"> • Bat Mitigation Guidelines for Ireland Ver 2. Irish Wildlife Manuals, No 134 (Marnell et al., 2022); • Bats and onshore wind turbines – survey, assessment and mitigation. (SNH, 2021); • Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, undated); • Guidelines for the treatment of bats during the construction of National Road Schemes (NRA, undated). <p>All bats, and their roosts, are afforded legal protection by the Wildlife Act, 1976 to 2021, as amended, and the European Communities (Birds and Natural Habitats) Regulations 2011 - 23 (as amended) . In the event that any active roosts are identified which it is proposed to remove, it will be necessary to submit an application for a Derogation Licence (issued under Regulation 54 of the Habitat Regulations). Strict criteria must be met before such a licence can be approved by the Minister who can only issue such derogation licences in very limited circumstances.</p>		

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	<p>Bat Activity Surveys</p> <p>If three or more years lapse from between the baseline surveys and commencement of the construction stage, it will be necessary to repeat the bat activity surveys, described above, in order to establish a robust and reliable baseline for future monitoring. Future survey work will be completed according to the best practice guidelines then pertaining.</p> <p>Turbine Buffer Felling</p> <p>SNH (2021) recommends a buffer distance of 50 m between a turbine blade tip and nearest woodland (or other key habitat feature for bats e.g., wetland) (SNH, 2021). This buffer creates a clearance setback of 50 m between the arc of the blade’s sweep and the forest edge which could be used by bats to minimise risk of collision with the turbine blades.</p> <p>To calculate the necessary buffer distance required between the edge of the woodland (feature) and the centre of the tower to achieve the 50m clearance setback, as above, the following formula (adapted from SNH, 2021) is used to calculate (D), the distance;</p> $D = [(50 + bl)^2 - (hh - fh)^2]^{1/2}$ <p>Where: bl = blade length, hh = hub height, fh = feature height (all in metres).</p> <p>Based on this formula and proposed turbine dimensions, a felling distance of up to 95m around each turbine is proposed to minimise impacts to foraging bats, in line with SNH (2021). This buffer felling distance has been calculated based on a proposed turbine blade length of 68m, hub height of 90m and the various tree/hedgerow heights. This buffer felling distance around all turbines is therefore highly precautionary and is indicative of the maximum potential buffer felling area across all turbines.</p> <p>Control of regrowth of trees/encroachment of scrub will be managed and controlled within buffer areas for the lifetime of the wind farm to maintain vegetation at low-height, and thus retain clearance setbacks around relevant turbines. Vegetation will be managed by appropriate mechanical means. Chemical control will be prohibited.</p> <p>Tree-felling</p> <p>All tree-felling is to be conducted in a manner sensitive to bats, and in accordance with NRA (2005). Any ivy-covered trees which are felled will be left to lie for a minimum 24 hours after felling to allow any bats present to leave. Tree felling will be carried out in line with a felling licence where required.</p> <p>Bat-boxes (Loss of potential roost-sites)</p> <p>Where tree-felling of PBRs is required, bat boxes will be erected prior to any tree felling to mitigate for loss of potential roost-sites. The number and type of bat boxes required will be determined by the species recorded and number of bats or roosts that are affected and/or the category and number of PBR trees proposed to be felled.</p> <p>Design and installation of the bat box scheme will be as per NRA (undated) and overseen by a bat specialist and/or the Project Ecologist/ECOW.</p> <p>Lighting</p> <p>Appropriate lighting will be employed during the construction and operational phases to minimise impacts on local bat populations. Use of lighting will be minimised and avoided, where possible. Construction lighting will be targeted</p>		

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	<p>to minimise/avoid light spill to enable the retention of dark-corridor connectivity within the landscape for commuting bats.</p> <p>Where lighting is required, the following will be considered:</p> <ul style="list-style-type: none"> • Lighting that meets the lowest light levels permitted under health and safety will be installed. Low-pressure sodium lights will be used instead of high-pressure sodium lights or mercury lamps. If mercury lamps are to be used, they will be fitted with UV filters. • LED luminaires will also be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability. • All lighting used will lack UV/IR elements to reduce impact. • Directional lighting will be used to prevent overspill on to forestry/woodland edges, riparian zones or other habitat features of importance to bats. This will be achieved with the use of covers and shields (baffles, hoods or louvres) to reduce light spill and direct lighting to the intended area only. • Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. • Only luminaires with an upward light ratio of 0% and with good optical control will be used. • Luminaires will be mounted on the horizontal, i.e. no upward tilt. <p>Any external security lighting will be set on motion-sensors and short (1min) timers.</p> <p>The use of ‘white lights’ on the turbines will not be permitted as these can attract insects, which in turn can attract bats (Bat Conservation Ireland, 2010).</p> <p>Any lighting introduced to the Proposed development site will follow guidance in the documents:</p> <ul style="list-style-type: none"> • Institution of Lighting Professionals (ILP) (2023). Guidance Note 08/18. Bats and Artificial Lighting in the UK - Bats and the Built Environment Series; • Bats & Lighting. Guidance Notes for: Planners, engineers, architects and developers (BCI, 2010); • Bat Mitigation Guidelines for Ireland Ver 2. Irish Wildlife Manuals, No 134 (Marnell et al., 2022); • Scottish Natural Heritage (SNH). Bats and onshore wind turbines – survey, assessment and mitigation (2021). 		
<p>DURING CONSTRUCTION</p>	<p>Biodiversity Protection of Amphibians</p> <p>Amphibian surveys will be carried out by an ecologist in advance of construction works. These surveys will focus on breeding areas potentially used by amphibians. Methodology for frog surveys will follow Reis et al. (2013). In the event that there is a requirement to disturb breeding frogs, frog spawn and/or spawning habitat, appropriate actions will be followed by the project ecologist to ensure their preservation including seeking derogation licence where frogs will require translocations in order to proceed with proposed works. Translocation efforts include the capture and removal of frogs, frogspawn, and tadpoles from any affected habitat to the nearest available and suitable habitat. These efforts will be undertaken in advance of construction works commencing. Furthermore, habitats in the vicinity of T1, wherein</p>	<p>Project Ecologist/EC oW Appointed Contractor</p>	<p>Chapter 6 Biodiversity</p>

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	<p>frog spawning habitat was identified, will be enhanced with the creation of approximately 1.8ha of wet grassland area and approximately 2.1ha of wet heath/upland bog habitat. Additionally, the nearby Cappateemore East stream to the south east of T1 (ca. 130m of nearest frog spawning) and an unnamed tributary of the Glennagross stream to the west of T1 (ca. 330m), both 1st-order streams, both offer suitable areas nearby for translocation efforts.</p> <p>Frogs are relatively opportunistic in habitat choice and are likely to occupy silt ponds where they are created. These silt ponds are likely to support amphibian and macroinvertebrate biodiversity during operational phases and beyond where are retained.</p>		
DURING CONSTRUCTION	<p>Suitable habitat for marsh fritillary, as per habitat criteria as set out by the NBDC as ‘Good Condition Habitat’, was identified within the study area, however outside the development area for the proposed Ballycar Windfarm and marsh fritillary were confirmed present in these areas (please see Appendix 6D). Areas of suitable marsh fritillary habitat identified within the study area will be marked and fenced off prior to the commencement of works. This will ensure no inadvertent loss or disturbance from machinery or storage of materials or equipment.</p> <p>This species has a meta-population structure. The extent and magnitude of these populations is dependent on the suitability of habitat patches and the topography of the landscape. While the proposed development has avoided, as part of design, areas identified as good habitat for marsh fritillary, the remaining surveyed areas, determined to be ‘Unsuitable Habitat’ at the time of baseline surveys, have the potential to become more favourable for marsh fritillary should existing land management practices change in the intervening period between the baseline surveys and construction.</p> <p>Given the presence of a confirmed population of marsh fritillary, outside but in close proximity to the proposed development site, on a precautionary basis, pre-construction larval web surveys for marsh fritillary will be undertaken in potentially suitable habitat by a suitably qualified ecologist, in line with NBDC guidance, prior to construction works commencing, in order to identify any areas additional to those mapped in the Marsh Fritillary Survey Report and appropriate mitigation measures will be taken. Mitigation measures for Marsh Fritillary include pre-construction surveys for marsh fritillary as well as the marking and fencing off of suitable marsh fritillary habitat prior to the commencement of works.</p> <p>In the event that marsh fritillary are discovered within the proposed development site, the Project Ecologist/ECOW will require appropriate mitigation measures, in line with NPWS guidance, where required.</p> <p>Where suitable marsh fritillary habitat occurs in close proximity to the proposed infrastructure, side casting of material will be to the opposite side of the proposed infrastructure to where the suitable habitat occurs. This will ensure that there is no potential for direct or indirect impacts on marsh fritillary habitat. This measure will also protect existing suitable habitat for other Lepidoptera/pollinator species of local importance.</p>	Project Ecologist/ECOW Appointed Contractor	Chapter 6 Biodiversity
DURING CONSTRUCTION	<p>Species identified on-site include Japanese knotweed, Himalayan balsam and cherry laurel. An preliminary site-specific Invasive Species Management Plan (ISMP) has been developed (see Appendix 6F) and will be incorporated into the finalised Contractors CEMP. The project proponent will engage the services of an invasive plant species specialist to prepare and oversee the implementation of the Site-Specific Management Plan. The Management Plan will be in place for the duration of the construction phase of the proposed project.</p> <p>The Management Plan will describe the best practice measures that will be adhered to during the construction phase of the proposed project, including the installation of the grid connection, to manage and/or control IAS on-site, and</p>	Project Ecologist/ECOW Appointed Contractor	Chapter 6 Biodiversity CEMP

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	<p>will be in line with the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA, 2010). Best practice and mitigation will be incorporated into the project construction phase via the CEMP (See EIAR Volume III).</p> <p>A pre-construction survey for invasive species will be conducted and will include the proposed wind farm site and the grid connection route. Should invasive species be recorded at works locations along the grid connection route or within the development footprint, other than those species/infestations already documented as part of baseline ecology surveys, the ISMP will be updated accordingly, prior to construction works commencing.</p> <p>All areas where invasive species occur will be identified during the pre-construction surveys. All areas will be demarcated prior to commencement of construction.</p> <p>Treatment and management of Japanese knotweed and Himalayan balsam on-site is to follow Best Practice Management Guidelines produced by NRA (2010), and Invasive Species Ireland (Kelly et al., 2008a, and 2008b), as relevant.</p> <p>For more information, please see the ISMP for the Proposed Development, which can be found in Appendix 6F, which details containment and eradication measures.</p> <p>Biosecurity</p> <p>Prior to being brought onto site, all plant, equipment and PPE will have to be clean and free of soil/mud/debris or any attached plant or animal material. Prior to entering the site, all plant and equipment will be thoroughly cleaned down using a power washer unit to prevent the spread of IAS. All plant/equipment will be visually inspected to ensure all adherent material and debris has been removed.</p> <p>Prior to being brought to site, certification will be obtained from suppliers that all raw materials including soil, fill, sand, gravel and landscaping materials to be imported are free from IAS. Locations for supply e.g. quarries etc., will be assessed for the presence of IAS prior to materials being brought to site.</p> <p>All footwear/waders and/or equipment that is to be used within the aquatic environment will be treated to prevent foreign flora/fauna entering the water, and again after use, to prevent spread to other catchments.</p> <p>Non-native species control will be implemented and managed according to the following IFI document, noting that some works components are located at/near watercourses 'IFI Biosecurity Protocol for Field Survey Work' (IFI, 2010).</p> <p>For more information, please see the ISMP for the Proposed Development, Appendix 6F, which outlines all mitigation measures in relation to biosecurity on-site.</p>		
DURING CONSTRUCTION	<p>Water Quality</p> <p>The main potential for impacts is during the construction phase. Run-off of silt and pollution by accidental concrete/fuel/oil spill, will comprise the main sources of potential water quality impacts during the construction stage.</p> <p>Construction phase mitigation for hydrology will follow that outlined in Chapter 8 Water.</p> <p>A site-specific Surface Water Management Plan has been designed for the proposed development to avoid/minimize impacts to water quality within and downstream of the site. Refer to Chapter 3 Civil Engineering for full details. In addition, the CEMP provides various management plans for the protection of water quality during the construction</p>	Project Ecologist/ECOW Appointed Contractor	Chapter 6 Biodiversity Chapter 8 Water CEMP

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	<p>phase. The CEMP also provides for the appointment of a Site Environmental Manager who will be responsible for checking and monitoring construction works from an environmental perspective, including the protection of water quality in receiving watercourses.</p> <p>A programme for water monitoring will be prepared in consultation with Inland Fisheries Ireland prior to the commencement of the construction of the wind farm. The plan will include monitoring of water during the pre-construction, throughout construction and in the immediate post construction phases.</p> <p>Further baseline water quality monitoring of all streams near the development site will be undertaken prior to construction to confirm existing conditions at the time of construction. This baseline data will include the main components of a full hydrograph for the streams including both high spate flow and base flow where possible.</p> <p>Silt control will be a primary concern during the construction stage, as silt has been identified as a sediment source to downstream areas. Silt ponds will be required mitigation to access tracks and swales at the proposed development site as these are considered an effective method of retaining silt. The design of these features will be in accordance with best practice, oversized and retained post construction.</p> <p>During the construction phase of the project, water quality in the streams and outflow from the drainage and attenuation system will be monitored, field-tested and laboratory tested on a regular basis during different weather conditions. This monitoring together with the visual monitoring will help to ensure that the mitigation measures that are in place to protect water quality are working effectively.</p> <p>During the construction phase of the project, the development areas will be monitored regularly for evidence of groundwater seepage, water ponding and wetting of previously dry spots, and visual monitoring of the effectiveness of the constructed drainage and attenuation system to ensure it does not become blocked, eroded, or damaged during the construction process.</p> <p>Prior to any construction activity being carried out, the subject part(s) of the proposed development site will be inspected for areas that may be prone to siltation of nearby rivers/streams and drains as appropriate. Where necessary, check dams, sand-bags and/or silt fences will be installed in adjacent trackside drainage ditches to ensure an optimum standard of water running into adjacent streams from the trackside drainage. During periods of heavy precipitation and run-off, works will be halted if posing a risk to the water environment or working surfaces/pads will be provided to minimise soil disturbance. Any requirement for temporary fills or stockpiles will be covered with polyethylene sheeting of suitable grade/gauge to avoid sediment release during periods of heavy rainfall.</p> <p>Additional infrastructure and measures used to control water quality will include:</p> <ul style="list-style-type: none"> • Settling out as far as reasonably practicable any silty water generated on site through drainage mitigation measures (silt traps, etc.) and channeled into suitable vegetation (as defined by ECoW) at least 50 m from watercourses; • Establishing vegetation on exposed areas by using top sod or reseeding with a suitable seed mix; • Regular access track cleaning; • Use of wheel washes; • Use of check dams on drains to slow water velocity; 		

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	<ul style="list-style-type: none"> • Use of silt fences on drains to reduce sediment loading; • Daily and weekly weather forecast monitoring; and • Programme of daily, weekly, and monthly water quality monitoring. <p>All design and works in proximity to watercourses will follow the best practice guidance outlined in the following documents:</p> <ul style="list-style-type: none"> • Draft Revised Wind Energy Development Guidelines (DHPLG, 2019); • ‘Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters’ (IFI, 2016); • ‘Control of water pollution from linear construction projects’ (Murnane et al. 2006); • ‘Guidelines for the crossing of Watercourses during Construction of National Road Schemes’ (NRA, 2008). <p>A site-specific Water Quality Management System has been designed for the proposed development to avoid and minimize impacts to water quality within the site (refer to Chapter 3 Civil Engineering).</p> <p>Dewatering</p> <p>All ground water/surface water that may enter turbine foundations or cable trenches/joint bays will be removed and treated and disposed of appropriately, in accordance with best practice. Any dewatering (if/where required) will adhere to the following measures:</p> <ul style="list-style-type: none"> • Ground water/surface water will not be pumped directly into trackside drains/watercourses; • Ground water/surface water which has become silted within the turbine foundations will be pumped to the surface water drainage system to settle out; and • Ground water/surface water which has become silted within the trenches/joint bays will be pumped and allowed to infiltrate to a designated percolation area (area designated by the ECoW). Dedicated settlement ponds will be provided adjacent to the site tracks, proposed borrow pit location, hard stands, substation. The design and locations of the ponds are outlined in Chapter 3 Civil Engineering. Where necessary, sediment ponds will be partly filled with stone so that they will not present a long-term safety risk. The remaining ponds will be left to fill in and re-vegetate naturally or retained as ponds. <p>Cement Bound Granular Mixtures (CBGM)</p> <p>For the cable trench construction, temporary storage of CBGM will be on hardstand areas, or areas that are not prone to run off. These areas will be located where there is no direct drainage to surface waters and where the area has been appropriately bunded. Bunding will be in the form of sandbags, geotextile sheeting, or silt fencing. This method will prevent any solid run-off. Concrete truck chutes will be washed out at a dedicated, bunded area.</p> <p>Forestry Felling</p> <p>Harvesting is the main of two forest operations that can cause nutrient run-off to water bodies and contribute to their eutrophication unless mitigating measures are taken. The Forestry and Water Quality Guidelines (DMNR, 2000)</p>		

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	<p>and Standards for Felling & Reforestation (DAFM, 2019) describe best practice that must be adopted if carrying out felling. A harvesting plan and associated mapping will be prepared and will include a review of the felling areas, environmental receptors – water features (including aquatic zones, relevant watercourses, hotspots, water abstraction points and crossing points), biodiversity (including hedgerows and other habitats), selection of felling and extraction system and machinery, silt and sediment control, timing, and extraction management.</p>		
	<p>Fuel Management</p> <p>All plant will be refuelled on site e.g. excavators, dumpers etc, while rigid and articulated vehicles will be fuelled off site as will all site vehicles (jeeps, cars and vans). At construction stage, a Fuel Management Plan will be developed specific to the site and the particular plant and equipment required for construction.</p> <p>The plan outlined will have regard to the following elements:</p> <ul style="list-style-type: none"> • Mobile bowsers, tanks and drums will be stored in a secure, impermeable storage area, away from drains and open water; • Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores; • Ancillary equipment such as hoses, pipes will be contained within the bund; • Taps, nozzles or valves will be fitted with a lock system; • Fuel and oil stores, including tanks and drums, will be regularly inspected for leaks and signs of damage; • Only designated trained operators will be authorised to refuel plant on site; • Procedures and contingency plans will be set up to deal with emergency accidents or spills; and • An emergency spill kit with oil boom and absorbers will be kept on site in the event of an accidental spill. <p>A detailed fuel and oil management plan can be found in the CEMP.</p> <p>Refuelling of Construction Plant On-Site</p> <p>The following measures will be undertaken to avoid or minimise negative effects to water quality as a result of the use of hydrocarbons:</p> <ul style="list-style-type: none"> • Refuelling will be carried out using 110% capacity double banded mobile bowsers. The refuelling bower will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using; • Mobile bowsers, tanks and drums will be stored in secure, impermeable storage area, away from drains and open water; • To reduce the potential for oil leaks, only mechanically sound vehicles and machinery will be allowed onto the site. An up to date service record will be required from the main contractor; 		

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	<ul style="list-style-type: none"> • Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; the nearby dirty water drain outlet will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in a licensed facility; • Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery; • In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery. 		
	<p>Construction Wheel Wash</p> <p>A Construction Wheel Wash will be used for vehicle wheels and undersides entering and leaving the construction site. Water residue from the wheel wash will be fed through a settlement pond for settling out of suspended solids. The wheel wash area will be cleaned regularly so as to avoid the buildup of residue. While these measures pertain to hydrology, and are included in the CEMP, they also relate to aquatic biodiversity, so are included here.</p> <p>Temporary Construction Compound</p> <p>The following measures will be undertaken to avoid or minimise negative effects to water quality as a result of the erection of the temporary compound:</p> <ul style="list-style-type: none"> • Drainage within the temporary site compound will be directed to an oil interceptor to prevent pollution if any spillage occur; • A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils etc.; and • The compound will be in place for the duration of the construction phase and will be removed once commissioning is complete. <p>Storage</p> <p>The storage of materials, containers, stockpiles, and waste, however temporary, will follow best practice at all times and be stored at designated areas. Storage will be located as follows:</p> <ul style="list-style-type: none"> • Away from drains and sensitive habitats (IEFs); • On an impermeable base; • Under cover to prevent damage from the elements; • In secure areas; and • Well away from moving plant, machinery and vehicles. <p>All containers will be stored upright and clearly labelled. Sufficient storage will be supplied near to all working areas.</p>		

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	<p>Excavation Works</p> <p>Excavation works relate mainly to trench digging and excavations. Mitigation in soil management as outlined in Chapter 9 Land and Soil will also apply. The following measures will be undertaken to avoid or minimise negative effects to water quality as a result of excavation works:</p> <ul style="list-style-type: none"> • Earth movement activities will be suspended during periods of prolonged rainfall events; • The earthworks material will be placed and compacted in layers to prevent water ingress and degradation of the material; and • Drainage and associated pollution control measures will be implemented on site before the main body of construction activity commences. <p>Excavated Materials and Soil Management</p> <p>All soils generated from excavation works within the wind farm associated with turbines, access track, substation, grid connection and internal cable construction will be retained on site and reused in bunding, landscaping and restoration of the borrow pit and deposition areas. No soils will be removed from the site. Permanent stockpiling of soils will not take place.</p> <p>During excavations in the existing tracks, excavated material will be temporarily stockpiled adjacent to the section of trench, with appropriate material used as backfill. Appropriate siltation measures will be put in place prior to excavations. Stockpiles will be stored a minimum of 50m back from rivers/streams on level ground with a silt barrier installed at the base.</p>		
DURING CONSTRUCTION	<p>The present assessment has identified loss of semi-natural grassland and woodland/hedgerows habitats as an Adverse Effect of Slight Significance.</p> <p>While habitat loss cannot be mitigated, the loss will be offset through a Biodiversity Enhancement Management Plan (BEMP). The BEP is described in Chapter 6 Biodiversity (Section 6.7) and is presented in full in Appendix 6E.</p> <p>Briefly, the BEMP will preserve and enhance parts of the proposed development site for Biodiversity through the following main measures:</p> <ul style="list-style-type: none"> • Creation of ponds/wetland habitat; • Creation of invertebrate refugia; • Retention and enhancement of existing boundary habitats; and • Creation of linear wildflower meadow habitat. <p>The above will benefit bird species through the supply of breeding and foraging habitats during the lifetime of the proposed development.</p> <p>This Plan will compensate for the loss of habitats used by birds.</p>	<p>Project Ecologist/EC oW</p> <p>Appointed Contractor</p>	<p>Chapter 7 Ornithology</p> <p>CEMP</p>

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	<p>A range of passerine bird species breed within the Site, including meadow pipit (Red-listed) and Amber-listed species such as skylark, goldcrest and willow warbler. In compliance with Section 22 of the Wildlife Acts 1976 to 2022 as amended, all vegetation required to be cleared, including tree felling, to facilitate the works will be done outside of the restricted period from 1st March to 30th August.</p> <p>Should it be necessary to remove vegetation during the breeding season, for instance where bramble and ephemeral plant species have become established on ground cleared earlier, this will be surveyed by an ornithologist up to 10 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the ornithologist. The restriction will be maintained until it is established that any young birds present have fledged. Should an instance arise where the placement of a restriction would have significant implications for the time frame of the Proposed development, and where no alternative mitigation is available, the ornithologist will prepare a report (to include species, stage of breeding etc.) on the implications of removal of the nest in the context of the Wildlife Acts and consultation will be undertaken with the NPWS.</p> <p>An ECoW will be on site for the duration of the construction phase and will ensure that all mitigation measures relating to ornithology described in this report are implemented. In particular, the ECoW will monitor that any restriction zone implemented will be strictly adhered to.</p>		
DURING CONSTRUCTION	<p>A site drainage system will be constructed on the proposed Wind Farm site so as to attenuate run-off, guard against soil erosion and safeguard downstream water quality. The drainage system will be implemented along all internal site access tracks, storage areas, crane hardstand areas and site construction temporary compound. Details of the proposed site drainage system are given in the Planning Drawings.</p> <p>The drainage system will be excavated and constructed in conjunction with the access tracks and crane hardstand construction.</p> <p>The concepts and details pertaining to the drainage philosophy are described in Chapter 3 (Section 3.13) of the EIAR prepared as part of this planning application.</p> <p>The following gives an outline of drainage management arrangements:</p> <ul style="list-style-type: none"> • The surface water run-off drainage system will be implemented along all internal access routes, to separate and collect 'dirty water' run-off from the track and to intercept clean over land surface water flows from crossing internal tracks; • To achieve separation, clean water drains will be positioned on the upslope and dirty water drains positioned on the downslope of track sides, with track surfaces sloped towards dirty drains; • Clean water will be piped under both the access track and downslope collection drains to avoid contamination. Piping the clean water under the access tracks allows the clean water to follow the course it would have taken before construction thus mimicking the existing surface water over land flow pattern of the proposed development site and thus not altering the natural/existing hydrological regime on site. Noting that the natural hydrology of the wind farm site is already altered by the imposition of the current forestry drainage regime; • Measures addressed in the drainage design include: 	Appointed Contractor	Chapter 8 Water

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	<ul style="list-style-type: none"> ○ Check dams will be placed at regular intervals, based on slope gradient, along all drains to slow down runoff and to encourage settlement and to reduce scour and ditch erosion; ○ Check dams will be constructed in accordance with best practice utilising clean stone at points along the drainage channel during the construction phase to further mitigate against any sediment escaping to nearby watercourses; and ○ Low gradient drains will be provided. These reduce the velocity of flow in the drains, thus reducing soil and subsoil erosion and reducing hydraulic loading to watercourses. ● Where possible existing drains will remain untouched; ● Regular buffered outfalls that consist of numerous small drains off the main drain which end by fanning out into the surrounding vegetation by tapering drains. The drain will contain hard-core material to entrap suspended sediment; ● Drains carrying construction site runoff will be diverted into settlement ponds, which will promote sediment deposition and reduce hydraulic loading by slowing flow velocities allowing sediment to settle. Settlement ponds have been designed in the form of a three stage tiered pond system. The design of the settling pond system for the proposed development site is detailed in the Planning Drawings; ● These will be maintained by the contractor to the satisfaction of the client’s engineers and IFI for the entire construction period; ● Flow from the settlement ponds will enter the sediment traps where runoff will be cleaned further by a series of graded gravel filters. Silt traps will require regular inspection and cleaning and removed material will be disposed of at an appropriate location such as an on-site borrow pit; ● Drainage ditch outfalls from silt traps will discharge at regular intervals to mimic the natural hydrology by encouraging percolation and by decreasing individual hydraulic loadings from discharge points. The drainage ditches will flow onto the existing ground by fanning out onto the surrounding vegetation via tapering drains; ● The access tracks will be graded so that all runoff is directed to the dirty water drains. A low mound will be constructed between the track and the clean water drain to ensure that runoff from the track cannot flow into the clean water system; ● No disturbance will be permitted to the natural vegetative buffer. They can be fenced where necessary; and ● Best practice and practical experience on other similar projects suggests that in addition to the above outlined drainage plans there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Geotechnical Engineers. In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures outlined above and to ensure protection of all watercourses. These details are included in the CEMP and Surface Water Management System for the project (Chapter 3 and Appendix 2A and B). 		
DURING CONSTRUCTION	<p>Water Site Clearance</p> <p>Some keyhole felling of coniferous trees is required in the vicinity of T5 & T6 and the associated access track to these turbines. This is in excess of 100 metres from the nearest watercourses. Mitigation measures will be implemented in accordance with the Forestry and Water Quality Guidelines (DMNR, 2000) and Coillte (2009): Forest Operations & Water Protection Guidelines. These measures will prevent run-off erosion and consequent sediment release into the nearby watercourses.</p>	Appointed Contractor Site Environmental Manager	Chapter 8 Water

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DURING CONSTRUCTION	<p>Water River Crossing</p> <p>Any works taking place in the vicinity of unmapped watercourses or land drains will be undertaken in accordance with the mitigation measures set out in Chapter 8 Water and in the CEMP and Surface Water Management Plan contained in Appendix 2A and 2B respectively. Working near watercourses during or after intense or prolonged rainfall events will be avoided and work will cease entirely near watercourses when it is evident that there is a risk that pollution could occur. All construction method statements will be developed in consultation with Inland Fisheries Ireland and in accordance with the details in the CEMP accompanying this application. The selection criteria and other details of the proposed crossings can be found in Chapter 3 Civil Engineering. These crossings will be subject to a Section 50 application to ensure flood risk upstream and downstream of the crossing is not increased.</p>	Appointed Contractor	Chapter 8 Water CEMP SWMP
DURING CONSTRUCTION	<p>Water Drains</p> <p>A robust drainage system will be put in place including maintenance and enhancement of existing drainage, as well as new systems, to minimise sediment release during construction. The existing drainage system will be retained and improved where required. Along new access tracks, interceptor drains and silt traps will be put in place simultaneously with the construction of site access tracks and turbine base construction, such that excavation works and any constructed hard surface or mineral soils storage areas will have a functioning drainage system in place in advance of the main construction activity. Drains adjacent to access tracks, and cable trenches, will be excavated as outlined in the Forest Road Manual (Ryan et al., 2004). The increase in the rate of run-off along the route of the site access tracks and hard-standing areas will be mitigated by the proposed drainage system which includes the provision of settlement ponds to reduce the concentration of suspended solids in the run-off from these areas, and the addition of silt fencing where deemed necessary.</p> <p>Disturbance to the soil layer adjacent to these tracks will be minimised and thus there will be a low potential for an increase in suspended solids in the surface water run-off. Silt traps will be provided at regular intervals in the existing drains along the tracks to mitigate any increase in suspended solids in the surface water run-off due to trafficking these access tracks from the construction areas.</p> <p>Where the tracks have a gradient greater than 2%, check dams will be installed in the drains. The check dams will be constructed in stone of minimum size 37.5mm and will be laid at a spacing of between 9m and 30m dependent on the site slope. The bottom of the upper check dam will be at same height as top of lower check dam.</p>	Appointed Contractor	Chapter 8 Water
DURING CONSTRUCTION	<p>Water Sediment Control</p> <p>The runoff from the existing and new internal tracks will be collected in open drains on both sides of the track. These drains will outfall directly to the adjacent land. Each outfall will have a silt fence to collect the sediment in the runoff. Any residual sediment downstream of the silt fences will be trapped in the surface vegetation so that it does not contaminate the downstream watercourses. The runoff from each of the turbine and crane hardstand sites will be collected separately from the access track runoff and directed to settlement ponds. The ponds will allow any silt in the runoff to settle out before discharge to the adjacent vegetated surface. Details of the settlement ponds including calculation of the required size are included in Chapter 3 – Civil Engineering of the EIAR.</p> <p>Where the access tracks have a gradient greater than 2%, check dams will be installed in the drains. The check dams will be constructed with filter stone and will be placed at a spacing that is dependent on the drain gradient with shorter spacing used on steeper sections. The bottom of the upper check dam will be at same height as top of lower check dam.</p>	Appointed Contractor	Chapter 8 Water
DURING CONSTRUCTION	<p>Water Settlement Ponds</p> <p>Dedicated settlement ponds will be provided adjacent to access tracks, hardstands, substation, and storage areas. The criteria for settling efficiency will be in accordance with that set down in CIRIA B14 Design of Flood Storage Reservoirs</p>	Appointed Contractor	Chapter 8 Water

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	<p>(Hall et al. 1993), for the efficient removal of suspended solids. Settlement ponds will be put in place prior to excavation for turbines or construction of site access tracks.</p> <p>All drains adjacent to access tracks will discharge to settlement ponds which will reduce the flow velocity and allow the suspended solids to settle. There may be a requirement for a series of settlement ponds where storage volumes are insufficient to allow settlement. Drainage stone will be placed at the inlet and outlet to the ponds to filter the flows before they enter the ponds. The ponds will have a modular surface area of 24 m² to cater for a runoff area of 1,200 m². Where larger areas have to be catered for, the pond area will increase pro rata. The settlement capacity is independent of depth; however, a nominal depth of 1.00 metres will be used to allow for storage of settled material. The length to width ratio will be at least 5:1 to encourage uniform flow across the cross-section of the pond and to avoid short-circuiting of the flow.</p> <p>In the event of an emergency, the settlement ponds will provide a temporary holding area for any accidental spills on site as it will be possible to block off the outflow for a limited period. The settlement ponds will be fenced off for safety.</p> <p>The outfall detail from the ponds will include a shallow trough of 300mm depth, lined with an impermeable liner and filled with stone. This trough will be 2 metres in length and will encourage the diffuse spread of flow back into the downstream watercourses. This will also help to mitigate the effect of flows above the design flow rate.</p>		
<p>DURING CONSTRUCTION</p>	<p>Water Concrete Control</p> <p>During the pouring of concrete, effective containment measures will be implemented to avoid spilling concrete outside construction areas and to prevent concrete entering any part of the drainage system. To reduce the potential for cementitious material entering watercourses, concrete pours will be supervised by the Construction Manager. The construction manager will ensure that the area of the pour is completely drained of water before a pour commences. Pours will not take place during heavy rainfall.</p> <p>There will be a dedicated concrete chute washout area on site. Concrete trucks will be washed out off site at the source quarry. Wet concrete operations are not envisaged for this site within or adjacent to watercourses or aquatic zones. No batching will take place on site. However, if wet concrete operations are required in such locations, a suitable risk assessment will be completed prior to works being carried out.</p> <p>For the cable trench construction, temporary storage of Cement Bound Granular Mixtures will be in areas where there is no direct drainage to surface waters and where the area has been appropriately isolated with bunds.</p>	<p>Appointed Contractor</p>	<p>Chapter 8 Water</p>
<p>DURING CONSTRUCTION</p>	<p>Water Borrow Pit and Deposition Area</p> <p>There is one borrow pit and dedicated spoil storage areas proposed. The borrow pit proposed within the site will be used to obtain approximately 30000m³ of subsoil and 165,000m³ of site won stone aggregate for use in the construction of the wind farm. The borrow pit is located within the northern area of the site where it will be used as a source of hardcore for the construction of access tracks, crane hardstands and construction compound.</p> <p>Prior to felling of trees over the area of the proposed borrow pit; an interceptor drain will first be excavated upslope to intercept existing overland flows and divert them around the borrow pit prior to discharge via a buffer zone on the downslope side.</p> <p>Standing water, any surface water runoff or water pumped from within the borrow pit is likely to contain an increased concentration of suspended solids. Runoff or pumped water from the borrow pit will be isolated from the clean catchment runoff by means of a series of open drains that will be constructed within the area. These drains will contain</p>	<p>Appointed Contractor</p>	<p>Chapter 8 Water</p>

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	<p>check dams that will attenuate the flow and provide storage for the increased runoff from exceptional rainfall events. The settlement ponds have been designed to a modular size where if larger areas of runoff must be catered for at a single discharge point the size of the settlement pond will be increased pro rata.</p> <p>It is not anticipated that large volumes of groundwater will be encountered within the borrow pit. The bedrock in this area is comprised of sandstone bedrock which typically yields flow paths which are short, localised, and shallow. This is combined with the fact that there is no regional groundwater flow regime influencing groundwater inflows at the elevation of the borrow pit. Groundwater inflows will be influenced by recent rainfall and limited groundwater storage. It's location at the top of a ridge and alongside a watershed divide also ensures groundwater inflow will be restricted to recent recharge.</p>		
DURING CONSTRUCTION	<p>Cement products are hazardous and will always be stored in a Control of Substances Hazardous to Health (COSHH) store or similar (such as a shipping container), and only be in the open when in use. If cement products are temporarily located in the open, then they will be located within an impermeable bunded area and covered to prevent contact with rainwater. This will prevent direct drainage of cement storage areas to surface waters. Bunding will be in the form of sandbags or silt fencing.</p> <p>Spoil will also be stored around the turbines to a maximum height of 1m. The felled areas around the turbines have been identified as a potential additional area that will be used to store material; however, priority will be given to restoration of the borrow pit and the dedicated spoil storage areas.</p> <p>No permanent stockpiles will be left on site after the completion of the construction phase works. After completion of the turbine base reinstatement works will commence and all remaining stockpiles are to be removed for permanent disposal at the proposed deposition area within the site. Excavated soil will be removed to the designated material storage areas. Details of how materials will be managed on-site during construction are set out in Chapter 3 Civil Engineering.</p> <p>To facilitate both construction of the internal tracks and disposal of excavated spoil and to avoid double handling and unnecessary transportation, excavated spoil will, where possible, be placed during construction directly into material storage areas.</p> <p>Temporary stockpiles of spoil will not be permitted within 50m of any watercourse.</p> <p>The drainage of the material storage areas will include the provision of settlement ponds to reduce the concentration of suspended solids in the run-off from these areas, and the addition of silt fencing where deemed necessary. Overland flows will be diverted around these areas. Material storage areas will be monitored to manage any potential loss of suspended solids to surface waters.</p> <p>Any diesel or fuel oils stored on site will be protected by a bund with 110 % of the capacity of the storage tank.</p>	Appointed Contractor	Chapter 8 Water
DURING CONSTRUCTION	<p>Water Road Construction</p> <p>To mitigate against siltation of storm water runoff, track construction material will consist of crushed aggregate with low fines content. The use of quarry dust will not be permitted.</p>	Appointed Contractor	Chapter 8 Water
DURING CONSTRUCTION	<p>Water Plant and Refuelling</p> <p>Only qualified persons shall operate machinery or equipment. Machinery and equipment shall be checked on a regular basis to ensure they are working properly (no oil/fuel leaks etc.). No refuelling shall take place within 50m of any watercourse. Fuel will be stored in doubly bunded bowsers or in bunded areas at the site compound. Plant nappies</p>	Appointed Contractor	Chapter 8 Water

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	<p>and spill kits will be readily available on plant equipment or when working with fuel operated heavy tools. To mitigate against sources of contamination, refuelling of plant and vehicles will only take place within designated areas of the site compound or in other areas specifically designated for this purpose. Only emergency breakdown maintenance will be carried out on site. Appropriate containment facilities will be provided to ensure that any spills from breakdown maintenance vehicles are contained and removed off site.</p> <p>A suitable permanent fuel and oil interceptor shall be installed to deal with all substation surface water drainage. Temporary petrol and oil interceptors will be installed at the site compound for plant repairs/storage of fuel/temporary generator installation.</p>		
DURING CONSTRUCTION	<p>A dedicated storage area will be provided at the site compound for building materials such as cables, geotextile membranes, blocks, tools and equipment, fence posts and wire, booms, pipes etc. A Waste Management Plan will be prepared by the Appointed Project Contractor for the construction phase. This will be prepared with reference to ‘Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects’ (DoEHLG, 2006).</p> <p>Any material deemed unsuitable for re-use in the works will be transported off site in trucks and disposed of under license from Clare County Council. This will prevent any contaminated run-off to drains adjacent to access tracks during heavy rainfall.</p> <p>All personnel working on site will be trained in pollution incident control response, and an emergency response plan will be prepared as part of the CEMP.</p> <p>A Natura Impact Statement (NIS) was completed for the proposed development and determined that there will be no adverse impacts on any qualifying interests of protected Natura 2000 sites hydrologically linked and downstream of the proposed site. Additionally, associated mitigation measures as outlined will be implemented as part of this EIAR and the CEMP during the construction and operational phases to ensure that there will be no significant adverse effects on the hydrological or hydrogeological regime pertaining to the development site.</p>	Appointed Contractor	Chapter 8 Water
DURING CONSTRUCTION	<p>During the construction phase of the project, a surface water monitoring schedule, finalised prior to construction, will be followed. In summary, weekly field surface water quality chemistry monitoring will take place at the identified water quality monitoring locations outlined in Chapter 8 Water. The following parameters will be measured:</p> <ul style="list-style-type: none"> • pH (field measured) • Electrical Conductivity (field measured) • Temperature (field measured) • Dissolved Oxygen (field measured) • Total Dissolved Solids (TDS) (field measured) • Turbidity (field measured) <p>Each month, the ECoW will take samples from each location and bring to the laboratory for analysis on a range of parameters with relevant regulatory limits and EQSs. This will be compared with the baseline data obtained prior to construction from the EPA and from sampling. If the measured value exceeds the baseline values, the cause will be determined, and remedial measures put in place as necessary.</p> <p>The analytical determinants of the monitoring programme (including limits of detection and frequency of analysis) will be as per S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and</p>	Appointed Contractor Site Environmental Manager	Chapter 8 Water

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	<p>European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The likely suite of determinants will include:</p> <ul style="list-style-type: none"> • pH • Total Petroleum Hydrocarbons (TPH) • Temperature • Total Phosphorus • Chloride • Nitrate • Nitrite • Total Nitrogen • Orthophosphate • Ammonia N • Biochemical Oxygen Demand • Total Suspended Solids <p>Continuous, in-situ, monitoring equipment will be installed at selected locations. The monitoring equipment will provide continuous readings for turbidity levels, flow rate and water depth in the watercourses.</p>		
DURING CONSTRUCTION	<p>A Construction Environmental Management Plan (CEMP) will be developed and will be implemented during construction works providing a commitment to water quality mitigation and follow-up monitoring, reducing the risk of pollution, and improving the sustainable management of resources.</p> <p>The implementation of the environmental control measures, proposed and agreed mitigation measures, monitoring, and follow-up arrangements and management of impacts will be managed through the CEMP. The waste management plan provides for systematic waste management identifying types and quantities of wastes arising, their management, documentation, treatment or disposal, and the parties responsible, at all stages of the project. The CEMP provides the client and main project contractor with a practical guide to ensuring compliance with Planning and Environmental requirements by all parties.</p> <p>An Environmental Manager with appropriate experience and expertise will be employed by the appointed Principal Contractor for the duration of the construction phase to ensure that all the environmental design, control and mitigation measures outlined in the EIAR and supporting planning documentation in relation to the water environment are implemented. The Environmental Manager together with an environmental team will deal with drainage maintenance, mitigation measures and monitoring. The Environmental Manager will have the authority to stop construction activity if there is potential for adverse environmental effects to occur.</p>	Appointed Contractor Site Environmental Manager	Chapter 8 Water CEMP
DURING CONSTRUCTION	<p>The overall footprint of the proposed development is approximately 30% of the landholding boundary. To reduce the potential effect of changing the land use associated with the footprint of the proposed development, the footprint of the works has been minimized to avoid unnecessary soil sealing, disruption etc. Material extraction will be minimised as much as possible. A minimal volume of soil and subsoil will be removed to allow for infrastructural work to take place in comparison to the total volume present on the site due to optimisation of the layout by mitigation by design. A minimal volume of material will be imported to accommodate the works. This material is required for access track construction, hardstand construction and other structures such as the compound and storage facilities. Turbine locations, the alignment and rotation of the hardstands, and the routes of proposed new access tracks were designed</p>	Appointed Contractor	Chapter 9 Land and Soils

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	<p>to optimise the balance between access criteria and the required volumes of excavated and imported materials. The turbine foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation, and landscaped using the vegetated soil set aside during the excavation.</p> <p>The land associated with the footprint of the development will be reinstated at the end of the operational life of the wind farm such that it can be used again for agricultural/pastural and/or forestry purposes. The land outside the development footprint, within the study boundary will not be affected by the development, and current land use practices (agriculture/forestry) will remain in place on these lands over the lifetime of the development. The area of land required to construct, operate, maintain and ultimately decommission the wind farm has been kept to the minimum reasonably practicable area as part of the design process. Existing access tracks have been utilised in the design as much as possible such that the existing land use does not change in these areas of the site during the operational life of the wind farm. This approach minimises the area temporarily altered from its current land use.</p> <p>These measures are designed to reduce the effect of land use change by sequestering carbon, reducing waste (soil, subsoil, and rock materials), target limitations and controls on soil sealing, and not changing the use of the original lands where practicable.</p> <p>The proposed grid connection route was designed to minimise the length of cabling to connect the wind farm to the grid, with the majority of the route within existing tracks, thereby not significantly impacting on current land use.</p>		
DURING CONSTRUCTION	<p>Soil Erosion</p> <p>Materials used during the construction phase of the proposed development will be managed in line with the approved CEMP which can be found in Appendix 2A (the CEMP) includes site management controls to mitigate for soil erosion.</p> <p>Due to the significant loads that will be imposed by the outriggers of the main lifting crane during the erection process for the installation of the wind turbines on site; it is intended that the proposed crane hardstands will be constructed using excavation methods over the footprint of the hardstand area / turbine base.</p> <p>Excavations for turbine foundations will be the largest scale excavations onsite. These excavations will be completed to an approved temporary works design and carried out such that they are stable or adequately supported. This is likely to involve creating safe side slope angles, installation of drainage around and within the excavation, and installation of sediment control measures within the drainage system to prevent soil erosion. Sediment control measures and further measures to limit soil erosion and discharges to the drainage system are outlined in Chapter 3 Civil Engineering and the CEMP.</p> <p>Drainage will be constructed in parallel with access track construction and turbine excavation, including drains and stilling ponds, etc. A combination of new and upgraded drainage networks will be installed within the site. The existing drainage network will be upgraded, where necessary, and settlement ponds and sediment traps installed at key locations. The drainage network has a twin system of water management separating out clean water from dirty water. This network and design approach is outlined in Chapter 3 Civil Engineering of this EIAR. Temporary works will be such that they do not adversely interfere with existing drainage channels/regimes.</p> <p>Temporary stockpiles of excavated spoil, stored in the footprint of the excavation areas, will be directed for use in backfilling and restoration or placed in the deposition areas on site. Reusable excavated sub-soils and aggregate will be stored in temporary stockpiles at suitably sheltered areas to prevent erosion or weathering and shall be shaped to ensure rainfall does not degrade the stored material. Stockpiles will be stored away from any open surface water</p>	Appointed Contractor	Chapter 9 Land and Soils

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	<p>drains, managing height and slope of all stockpiles and minimising soil movement. Estimated volumes of material can be found in Chapter 3 Civil Engineering of this EIAR.</p> <p>Whenever possible, existing access tracks have been utilised to access turbine locations. This reduces the volume of excavated material and imported crushed rock for track construction. Excavations and material removal that will take place during the construction phase will be localised to the turbine locations and access tracks.</p> <p>Excavated material from the grid connection route will be used to reinstate the area around the cable trench following backfilling of the trench with approved materials. Any excess material from the grid connection route will be removed and disposed of to the onsite deposition areas or to an appropriate facility licensed to accept such waste.</p> <p>The implementation of erosion and sediment controls will be made prior to the commencement of site clearance works. Silt traps, such as geotextile membrane, will be placed in the existing drainage network prior to construction work. These will be inspected weekly by the Environmental Manager and cleaned regularly as required as directed by the Environmental Manager.</p> <p>Soil Compaction</p> <p>The CEMP includes minimum site management controls to reduce and mitigate for compaction.</p> <p>A Traffic Management Plan (TMP) (Appendix 2D) has been developed to manage and control vehicular movement onsite. Measures will include the scheduling of HGVs during the construction phase to reduce the number of vehicle movements in, through and off site. This in turn will reduce the impact of soil compaction and erosion. Unscheduled vehicles will not have access to the site. Machinery will not operate directly on excavated/stockpiled soils. Heavy vehicles will only follow designated and newly constructed access tracks and avoid loading areas which are not contained within the footprint of the main works to minimise disturbance of the original soil and subsoil formations and to retain soil structure.</p> <p>The compound, vehicles, stockpiled materials and heavy machinery will be in place for the duration of the construction phase and will be removed once commissioning is complete.</p> <p>Within and around excavations, pore water pressure will be kept low by avoiding loading the soil/subsoil and giving careful attention to the existing drainage, as compaction would alter the surface drainage regime (see Chapter 8 Water).</p> <p>Slope Stability</p> <p>All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Temporary works will be such that they do not adversely interfere with existing drainage channels/regimes.</p> <p>All site excavations and construction will be supervised by a suitably competent and experienced engineer. The Contractor's method statements for each element of work will be reviewed and approved by the engineer prior to site operations. Prior to excavation, drains will be established to effectively intercept overland flow prior to earthworks. The existing network of drainage within the site will be utilised whenever possible. From examination of factual evidence to date, the majority of landslides occur after an intense period of rainfall. An emergency response system will be developed for the construction phase of the project, particularly during the early excavation phase. This, as a minimum, will involve 24 hour advance meteorological forecasting (Met Éireann download) linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded (e.g. 1 in 100 year storm event or very</p>		

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	<p>heavy rainfall at >25mm/hr), planned responses will be undertaken. These responses will include cessation of construction until the storm event including storm runoff has passed over.</p> <p>From a desk-top review, the GSI’s Landslide Events database have no records of any landslide events recorded within or in proximity to the site. The three closest events include “Ayleacotty 2009” 16km northeast, with the collapse of a steep railway bank, “Slieve Bearnagh 2003” 16km north, with a peat flow onto the local road, and “Fort Henry 1948” 18km northeast, with a riverbank rupture.</p> <p>A competent project geotechnical engineer or engineering geologist will be employed during the construction phase of the works. As part of the detailed design and assessment, identification of potential planes of weakness will be made in the overburden such as discrepancies in the material type and foliation direction in the bedrock. Earthworks will be constructed to safe stable angles in accordance with the detailed design and best practice.</p> <p>Plant and materials will be stored in approved locations only (such as the proposed temporary site compound) and will not be positioned or trafficked in a manner that would surcharge existing or newly-formed slopes.</p>		
DURING CONSTRUCTION	<p>The CEMP (Appendix 2A) includes site management controls to mitigate for contamination /pollution.</p> <p>The permanent access track works will require a drainage network to be in place for the construction and operation phases of the wind farm. Fundamental to any construction phase is the need to keep clean water (i.e. runoff from adjacent ground upslope of the permitted development footprint) clean and manage all other runoff and water from construction in an appropriate manner. Wheel wash facilities will be available onsite for the duration of the construction phase. These, and other measures are outlined in the CEMP (Appendix 2A). The proposed surface water drainage is summarised in Chapter 3 Civil Engineering, Chapter 8 Water and Chapter 15 Material Assets.</p> <p>A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils etc.</p> <p>Good site practice will be applied to ensure no fuels, oils or any other substance are stored in a manner on site in which they may spill and enter the ground, particularly when the initial top layer of made ground is excavated. Dedicated, bunded storage areas will be used for all fuels or hazardous substances. Spill kits will be maintained on site. The CEMP includes a management plan and can be seen in Appendix 2A.</p> <p>The potential for hydrocarbons getting into the existing drains, local watercourses, and the land and soils environment will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed re-fuelling procedure. A fuel management plan will be implemented incorporating the following elements:</p> <ul style="list-style-type: none"> • Refuelling of Construction Plant On-Site - Refuelling will be carried out using 110% capacity double bunded mobile bowers. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using. Plant nappies or absorbent mats will be placed under refuelling points during all refuelling to absorb drips. Mobile bowers, tanks and drums will be stored in secure, impermeable storage areas, over 50m away from drains and open water. To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up to date service record will be required from the main contractor. Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits, all oil and any contaminated material will be removed and properly disposed of in a licensed facility. Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery. Correct action in the event of a leak or spill will be facilitated by training all 	Appointed Contractor Site environmental Manager	Chapter 9 Land and Soils Chapter 3 Civil Engineering Chapter 8 Water and Chapter 15 Material Assets CEMP

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	<p>vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction. In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery.</p> <ul style="list-style-type: none"> Materials Handling, Fuels and Oil Storage - Leakages of fuel/ oil from stores will be prevented by storing these materials in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Taps, nozzles or valves will be fitted with a lock system. On-site washing of concrete truck barrels will not be allowed. A designated chute wash down area, which will retain the washout water, will be located within the construction compound and there will be no other chute wash down activity on any other part of the site. <p>The drainage and treatment system will be managed and monitored and particularly after extreme rainfall events during the construction phase. Controls will be regularly inspected and maintained. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage this programme. A checklist of the inspection and maintenance control measures will be developed and records kept of inspections and maintenance works. The purpose of this management control is to ensure that the measures in place are operating effectively, prevent accidental leakages, and identify potential breaches in the protective retention and attenuation network during earthworks operations.</p> <p>Stockpiles of stripped topsoil will be in locations with minimum trafficking to prevent damage and dusting.</p> <p>The access track surface can become contaminated with clay or other silty material during construction. Access track cleaning will, therefore, need to be undertaken regularly during wet weather to reduce the volume of sediment runoff to the treatment system. This is normally achieved by scraping the track surface with the front bucket of an excavator and disposing of the material at designated locations within the site.</p>		
<p>DURING CONSTRUCTION</p>	<p>Land and Soils Rock Blasting</p> <p>As part of the constraints led design process, the borrow pit and the most northerly proposed turbine foundations have been located in areas away from steep slopes, a large change in the topography, and of thin soil cover as per Chapter 3 Civil Engineering of this EIAR. Turbines and infrastructure in these areas are deemed to have low susceptibility to landslides. In order to further mitigate against possible slope instability close to the borrow pit, blasting will not occur after periods of heavy rainfall. In particular, no blasting will take place for at least 24 hours following a period of rainfall which exceeds 25mm within the previous 24 hours. Rock blasting will only take place within the borrow pit if extraction using rippers or hydraulic breakers is deemed impractical. Circumstances include where the rock strength is such that other means of extraction are not possible and production rates need to be increased to keep up with the construction programme. If rock blasting proves to be necessary, a detailed blasting design will be undertaken by a suitably qualified and experienced specialist for each location to ensure that a peak particle velocity (PPV) of 10 mm/s is not exceeded at a distance of greater than 20m from the blast holes as per BS 7385 Part 2: 1993. If this cannot be achieved, blasting will not be permitted at this location. To mitigate the risk of slope failure occurring, blasting will not be permitted at turbine locations unless robust mitigation measures are put in place. Blasting for the access track cuttings and hardstands will be subject to the same rigorous controls as that proposed at borrow pit and turbine foundation locations. To mitigate against the risk of excessive dust within the vicinity of the borrow pit, the blast areas will be lightly sprayed with water prior to blasting. A Blast Management Plan will ensure compliance with the Explosive Act 2006 (amended by Part 6 of the Criminal Justice Act 2006) and related</p>	<p>Appointed Contractor</p>	<p>Chapter 9 Land and Soils CEMP</p>

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	<p>legislation, and BS 7385 in relation to blasting. Clare County Council, An Garda Síochána, and adjoining landowners will be notified in advance of any blasting activities on the site. The Blast Management Plan will be prepared by the appointed contractor prior to the construction phase and in consultation with Clare County Council, An Garda Síochána and adjoining landowners. Blasting will not occur at the same time as blasting at the adjoining quarry. Additionally, the NPWS and any other required consultees will be consulted as part of the general consultation and blasting permitting process, in order to keep them informed of any blasting proposals for the site.</p>		
DURING CONSTRUCTION	<p>Topsoil removed from felled areas for the construction of the proposed development will be used in landscaping works or placed in the deposition areas. Where possible, the vegetative layer will be stored with the vegetation and soil facing the right way up to encourage regrowth. The felling areas will then be monitored and maintained following construction and into the operational phase of the development.</p> <p>Any runoff from the clear felled areas will be treated using the same design philosophy as that for the access tracks and hardstands. This includes the separation of clean and dirty water by the installation of berms, channelling dirty water to silt traps and settlement ponds and ensuring that the discharge rate of the drainage system is no higher than the existing condition by using engineered settlement ponds.</p> <p>Where practicable, brash mats will be used to support vehicles on soft ground, reducing soil erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along off-track routes where practicable, to protect the soil from compaction and rutting.</p> <p>All works will be completed to standard forestry guidelines (Department of Agriculture, Food and the Marine [Teagasc], 2019, Standards for Felling and Reforestation), and in accordance with licence conditions issued by the Forest Service.</p> <p>At the end of the forestry lifetime in the felling areas, the felling will be subject to the requirements of a felling licence and adherence to the environmental mitigation measures associated with the licence.</p>	Appointed Contractor	Chapter 9 Land and Soils
DURING CONSTRUCTION	<p>The mitigation measures for the grid connection route and substation will be the same as those at the wind farm site as discussed in previous sections. These include mitigation measures for soils and geology, drainage, siltation control, hydrocarbon release and general site management and will be fully in line with any requirements identified in the Environmental Management Plans found in the CEMP (Appendix 2A).</p>	Appointed Contractor	Chapter 9 Land and Soils CEMP
DURING CONSTRUCTION	<p>The contract documents shall specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures when deemed necessary to comply with recommendations of BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise. The following list of measures will be implemented, where necessary, to ensure compliance with the relevant construction noise criteria:</p> <ul style="list-style-type: none"> No plant used on site will be permitted to cause an on-going public nuisance due to noise. The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. 	Appointed Contractor Site Environmental Manager	Chapter 10 Noise and Vibration CEMP

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	<ul style="list-style-type: none"> • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract. • 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. • Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use. • Any plant, such as generators or pumps, which is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen. • During the construction programme, supervision of the works will include ensuring compliance with the construction limits using methods outlined in BS 5228- 1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise. • The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs weekdays and between 7:00hrs and 14:00hrs on Saturdays. However, to ensure that optimal use is made of good weather period or at critical periods within the programme (i.e. concrete pours) or to accommodate delivery of large turbine component along public routes it could be necessary on occasion to work outside of these hours. Any such out of hours working will be agreed in advance with the local Planning Authority. • Where rock breaking is employed, the following are examples of measures that will be implemented, where necessary, to mitigate noise emissions from these activities: <ul style="list-style-type: none"> ○ Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency. ○ Ensure all leaks in air lines are sealed. ○ Erect acoustic screen between compressor or generator and noise sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured. ○ Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation. <p>Vibration levels will not exceed those described in BS5228 –1&2:2009 + A1 2014, Code of Practice for the Control of Noise and Vibration on Construction and Open Sites and this chapter.</p>		
<p style="text-align: center;">DURING CONSTRUCTION</p>	<p>Construction vibration</p> <p>Vibration associated with construction activities will be limited to the values set out in Section 10.2.5. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause damage.</p> <p>Although the assessment concluded that the proposed development is not predicted to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to buildings, the following measures shall be implemented during the construction period:</p>	<p>Appointed Contractor Site Environmental Manager</p>	<p>Chapter 10 Noise and Vibration CEMP</p>

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	<ul style="list-style-type: none"> • A clear communication programme will be established to inform closest building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars. • Alternative less intensive working methods and/or plant items shall be employed, where feasible. • Appropriate vibration isolation shall be applied to plant, where feasible. • Cut off trenches to isolate the vibration transmission path shall be installed where required. • Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values. <p>Vibration levels will not exceed those described in BS5228 –1&2:2009 + A1 2014, Code of Practice for the Control of Noise and Vibration on Construction and Open Sites and this chapter.</p>		
DURING CONSTRUCTION	<p>A Blast Management Plan will be prepared and implemented during the construction phase. The following mitigation measures will be incorporated into the Blast Management Plan and complied with during blasting operations:</p> <ul style="list-style-type: none"> • The appointed contractor will liaise with O’ Connells quarry to ensure blasting that may be required are carried out for the proposed development at different times to blasting at O’ Connell Quarry. • Trial blasts will be carried out in less sensitive areas to assist in blast designs and identify potential zones of influence. • An appropriate burden will be ensured to avoid over or under confinement of the charge. • Accurate setting out and drilling will be implemented. • Appropriate charging will be implemented. • Appropriate stemming with appropriate material such as sized gravel or stone chipping will be implemented. • Detonation will be delayed to ensure small maximum instantaneous charges. • Decked charges and in-hole delays will be implemented. • Blast monitoring will be carried out to enable adjustment of subsequent charges. • Good blast design will be ensured to maximise efficiency and reduce vibration. • Using exposed detonating cord on the surface will be avoided. • Hours within which blasting can be conducted will be restricted. • A publicity campaign will be undertaken before any work and blasting starts (e.g. 48 hours written notification). • The firing of blasts at similar times will be implemented to reduce the ‘startle’ effect. • On-going circulars informing people of the progress of the works will be issued. 	Appointed Contractor Site Environmental Manager	Chapter 10 Noise and Vibration CEMP

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	<ul style="list-style-type: none"> An onsite documented complaints procedure will be implemented. Independent monitoring by external bodies for verification of results will be implemented. 		
DURING CONSTRUCTION	Shadow Flicker Not required.	Not applicable	Not applicable
DURING CONSTRUCTION	<p>Landscape Mitigation Measures:</p> <p>Tree protection and fencing are will be implemented where necessary during the construction phase, in the vicinity of the substation and where other areas of trees/woodland are in close proximity to construction.</p> <ul style="list-style-type: none"> Mitigation measures include the re-instatement of the areas following the construction phase, including replanting of the hedgerow with native species similar to what is to be removed at the temporary entrance. The borrow pit will be allowed to re-vegetate. Areas of cut and fill will be minimised, and any bare areas will be left to naturally re-vegetate (or as otherwise advised by ecologist). There will be no bunding or stockpiling of materials near the archaeological features in the north-west of the site. <p>Enhancement Measures:</p> <ul style="list-style-type: none"> Enhancement measures are set out in the BEMP (see Appendix 6E) and referred to in Chapter 6 Biodiversity. Those aiding in landscape and visual effects include: Existing internal treelines and hedgerows will be enhanced within the site, where possible. This includes planting up any large gaps with appropriate native shrubs and trees. Approximately 967 metres of native hedgerow planting is proposed. Linear sections adjacent to the proposed internal access tracks, and reinstated areas around turbines will be allowed to be colonised with local plants through natural dispersion and germination. 	Appointed Contractor	Chapter 12 Landscape and Visual BEMP Chapter 6 Biodiversity
DURING CONSTRUCTION	<p>Cultural Heritage General</p> <p>Groundworks associated with cuttings through townland / barony/ county boundaries will be kept to a minimum. Cutting locations will be archaeologically recorded and all boundary cuttings will be monitored with photographs and written descriptions.</p> <p>All ground disturbance associated with the construction of the proposed development will be monitored by a suitably qualified archaeologist working under licence issued by the Minister under Section 26 of the National Monuments Act (Amended) 1930 to 2014. Should archaeological material be found during the course of monitoring, the archaeologist may have work on site stopped, pending a decision as to how best to deal with the find (e.g. preservation in situ or excavation). Advice will also be sought from the National Monument Service (NMS). Having completed the work, the archaeologist will submit the report to the NMS.</p>	Appointed Contractor	Chapter 13 Cultural Heritage CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
DURING CONSTRUCTION	<p>Construction phase generated dust will be minimised by the following measures, which are also incorporated into the site-specific CEMP (Volume III, Appendix 2A):</p> <ul style="list-style-type: none"> • The use of water as a dust suppressant, e.g. a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise; • Public roads will be inspected regularly for cleanliness and cleaned as necessary; • All loads entering and leaving the site will be covered during dry periods if dust results in a disturbance on site; • Control of vehicle speeds passing over access tracks and crane hardstanding areas within the site; • Wheel wash facilities will be implemented at the site entrance from the public road to facilitate removal of any material collected by vehicles entering or leaving the site and preventing its deposition on public roads; • Site stockpiling of materials will be designed and laid out to minimise exposure to wind; • Daily site inspections will take place to examine dust measures and their effectiveness. 	<p>Appointed Contractor Site Environmental Manager</p>	<p>Chapter 14 Air and Climate</p>
DURING CONSTRUCTION	<p>Construction traffic emissions will be reduced using the following measures:</p> <ul style="list-style-type: none"> • Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently; • Implementation of the Traffic Management Plan (Volume III, Appendix 2D) to minimise congestion; • All site vehicles and machinery will be switched off when not in use, and no idling of engines will be permitted; • The majority of aggregate materials for the construction of the proposed development will be obtained from an on-site borrow pit. This will reduce the number of delivery vehicles to site, thereby reducing emissions associated with vehicle movements. 	<p>Appointed Contractor Site Environmental Manager</p>	<p>Chapter 14 Air and Climate</p>
DURING CONSTRUCTION	<p>The following measures will be implemented to ensure a safe and regulated traffic management system is enforced:</p> <ul style="list-style-type: none"> • Pre-construction and post-construction surveys will be carried out to ensure the structural integrity of the proposed haulage route road network. Repairs will be carried out on the public roads, as necessary, during the construction phase, to ensure that the condition does not deteriorate below a standard that could affect the use of the site, as required; • The appointed contractor will liaise with An Garda Síochána and Clare County Council during the construction phase. The appointed contractor will recognize that other external factors such as severe weather events can affect traffic flow close to the project and will endeavour to minimise the effect of the works on traffic in the planning of and programming of the works at construction stage. • Heavy vehicles traffic volumes generated by the proposed development construction could result in damage to existing and proposed road pavements on public roads, including at vehicle turning, accelerating and 	<p>Site Environmental Manager</p>	<p>Chapter 15 Material Assets</p>

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
	<p>decelerating locations. Road pavements will be regularly monitored and reinstated in accordance with the requirements of Clare County Council.</p> <ul style="list-style-type: none"> • Ensure a strict protocol for HGV drivers to follow the designated haulage route and timing restrictions, as detailed; • Haulage traffic would share the same route with local residents, tourists, and other road users, which would present risks. Advance warning will be given to the local residents and other users (i.e. cyclists) for specific times when large volumes of HGV traffic may occur; • All signage relating to the proposed construction traffic routes for construction traffic will be agreed with Clare County Council; • A well planned and executed delivery programme avoiding peak traffic on typical days will be ensured (i.e. local school start and finish times); • Adequate parking will be provided on site for both employees and visitors to ensure parking would not occur on the public road; and • A road sweeping vehicle will be provided as required to remove any mud that is deposited on the local road in the vicinity of the site access. • Wind turbine loads will be delivered in consultation with Clare County Council and An Garda Síochána, during off-peak traffic periods. 		
DURING CONSTRUCTION	<p>The impact of the wind farm on forest operations and the potential impact of forestry felling on the environment will be controlled as it currently is, by strict environmental controls, practices and guidelines as described by the relevant Forest Service Guidelines. Any tree felling required to facilitate the construction and operation of the wind farm will be kept to a minimum and under the terms of felling licences, obligations to replant clearfell areas will be fulfilled.</p> <p>The proposed project will not result in any significant adverse impacts on forest resources requiring additional mitigation.</p>	Site Environmental Manager	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.</p> <p>All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines</p>	Site Environmental Manager	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>Ballycar Green Energy will agree an acceptable aviation obstacle warning lighting scheme with the Department of Defence and the Irish Aviation Authority (IAA) ahead of turbine construction and will supply the coordinates and elevations for built turbines, as is standard for wind farm developments.</p> <p>To prevent any interference to surveillance radar to Woodcock Hill MSSR and the Shannon Airport PSR mitigation measures outlined in the Aviation Impact Assessment & Mitigation report will be applied, refer to Appendix 15 A.</p>	Site Environmental Manager	Chapter 15 Material Assets

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
DURING CONSTRUCTION	<p>Material Assets Television and Telecommunications</p> <p>In the event of interference to television and telecommunication services arising from the wind farm development, Ballycar Green Energy are committed to work with telecommunication providers to remedy any issues of interference to affected communication links.</p> <p>Contractors will be obliged to adhere to good practice measures outlined in the CEMP to prevent any impacts to television and telecommunication services during the construction phase.</p>	Site Environmental Manager	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>Material Assets Water and Wastewater</p> <p>All wastewater during the construction phase will be taken off-site by an authorised waste contractor and brought to an authorised waste facility.</p>	Site Environmental Manager	Chapter 15 Material Assets
DURING CONSTRUCTION	<p>Material Assets Waste Management</p> <p>Waste will be managed in accordance with the waste hierarchy in Council Directive 98/2008/EC on waste and section 21A of the Waste Management Act 1996, as amended, as follows: (a)Prevention; (b)re-use; (c)Recycling; (d)Other recovery (including energy recovery); and (e) Disposal.</p> <p>All waste for offsite treatment/disposal will be stored temporarily in appropriate dedicated storage areas. The areas in which waste is stored on site are segregated to prevent material and contaminated surface water runoff entering local surface water drains.</p> <p>All chemical, hydrocarbon or other controlled wastes will be stored in designated areas in appropriate approved containers within bunds or on spill pallets, as required.</p> <p>All waste to be removed from site will be undertaken by authorised waste contractors and transported to an authorised facility in accordance with best practice and the site waste management plan as discussed in the CEMP as included in EIAR Volume III Appendix 2A.</p>	Site Environmental Manager	Chapter 15 Material Assets
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Biodiversity Water Quality</p> <p>The measures for control of runoff and sediment relate to the construction phase of the project when there is continuous movement of site vehicles and delivery vehicles moving around the wind farm site. Following construction, the amount of on-site traffic will be very low and there will be negligible risk of sediment runoff. Runoff from the access tracks, hard-standings, and other works areas will continue to be directed to settlement ponds and from there to the outfall weirs. Check dams within the drainage channels will also remain in place. The retention of this drainage infrastructure will ensure that runoff continues to be attenuated and dispersed across existing vegetation before reaching the downstream receiving waters. This infrastructure will be inspected regularly by the operational maintenance personnel.</p> <p>The regular inspections during the operational phase will ensure culverts are free from blockages, and there is no damage or erosion of the stream crossing wing walls, particularly after storm events. Silt ponds will also be inspected and maintained before the drains and verges have vegetated.</p> <p>It is important to keep ecological disruption of watercourses to a minimum and to maintain the aquatic ecosystem in a healthy, functional condition. Biological water quality monitoring will be undertaken to monitor surface water quality during the operational phase.</p> <p>Macroinvertebrates will be sampled annually on the first, second and third years at aquatic sites listed in the aquatic report, and in future years if there is instability in the macroinvertebrate communities. Biotic indices corresponding with those used in the aquatic report, as well as Functional Feeding Group Analysis will be carried out in line with the</p>	<p>Wind farm operator</p> <p>Appointed contractor</p>	Chapter 6 Biodiversity

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
	<p>methodology described the aquatic report. A key biotic index in this regard is the Quality Rating System. This biotic index has been shown to be a robust and sensitive measure of riverine water quality and has been linked with both chemical status and land use pressures in catchments (Clabby et al., 1992).</p>		
<p>POST CONSTRUCTION /OPERATIONAL PHASE</p>	<p>Bat mitigation outlined in Section 6.5.2.1 (turbine buffer felling) aimed at reducing the potential of bat collision risk will reduce the potential for collision related mortality and barotrauma.</p> <p>Reduced rotation speed will be implemented when turbines are idling. 'Feathering' of idling blades may reduce fatality rates by up to 50% and does not result in a loss of output (NatureScot, 2021). Post-construction surveys will be carried out in order to assess the effectiveness of the proposed mitigation measures described. Monitoring will take place for at least 3 years, though not necessarily consecutively, post-construction as recommended by NatureScot (2021). Post-construction fatality monitoring and activity surveys will be carried out in years 1, 2, 3, 10, and 15 post-construction and will assess any changes in bat activity patterns to determine the effectiveness of the mitigation and can be used to inform any changes that may be required to curtailment strategy, should post-construction monitoring identify a need to enforce should feathering of blades prove ineffective. The NPWS will be contacted to discuss the full scope and timing of these post construction surveys prior to the completion of the construction phase. Post construction bat monitoring will be developed in line with recommendations in Marnell et al., (2022), SNH (2021) and those recommended by Bat Conservation Ireland (BCI, 2012).</p> <p>Monitoring of the operational phase shall include the following elements. Additional details are provided in Appendix 6A.</p> <ul style="list-style-type: none"> • Post construction monitoring of bat activity within the proposed development site (monitoring from April to mid-October at each turbine location); • Fatality searches for bats around each turbine location (SNH, 2021); • Monitoring of proposed bat boxes by a qualified ecologist, and relocation of any boxes with no evidence of use in the first year after construction. <p>This monitoring will identify if any additional measures are required to reduce effects on bat species. Based on the results, alterations and/or further enhancements will be undertaken, where required. Curtailment measures will be considered further if monitoring identifies bat fatalities underneath turbines. Such additional measures will include increases in cut-in speeds or curtailment. If required, each of these measures could be temporally and spatially focussed, e.g., only undertaken at individual turbines or in certain seasons at certain times.</p> <p>To ensure that the keyhole clear felled areas do not, over time, develop into habitats supporting high value macroinvertebrate production that would comprise a prey resource for bats, control of regrowth of trees/encroachment or scrub will be monitored and physically controlled within buffer areas to maintain vegetation at low-height, and retain the SNH recommended 50m clearance setback around relevant turbines.</p> <p>Bat boxes installed will be inspected within one year of erection, involving a daytime inspection of bat boxes using endoscope/thermal imagery scope. This will be undertaken for a minimum of 1 year. Seasonal inspection of bat boxes will be undertaken (excluding mid-June to mid-August, the lactation period of females, where any disturbance at this time can be detrimental to survival of young) to monitor bat usage and in wintertime for general wear and tear and to remove droppings following use the previous summer. This will be undertaken by a licensed bat-handler. Any boxes remaining unused after 1 year will be relocated (NRA, undated).</p>	<p>Wind farm operator</p> <p>Appointed contractor</p>	<p>Chapter 6 Biodiversity</p>

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Biodiversity Habitats & Flora</p> <p>An operational phase monitoring programme for habitat reinstatement areas will be developed by the Project Ecologist/ECOW and incorporated into the Biodiversity Enhancement Management Plan. This monitoring programme will be implemented post-construction and will evaluate the success of habitat reinstatement areas. Any additional measures deemed necessary to further facilitate reinstatement of habitats will be incorporated into the monitoring program by the Project Ecologist/ECOW. This plan will be agreed in advance with NPWS. The plan will be updated in light of the operational conditions and any statutory requirements. Vegetation structure and suitability for marsh fritillary within habitat reinstatement and enhancement areas will be monitored in line with NBDC survey methodology.</p> <p>Invasive species will continue to be monitored, and where required, managed throughout the operational phase, in accordance with the ISMP (see Appendix 6F).</p>	<p>Wind farm operator</p> <p>Appointed contractor</p>	<p>Chapter 6 Biodiversity</p>
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Ornithology Collision Risk Mitigation</p> <p>The CRM carried out for the proposed development identified three species, buzzard, kestrel and peregrine, as having a collision risk of more than one bird over the lifetime of the proposed development. Each of these species breeds within the Study Area.</p> <p>For buzzard and kestrel, the risk is likely to affect birds hunting through the site. Mitigation will be through discouragement of hunting birds from the area around the turbines. This can be achieved by the clearance of vegetation which attracts small mammals, birds and large insects (all prey items). This approach has proved highly effective at several wind farms in central-eastern Spain where the number of collisions with lesser kestrel decreased by 75% to 100% after the ground was superficially tilled to a distance of 80 m from the turbine base (Pescador et al. 2019).</p> <p>For the proposed development, the area which will be cleared of vegetation to discourage bat activity around the turbines will suffice for birds as well. This will be a 95 m radius around each turbine (see Chapter 6 Biodiversity Section 6.5.21). This area will be kept as a short sward through regular mowing and trimming from March through to October. Scrub or rank grass will not be allowed to become established within any of these buffer zones.</p> <p>For peregrine, the risk of collision is more likely associated with birds flying through the site when leaving or arriving at the breeding location rather than birds hunting around the turbines. As adult peregrines would normally be highly effective in avoiding man-made structures such as antennae, masts and turbines, the risk of collision is likely to be highest when inexperienced young birds are initially fledged and engaging in flight practice. As the young birds will often follow the adults in their initial practice flights, the turbines which pose the highest risk would be determined by the route used most regularly by the adults when exiting the breeding location.</p> <p>Mitigation to minimise risk of collision will be by real time monitoring of the breeding location through the breeding season or for as long as the breeding attempt is in progress. It is noted that in some years the site may not be occupied or breeding may be abandoned at any stage for various reasons, including inclement weather. In the early stage of the breeding cycle, focus will be on determining the routes taken by the adults when leaving the site (or arriving back at same). This may indicate the turbines which pose the highest potential risk of collision. Through June, emphasis will be on assessing the progress of the young and when the birds are fledged (the average date of fledging in Britian/Ireland is 20th June). At this stage the birds are highly vocal and easily detected by an observer. From thence on, focus will be on the behaviour and movements of the young birds. For several weeks, the young will be fed by the parents whilst they practice hunting themselves. If there are two or more young, they will also engage in social activities and play 'hunting games' in the air. As the young grow stronger, they and the parents move increasingly</p>	<p>Wind farm operator</p> <p>Appointed contractor</p>	<p>Chapter 6 Biodiversity</p>

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
	<p>further from the home cliff during the day but the family may return there at night to roost. With time, the young will gain full independence and will roost away from the natal cliff.</p> <p>From the above, it is considered that there is at least a 4-week period when the birds are at the highest risk of collision with the turbines. In this period, it may be preferable to curtail during daylight hours the turbine or turbines which are perceived (based on earlier observations) to pose the highest risk to fledgling collision. Alternatively, the approach might be to turn off the turbines immediately when the young birds are becoming active in the morning (which will vary between days based on weather) and leave them off until they settle down later (which could be for several hours). For this to work, the relevant turbines would need to be turned off (on instruction from the observer) within a very short space of time, i.e. less than 60-90 seconds, and would require a direct line of contact between the observer and the turbine control room.</p> <p>As noted, the above mitigation would only be required in the years when the breeding territory is occupied and when young birds are reared successfully. As with most raptor species, breeding failure rate in peregrine can be quite high, as shown by a 47% failure of occupied territories in the 2002 national breeding survey (Madden et al. 2009).</p>		
<p>POST CONSTRUCTION /OPERATIONAL PHASE</p>	<p>There is potential for significant adverse effects on the habitats and food supplies of waterbird species within the River Shannon, including the SPA, should contaminants enter the system as a result of the construction, operation and/or decommissioning phases of the wind farm project. Mitigation is therefore required to avoid or minimise this risk.</p> <p>Mitigation measures to maintain water quality in the drainage channels and watercourses which drain the Site are detailed in Chapter 9 Land and Soils. Hydrology and Hydrogeology. The implementation of mitigation through avoidance principles, pollution control measures, surface water drainage measures and other preventative measures have been incorporated into the project design in order to minimise potential significant adverse impacts on water quality at the Site. A 50 m stream buffer zone will be implemented at the Site which will largely result in the avoidance of sensitive hydrological features. Direct discharges to surface waters of de-watered loads will not be permitted under any circumstances. This in turn will avoid or reduce the potential for adverse impacts on downstream estuarine habitats.</p> <p>All of the mitigation measures described in Chapter 9 Land and Soils are contained in the preliminary Construction and Environmental Management Plan (CEMP) (appended to the EIAR in Appendix 2A). The CEMP provides a contractual commitment to mitigation and monitoring and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental commitments of the Development will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, such that there will be a robust mechanism in place for their implementation. The CEMP addresses the construction phase, and will be continued through to the commissioning, operation and final decommissioning phases.</p> <p>It is noted that an Ecological Clerk of Works (ECoW) with experience in overseeing wind farm construction projects will be appointed by the Contractor for the duration of the construction phase to ensure that the CEMP is effectively implemented and that all planning conditions relating to ecology are complied with. An Environmental Manager will be appointed by the Developer to oversee the environmental management of the project, advise on the environmental issues and ensure compliance by the Contractor.</p> <p>With such mitigation in place and rigorously enforced, it can be concluded that there would not be any significant effects on the waterbirds associated with the River Shannon, and notably the Special Conservation Interests of the River Shannon and River Fergus Estuaries SPA, as a result of the Proposed Development.</p>	<p>Wind Farm Operator</p> <p>Project Ecologist/ECoW</p> <p>Appointed Contractor</p>	<p>CEMP</p> <p>Chapter 6 Biodiversity</p> <p>Chapter 7 Ornithology</p> <p>Chapter 8 Water</p> <p>CEMP</p>

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
POST CONSTRUCTION /OPERATIONAL PHASE	Ornithology Post Construction Monitoring	Wind farm operator Appointed contractor	Chapter 7 Ornithology

Post-construction bird monitoring will take place to establish whether the construction and operation of the proposed Development has had effects on the bird species associated with the Site prior to construction (as shown by the baseline surveys in the 2019-2023 period). The monitoring programme will comprise the following:

Flight activity surveys

Flight activity surveys will be undertaken using the Vantage Point method (Scottish Natural Heritage 2017). The purpose of the surveys is to determine if the presence of the turbines is causing species such as kestrel and buzzard to avoid the Site. This will use the same Vantage Points as used for the baseline **EIAR** surveys so that a valid comparison can be made between the two periods. The surveys will be undertaken monthly in Years 1, 2, 3, 5, 10 and 15 of the lifetime of the project (in accordance with Scottish Natural Heritage Guidance 2009).

Transect survey within Site

A transect survey will be undertaken to monitor short-term and long-term effects on bird populations within the Site. The transect location and the survey methodology will be the same as employed for the baseline **EIAR** surveys which will allow a comparison of data to be made for each monitoring year. Two surveys will be undertaken in each of the summer and winter seasons and will be in the same monitoring years as the vantage point surveys.

Collision searches

The objective of collision monitoring and corpse search is to establish whether bird fatalities are occurring as a result of collision with turbine blades. This also will provide data to determine the accuracy of the predictions from the Collision Risk Modelling carried out for the project.

Carcass search was traditionally completed by human observers whose efficiency is influenced by several factors including carcass type, environmental conditions and observer competence. Numerous studies have been conducted demonstrating that dogs have a superior ability to detect bird and bat carcasses than humans, particularly with small carcasses or in well vegetated areas (see for example Mathews 2013). A trained dog under the control of a handler will be used.

A standard plot size will be selected at each turbine location where search will occur. At the start of each survey, data recorded will include meteorological and ground cover information. The locations of any carcasses found will be recorded by GPS and will be photographed in-situ. The state of each carcass will be recorded on a corpse record card, using the following categories (after Johnson 2003):

- Intact - a carcass that is completely intact, is not badly decomposed, and shows no sign of being fed upon by a predator or scavenger
- Scavenged - an entire carcass which shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location such as wings, legs, skeletal remains or pieces of skin
- Feather Spot - ten or more feathers at one location indicating predation or scavenging. If only feathers are found, 10 or more total feathers or two or more primaries must be discovered to consider the observation a casualty.

Searcher efficiency and predation tests will be carried out at the commencement of the programme in order to calibrate the results to account for the search dog's ability to find bird corpses and to also account for scavenging of corpses by animals.

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
	<p>As the site is primarily of ornithological importance for breeding birds, it is proposed that the programme will be confined to the 6 month period March to August (inclusive)</p> <p>The collision searches for birds can be combined with the bat carcass searches which will be carried out in the first three years of operation (post-construction surveys) and subsequently in years 5, 10, 15, 20, 25 and 30 in the spring to autumn periods, i.e. both bats and birds will be monitored in one programme.</p>		
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Water</p> <p>The increase in the rate of surface water run-off due to the increase in hard surface areas as a result of the development could lead to an increase in flood risk downgradient of the site. The runoff control measures for the wind farm site have been designed in the context of storm events of varying duration and intensity. The settlement ponds have been designed to cater for a maximum continuous flow rate associated with a medium-intensity rainfall event. Higher intensity runoff will be attenuated by the open drain collection system which provides temporary storage and limits the rate at which it enters the settlement ponds. Further detail of the measures proposed can be found in the Surface Water Management System (See Appendix 2B).</p> <p>Potential impact on water quality due to the operation and maintenance of the wind farm is principally related to the minor risk of oil spillages. This will have been mitigated by design through the provision of adequate bunding and implemented in the construction stage.</p> <p>All vehicular movement during operation and maintenance will be restricted to the internal access tracks and hardstands.</p>	Wind farm operator	Chapter 8 Water
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Land and Soils Land Use</p> <p>The potential effect on the land and soils of the proposed development due to excavations will be significantly lower during operation and maintenance, as the majority of excavations will have been reinstated. Some erosion of soil may continue into the early operation phase, however as vegetation becomes established and equilibrium is achieved, erosion rates will reduce to normal levels. No additional mitigation measures are recommended in relation to land use for the soil and geological environment during the operation of the proposed development.</p>	Wind farm operator	Chapter 9 Land and Soils
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Land and Soils Soils and Geology</p> <p>All vehicular movement during operation and maintenance will be restricted to the areas of hardstanding and existing/newly constructed access tracks. The volume of traffic during the operational phase will be greatly reduced in comparison with the construction phase. The potential effect on slope stability will therefore be small.</p> <p>The risks associated with sedimentation and contamination of the watercourses and aquifers due to erosion and runoff will be significantly reduced as areas are revegetated and construction/forestry traffic ceases. Refer to EIAR Chapter 8 Water for further details in relation to hydrology and hydrogeology.</p>	Wind farm operator	Chapter 9 Land and Soils Chapter 8 Water

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Land and Soils Accidental Spills & Contamination/Pollution</p> <p>Mitigation measures for oils and fuels remain the same as the construction phase, however will be significantly reduced during the operation stage as maintenance of the turbines, substation and maintenance vehicles is all that is required. Turbine transformers will be located within the turbines, so any leak of oil would be contained within or adjacent to the turbine. Minimal refuelling or maintenance of operational vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station. Any on site re-fuelling will be undertaken using a double skinned bowser with spill kits at the ready for accidental leakages or spillages. A minimal amount of fuels will be stored on site. Storage areas where required will be bunded appropriately for the fuel storage volume during the operational phase and will be fitted with a storm drainage system and an appropriate oil interceptor. The plant used will be regularly inspected for leaks and fitness for purpose. These measures will be sufficient to reduce the risk of contamination to soil and subsoils, and groundwater and surface water quality. An emergency plan for the operational phase to deal with accidental spillages will be prepared and will be communicated to plant operatives. Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.</p> <p>The substation transformer oil storage tanks will be in a concrete bund capable of holding 110% of the oil in the transformer and storage tanks.</p>	Wind farm operator	Chapter 9 Land and Soils
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Land and Soils Grid Connection and Substation</p> <p>None required, unless repair works are undertaken, then mitigation will include:</p> <ul style="list-style-type: none"> • Use of temporary excavations over the shortest distances possible; • All excavated material will be stored and reused during reinstatement. 	Wind farm operator	Chapter 9 Land and Soils
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Noise</p> <p>As the proposed turbines are predicted not to exceed DoEHLG noise limit criteria in standard operating mode, mitigation measures are not required.</p> <p>In the unlikely event that a complaint of Amplitude Modulation arises during the operation of the wind farm, an investigation into the phenomenon will be carried out in accordance with best practice, specifically the Institute of Acoustics' (IoA) Noise working Group (Wind Turbine Noise) Amplitude Modulation Working Group (AMWG), Method for Rating Amplitude Modulation in Wind Turbine Noise (August 2016). If required, mitigation measures will be put in place to eliminate any disturbance that is found to occur. These mitigation measures will be applied during the specific meteorological conditions which causes the AM to happen and typically involve one or more of the following:</p> <ul style="list-style-type: none"> • slowing down or stopping the relevant wind turbine; • altering the pitch of the blades (i.e. changing the amount of rotation of the blade along its length); • realigning the yaw of the rotor (i.e. changing the angle at which the turbine rotor faces into the wind). <p>In the unlikely event an issue regarding low frequency arises, the matter will be fully investigated with regard to best practice and guidance at the time. Currently guidance 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).</p> <p>There are no significant vibrations predicted with the operational phase of the proposed development, therefore no vibration mitigations are recommended.</p>	Wind farm operator	Chapter 10 Noise and Vibration

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENATION	PERSON(S) RESPONSIBLE	RELEVANT CHAPTER/ACTION REQUIRED												
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Shadow Flicker</p> <p>The model has identified that there is the potential for shadow flicker to occur and has identified the times when this could happen. The developer commits to installing mitigation measures that will eliminate shadow flicker at a receptor.</p> <p>Turbines will be programmed to shut down during periods when shadow flicker is predicted to, and where conditions are present for it to occur. This strategy has been successfully employed at other wind farms.</p>	Not applicable	Not applicable												
POST CONSTRUCTION /OPERATIONAL PHASE	<p>Following consultation with impacted telecommunications providers, summarised in Appendix 15B, alternative relay links will be put in place to prevent telecommunication impacts from the wind farm.</p> <p>Telecommunications Mitigation Measures Summary</p> <table border="1" data-bbox="651 619 1675 911"> <thead> <tr> <th data-bbox="651 619 853 687">Operator</th> <th data-bbox="853 619 1435 687">Impacted PTP Link</th> <th data-bbox="1435 619 1675 687">Mitigation Measure</th> </tr> </thead> <tbody> <tr> <td data-bbox="651 687 853 767">Enet</td> <td data-bbox="853 687 1435 767">One PTP microwave radio link Woodcock Hill to Birdhill</td> <td data-bbox="1435 687 1675 767">Alternative relay link</td> </tr> <tr> <td data-bbox="651 767 853 836">Eir</td> <td data-bbox="853 767 1435 836">One PTP microwave radio link Woodcock Hill to Glenoue Newtown</td> <td data-bbox="1435 767 1675 836">Alternative relay link</td> </tr> <tr> <td data-bbox="651 836 853 911">Three Ireland</td> <td data-bbox="853 836 1435 911">Two PTP microwave radio links from Woodcock Hill to Ardnacrusha</td> <td data-bbox="1435 836 1675 911">Alternative relay link</td> </tr> </tbody> </table> <p>As standard practice, a signed Protocol between the developer and RTE will be put in place, in which the developer will be responsible to resolve any issue of interference with television reception as a result of the proposed development.</p>	Operator	Impacted PTP Link	Mitigation Measure	Enet	One PTP microwave radio link Woodcock Hill to Birdhill	Alternative relay link	Eir	One PTP microwave radio link Woodcock Hill to Glenoue Newtown	Alternative relay link	Three Ireland	Two PTP microwave radio links from Woodcock Hill to Ardnacrusha	Alternative relay link	Wind farm operator	Chapter 15 Material Assets
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POST CONSTRUCTION /OPERATIONAL PHASE	<p>Material Assets – Waste Management</p> <p>The operational phase of the proposed development will produce minimal volumes of waste and much less than the construction phase however, where relevant, mitigation measures outlined in Section 15.5.1.8 and the CEMP included in EIAR Volume III Appendix 2A for the construction phase will also be applied during the operational phase to prevent any adverse impacts from improper waste management.</p>	Wind farm operator	Chapter 15 Material Assets												

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DECOMMISSIONING	<p>Reinstatement</p> <p>If it is decided to decommission the wind farm at the end of its operational life of 35 years, a comprehensive reinstatement proposal, including the implementation of a program that details the removal of structures and landscaping, will be submitted to Clare County Council and the NPWS for approval prior to the decommissioning work.</p> <p>The potential for impacts during decommissioning are similar in nature, if not in scope, to those assessed for the construction phase. All elements of the decommissioning works will be agreed with Clare County Council beforehand and there will be a consent requirement for the timing of decommissioning works. The same mitigation for the construction phase of the wind farm will apply to the decommissioning phase. Any mitigation measures will be carried out using appropriate best practice at the time.</p>	Wind farm operator	Chapter 6 Biodiversity
DECOMMISSIONING	<p>Ornithology</p> <p>As the Decommissioning works will involve works similar to those involved at construction stage (albeit at a lower intensity), these could result in similar effects on birds. Hence, the mitigation that will be undertaken for minimising disturbance to nesting birds during construction will also be applied during the decommissioning phase (taking into account changes in bird populations and distribution that may have occurred locally during the operational life of the proposed development).</p>	Wind farm operator	Chapter 7 Ornithology
DECOMMISSIONING	<p>Water</p> <p>The potential impacts on the water environment during the decommissioning stage will be similar to those during the construction phase, and as such the proposed mitigation for the Decommissioning Phase are similar to those outlined previously. Moreover, due to the relative long life of the wind farm infrastructure, it is likely that a revised/updated environmental assessment will be required at the time of decommissioning to account for any changes in baseline conditions at the proposed development site, and potential changes is assessment guidelines and legislation.</p> <p>If it is decided to decommission the wind farm at the end of its 35-year operational life, rather than apply for permission to repower the wind farm, a comprehensive reinstatement proposal, including the implementation of a program that details the removal of all structures, will be submitted to Clare County Council for approval prior to the decommissioning work. Turbine components will be removed however it is envisaged that access tracks and associated drainage will remain in place. An environmental assessment will be undertaken at that time to ascertain whether or not it would be more or less environmentally damaging to remove or keep in place the underground cables and access tracks. If the access tracks are removed the associated artificial drains will be infilled. All elements of the decommissioning works will be agreed with the council beforehand and there will be a consent requirement for the timing of decommissioning works.</p> <p>The substation will likely remain in place as part of the permanent electrical infrastructure.</p> <p>The turbines, transformers, and met mast will be dismantled and removed from the site following a method statement agreed with Clare County Council. All associated hardstand areas will be remediated to match the surrounding land-cover at the time. All materials removed from the site will be treated in accordance with best practice waste management procedures and any requirements specified by the council.</p> <p>The grid cable will remain a permanent part of the national grid and therefore decommissioning is not foreseen. In the event of decommissioning, it will involve removing the cable from the ducting but leaving the ducting and associated supporting structure in place. The ducting will not be removed if the environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them in situ. The assessment</p>	Wind farm operator	Chapter 8 Water

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	will be carried out closer to the time to take into account environmental changes over the project life. There is the potential for surface water run-off from exposed soil surfaces, such as those that will initially cover over the decommissioned turbine foundations, to result in slight negative effects on water quality in local surface waters. However, in the case of the proposed development, the site drainage and sediment control measures will still be in place which will prevent any silt-laden run-off due to temporary disturbance and movement of soil from entering the local surface water network. Therefore, no negative effect on surface water or ground water quality is envisaged during decommissioning.		
DECOMMISSIONING	Land and Soils Where appropriate, mitigation measures used during decommissioning activities shall be comparable to those used during construction. By keeping some development components in place, when necessary, some of the effects will be avoided. In order to recover vegetation and lessen the effects of runoff and sedimentation, the turbine bases will be rehabilitated by being covered with local topsoil. Access tracks that are not needed for farming or forestry will also be allowed to naturally revert to vegetation. The wind farm's materials and equipment will all be removed from the site and disposed of or repurposed in a way that is environmentally responsible. There will be mitigation measures put in place to prevent potential pollution from fuel leaks and soil compaction caused by nearby plants.	Wind farm operator	Chapter 9 Land and Soils
DECOMMISSIONING	Noise & Vibration In all instances, the total predicted construction and decommissioning noise levels are expected to be below construction noise thresholds of 65 dB (A). The mitigation measures that will be considered in relation to any decommissioning of the site are the same as those proposed for the construction phase of the development i.e as per Section 10.5.1 . There will be no significant vibration during the decommissioning phase. Vibration levels will not exceed those described in BS5228 –1&2:2009 + A1 2014, Code of Practice for the Control of Noise and Vibration on Construction and Open Sites and this chapter.	Wind farm operator	Chapter 10 Noise and Vibration
DECOMMISSIONING	Landscape and Visual Overall, the impacts of decommissioning a wind farm are potentially similar to construction impacts and will comprise temporary disturbance such as noise associated with decommissioning of turbines and on-site machinery. Once decommissioned, however, the visual effects of the turbines will be reversed, and while viewers at close proximity may still see the access tracks, the hardstands will gradually re-vegetate. As stated in Chapter 6 Biodiversity , prior to the decommissioning work, a comprehensive reinstatement proposal, including the implementation of a programme that details the removal of structures and landscaping, will be submitted to the Planning Authority.	Wind farm operator	Chapter 12 Landscape and Visual
DECOMMISSIONING	Air and Climate Impacts resulting from the decommissioning phase are expected to be similar in nature, but smaller in scale in comparison to the construction phase. Therefore, similar mitigation measures such as those related to dust and construction vehicles are recommended.	Wind farm operator	Chapter 14 Air and Climate