



Cush Wind Farm

Environmental Impact Assessment Report

Annex 1.9: Schedule of Mitigation Measures

Cush Wind Limited

Galetech Energy Services
Clondargan, Stradone, Co. Cavan Ireland
Telephone +353 49 555 5050
www.galetechenergy.com



Contents

1.0	Introduction.....	1
1.1	Purpose of this Report.....	1
1.2	Implementation of Mitigation Measures.....	1
1.3	Environmental Impact Assessment Report (EIAR) Mitigation Measures.....	2



1.0 Introduction

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

The project; which comprises a wind farm, its connection to the national electricity grid, and all associated ancillary development, is located in rural County Offaly, approximately 4km north of the town of Birr and c. 28km south-west of Tullamore in the townlands of Cush, Galros West, Boolinarig Big, and Eglis.

The project will comprise:-

- 8 no. wind turbines with an overall tip height of 200m, and all associated ancillary infrastructure;
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including provision of site drainage infrastructure and forestry felling.
- Temporary alterations to the turbine component haul route; and,
- Construction of an electricity substation, Battery Electricity Storage System and installation of 5.6km of underground grid connection to facilitate connection of the proposed electricity substation to the existing 110kV substation at Clondallow, County Offaly;

The turbine component haul route and associated temporary alteration works, as described at **Chapter 3**, are located within counties Galway, Roscommon, Westmeath and Offaly. It is envisaged that the turbines will be transported from the Port of Galway, through the counties of Galway, Roscommon, Westmeath and Offaly, to the project site.

1.1 Purpose of this Report

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

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

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

This document therefore provides a list of all mitigation measures proposed within **Volume I** of the EIAR (**Section 1.3** below), which will be implemented during the pre-construction, construction, operation and decommissioning phases of the project.

1.2 Implementation of Mitigation Measures

Cush Wind Limited ('the Developer') can confirm that all mitigation measures outlined below, in addition to the measures inherent to the design of the project described at **Chapter 3**, will be implemented except as may be required in order to comply with conditions of consent.

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

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

Prior to the commencement of development, each of the above will be appointed, as necessary, by the Developer who will have ultimate responsibility for the implementation of all mitigation measures.

1.3 Environmental Impact Assessment Report (EIAR) Mitigation Measures

Environmental Impact Assessment Report – Schedule of Mitigation Measures		
Topic	Mitigation Measure	Phase of Development for Implementation
Population & Human Health	A suite of measures has been agreed with involved landowners regarding the management of agricultural activities during the construction phase. These measures have been incorporated into signed legal agreements and will be implemented in full.	Pre-Construction
Biodiversity	In order to mitigate potential effects during the construction phase, best practice construction methods will be implemented in order to prevent water (surface water and groundwater) pollution. Good practice measures will be applied in relation to pollution risk, sediment management and management of surface runoff rates and volumes.	Construction
Biodiversity	All personnel working on the project will be responsible for the environmental control of their work and will perform their duties in accordance with the requirements and procedures of the CEMP.	Construction
Biodiversity	During the construction phase, all works associated with the construction of the project will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015). Any groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).	Construction
Biodiversity	During the construction phase, a self-imposed conservative buffer zone of 50m will be maintained for all Rapemills River and West Galros Stream where possible.	Construction
Biodiversity	<p>Mitigation measures, during felling, which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods, as follows:-</p> <ul style="list-style-type: none"> • Machine combinations (i.e. handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance; • Checking and maintenance of tracks and culverts will be ongoing through any felling operation. No tracking of vehicles through watercourses will occur. Where possible, existing drains will not be disturbed during felling works; • Ditches which drain from the areas to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (~0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and avoid being placed at right angles to the contour; • Sediment traps will be sited in drains downstream of felling areas. Machine access will be 	Construction

	<p>maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the spoil disposal areas. All new silt traps will be constructed on even ground and not on sloping ground;</p> <ul style="list-style-type: none"> • In areas particularly sensitive to erosion or where felling inside the 50m buffer is required, it will be necessary to install double or triple sediment traps; • All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone; • Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled; • Brush or bog mats will be used to support vehicles on soft ground, reducing topsoil and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brush mat renewal will take place before they become heavily used and worn. Provision will be made for brush mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall; • Timber will be stacked in dry areas, and outside the 50m watercourse buffer. Straw bales and check dams will be emplaced on the down gradient side of timber storage/processing sites; • Works will be carried out during periods of no, or low, rainfall in order to minimise entrainment of exposed sediment in surface water run-off; • Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods, as follows:- • Machine combinations (i.e. handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance; • Checking and maintenance of tracks and culverts will be ongoing through any felling operation. No tracking of vehicles through watercourses will occur. Where possible, existing drains will not be disturbed during felling works; • Ditches which drain from the areas to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (~0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and avoid being placed at right angles to the contour; • Sediment traps will be sited in drains downstream of felling areas. Machine access will be 	
--	--	--

	<p>maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the spoil disposal areas. All new silt traps will be constructed on even ground and not on sloping ground;</p> <ul style="list-style-type: none"> • In areas particularly sensitive to erosion or where felling inside the 50m buffer is required, it will be necessary to install double or triple sediment traps; • All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone; • Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled; • Brush or bog mats will be used to support vehicles on soft ground, reducing topsoil and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brush mat renewal will take place before they become heavily used and worn. Provision will be made for brush mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall; • Timber will be stacked in dry areas, and outside the 50m watercourse buffer. Straw bales and check dams will be emplaced on the down gradient side of timber storage/processing sites; • Works will be carried out during periods of no, or low, rainfall in order to minimise entrainment of exposed sediment in surface water run-off; • Checking and maintenance of roads/tracks and culverts will be ongoing through the felling operation; • Refuelling or maintenance of machinery will not occur within 50m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; • A permit to refuel system will be adopted; • Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors; • Trees will be cut manually from along streams and using machinery to extract whole trees; and • Travel will only be permitted perpendicular to and away from surface water features. 	
Biodiversity	Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time and allow settling of silt in a controlled manner.	Construction
Biodiversity	<p>The following items will be carried out during pre-felling inspections and regularly thereafter:-</p> <ul style="list-style-type: none"> • Communication with tree felling operatives in advance to determine whether any areas have 	Pre-Construction / Construction

	<p>been reported where there is unusual waterlogging or bogging of machines;</p> <ul style="list-style-type: none"> • Inspection of all areas reported as having unusual ground conditions; • Inspection of main drainage ditches and outfalls. During pre-felling inspections, the main drainage ditches will be identified. Where possible, the pre-felling inspection will be carried out during rainfall; • Following tree felling, all main drains will be inspected to ensure that they are functioning; • Extraction tracks within 10m of drains will be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground; • Culverts on drains exiting the site, if impeded by silt or debris, will be unblocked; and • All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall. 	
Biodiversity	<p>Native woodland trees to be planted and will include Oak <i>Quercus robur</i>, Alder <i>Alnus glutinosa</i>, Holly <i>Ilex aquifolium</i>, Apple <i>Malus sylvestris</i>, Hazel <i>Corylus avellana</i>, Downy birch <i>Betula pubescens</i>, Willow e.g. <i>Salix cinerea/aurita</i> and Scots pine <i>Pinus sylvestris</i>.</p>	Construction
Biodiversity	<p>Prior to the commencement of vegetation clearance activity, a survey by an appropriately experienced ecologist will be carried out to confirm that no Third Schedule Plant species are present within the project site, including along the grid connection route and replant lands. If present, the full extent(s) of the invasive plant species will be mapped. The appointed contractor(s) will prepare and implement an Invasive Species Management Plan (ISMP) for the works with the input from a suitably qualified ecologist. The ISMP will include measures such as:-</p> <ul style="list-style-type: none"> • Fence off the infested areas prior to and during construction works where possible in order to avoid spreading seeds or plant fragments around or off the construction site; • Clearly identify and mark out infested areas. Erect signs to inform Contractors of the risk; • Avoid if possible using machinery with tracks in infested areas; • Clearly identify and mark out areas where contaminated soil is to be stockpiled on site and cannot be within 75m of any watercourse or within a flood zone; • If soil is imported to the site for landscaping, infilling or embankments, the contractor will gain documentation from suppliers stating that it is free from invasive species; • Ensure all site users are aware of measures to be taken and alert them to the presence of the Invasive Species Management Plan; and, • Erection of adequate site hygiene signage in relation to the management of non-native invasive material as appropriate. 	Pre-Construction
Biodiversity	<p>Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4-weeks of the felling activity commencing, preferably in medium-to-high water flow conditions. The 'during' sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as</p>	Construction

	necessary to demonstrate that water quality has returned to pre-activity status (i.e. where an impact has been shown).	
Biodiversity	During felling daily surface water monitoring forms (for visual inspections and field chemistry measurements) will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.	Construction
Biodiversity	Mitigation in the form of double silt fencing will be placed around all infrastructure that encroaches the 50m buffer zone.	Construction
Biodiversity	<p>Source controls to limit the likelihood for 'dirty water' to occur:-</p> <ul style="list-style-type: none"> • Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with clean washed gravel, filter fabrics, and other similar/equivalent or appropriate systems; • Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures. <p>In-Line controls to ensure appropriate management of silt laden water:-</p> <ul style="list-style-type: none"> • Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems. 	Construction
Biodiversity	<p>Treatment systems to fully attenuate silt laden waters prior to discharge:-</p> <p>Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. It should be noted for this site that an extensive network of bog and forestry drains already exists, and these will be integrated and enhanced as required and used within the wind farm drainage system. The integration of the existing land drainage network and the proposed wind farm network is common practice in wind energy developments and will also result in benefits to surrounding agricultural lands.</p>	Construction
Biodiversity	<p>The main elements of interaction with existing drains will be as follows:-</p> <ul style="list-style-type: none"> • Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction and attenuation for flow management) of runoff from the wind farm drainage into the existing site drainage network. This will reduce the likelihood of any increased risk of downstream flooding or sediment transport/erosion; • Silt traps will be placed in the existing drains upstream of any streams where construction works is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area; and 	Construction

	<ul style="list-style-type: none"> Buffered outfalls, which will be numerous over the site, will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site. 	
Biodiversity	If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train [sequence of water treatment processes]) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This water treatment train will apply for the entirety of the construction phase.	Construction
Biodiversity	Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be emplaced within drains down-gradient of all construction areas inside the 50m hydrological buffer zones to provide an additional layer of protection in these areas.	Construction
Biodiversity	Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats (sediment entrapment mats, consisting of coir or jute matting) placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.	Construction
Biodiversity	<p>During the initial placement of spoil in the deposition areas, silt fences, straw bales and biodegradable matting will be used to control surface water runoff. Double silt fencing will be placed along the edge of the bog drain that intercepts the deposition area.</p> <p>Drainage from the overburden deposition area will ultimately be into to the existing bog drain network where it is proposed that check dams will be installed every 20m or so to create a series of settlement ponds, before being discharged.</p> <p>Spoil deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff. Once re-vegetated and stabilised, spoil deposition areas will no longer be a likely source of silt laden runoff. Surface water protection infrastructure will be left in place until the areas have stabilised.</p>	Construction
Biodiversity	Temporary silt fencing/silt trap arrangements will be placed within existing roadside/field drainage features along the grid connection route to remove any suspended sediments from the works area. The trapped sediment will be removed and disposed of at an appropriate licenced facility. Any bare-ground will be re-seeded/reinstated immediately and silt fencing temporally left in place if necessary.	Construction
Biodiversity	The works programme for the initial construction stage of the project will also take account of weather	Construction

	<p>forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if prolonged or intense rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.</p> <p>The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities:-</p> <ul style="list-style-type: none"> • General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates; • Meteo Alarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale; • hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events; • Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3 hour record is given and is updated every 15 minutes. Radar images are not predictive; and, • Consultancy Service: Met Eireann provide a 24 hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest. 	
Biodiversity	<p>Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of an impending high rainfall intensity event.</p> <p>Works will be suspended if forecasting suggests either of the following is likely to occur:-</p> <ul style="list-style-type: none"> • >10 mm/hr (i.e. high intensity local rainfall events); • >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, • >half monthly average rainfall in any 7 days. <p>Prior to works being suspended the following control measures will be completed:-</p> <ul style="list-style-type: none"> • Secure all open excavations; • Provide temporary or emergency drainage to prevent back-up of surface runoff; and, • Avoid working during heavy rainfall and for up to 24-hours after heavy events to ensure drainage systems are not overloaded. 	Construction
Biodiversity	<p>The construction of the site drainage system will be carried out, at the respective locations, prior to other activities being commenced. The construction of the drainage system will only be carried out during periods of, where possible, no rainfall, therefore avoiding runoff. This will avoid the risk of entrainment of</p>	Construction

	suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and functional for all subsequent construction works.	
Biodiversity	Prior to the commencement of project, a detailed Site Drainage Plan and SWMP will be prepared to detail the siting and composition of the surface water management measures. The respective plans, which will form part of a detailed Construction Environmental Management Plan (CEMP), will be prepared prior to the commencement of project.	Construction
Biodiversity	The CEMP will also include a detailed Water Quality Monitoring Plan for the monitoring of surface waters in the vicinity of the construction site by a designated Environmental Manager. The monitoring programme will comprise field testing and laboratory analysis of a range of agreed parameters. The civil works contractor, who will be responsible for the construction of the site drainage system, and Environmental Manager will undertake regular inspections of the drainage system to ensure that all measures are functioning effectively. The surface water sampling locations used in this EIAR (i.e. SW1 – SW4) will be used during construction activities. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Any excess build-up of silt levels that may decrease the effectiveness of the drainage feature, will be removed and disposed of in an appropriate manner.	Construction
Biodiversity	The management of excavation dewatering (pumping), particularly in relation to any accumulation of water in foundations or electricity line trenches, and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:- <ul style="list-style-type: none"> • Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations, will be put in place; • The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters to ensure that Greenfield runoff rates are mimicked; • If required, pumping of excavation inflows will prevent build-up of water in the excavation; • The pumped water volumes will be discharged via volume and silt/sediment ponds and settlement lagoons adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit; • There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur; • Daily monitoring of wind farm excavations by the Environmental Manager will occur during the construction phase. If high levels of seepage inflow occur, excavation work at this location will cease immediately and a geotechnical assessment undertaken; and, • A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for 	Construction

	<p>emergencies. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as final line of defence if needed.</p>	
Biodiversity	<p>Mitigation measures proposed to avoid release of hydrocarbons at the site are as follows:-</p> <ul style="list-style-type: none"> • The volume of fuels or oils stored on site will be minimised. All fuel and oil will be stored in an appropriately bunded area within the temporary construction compound. Only an appropriate volume of fuel will be stored at any given time. The bunded area will be roofed to avoid the ingress of rainfall and will be fitted with a storm drainage system and an appropriate oil interceptor; • All bunded areas will have 110% capacity of the volume to be stored; • On site refuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled at the temporary compound and will be towed around the site by a 4x4 jeep to where plant and machinery is located. No refuelling will be permitted at works locations within the 50m hydrological buffer. The 4x4 jeep will also be fully stocked with fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations to avoid any accidental leakages; • All plant and machinery used during construction will be regularly inspected for leaks and fitness for purpose; • Spill kits will be readily available to deal with and accidental spillages; • All waste tar material arising from road cuttings (from trenching or other works in public roads) will be removed off-site and taken to a licensed waste facility. Due to the potential for contamination of soils and subsoils, it is not proposed to utilise this material for any reinstatement works; and • An outline emergency plan for the construction phase to deal with accidental spillages is contained within the Planning-Stage CEMP (Annex 3.4). This emergency plan will be further developed prior to the commencement of project, and will be agreed with the Planning Authority as part of the detailed CEMP. 	Construction
Biodiversity	<p>Measures to avoid contamination of ground and surface waters by wastewaters will comprise:-</p> <ul style="list-style-type: none"> • Self-contained port-a-loos (chemical toilets) with an integrated waste holding tank will be installed at the site compound, maintained by the providing contractor, and removed from site on completion of the construction works; • Water supply for the site office and other sanitation will be brought to site and removed after use to be discharged at a suitable off-site treatment location; and, • No water will be sourced on the site, nor will any wastewater be discharged to the site. 	Construction

<p>Biodiversity</p>	<p>The following mitigation measures are proposed to ensure that the release of cement-based products is avoided:-</p> <ul style="list-style-type: none"> • No batching of wet-cement products will occur on site. Ready-mixed concrete will be brought to site as required and, where possible, emplacement of pre-cast products will be utilised; • All watercourse crossings will utilise pre-cast products and the use of wet-cement products within the hydrological buffer will be avoided; • Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. Chute cleaning will be undertaken at lined cement washout ponds with waters being stored in the temporary construction compound, removed off site and disposed of at an approved licensed facility. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed; • Weather forecasting will be used to ensure that prolonged or intense rainfall is not predicted during concrete pouring activities; and, • The concrete pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event. 	<p>Construction</p>
<p>Biodiversity</p>	<p>The following (surface water) mitigation measures are proposed:-</p> <ul style="list-style-type: none"> • All proposed new stream crossings will be clear span bridges (bottomless culverts) and the stream beds will remain undisturbed. No in-stream excavation works at the crossing locations are proposed and therefore there will be no impact on the stream at the proposed crossing location; • All internal wind farm electrical cabling or grid connection cabling will pass above or below the existing culvert and will not directly interfere with the culvert; • At the time of construction, all guidance/best practice requirements of the OPW or Inland Fisheries Ireland will be incorporated into the design/construction of the proposed watercourse/culvert crossings; • As a further precaution, in-stream construction work (if/where required) will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to <i>Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters</i> (2016) (i.e., July to September inclusive). This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI); • During the near stream construction works (i.e. within the 50m buffer zone), double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase; • The new watercourse crossings at the wind farm site will require a Section 50 license application to the OPW in accordance with the Arterial Drainage Act 1945. The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 	<p>Construction</p>

	<p>consent; and,</p> <ul style="list-style-type: none"> No instream works are proposed at the grid connection watercourse crossings. 	
Biodiversity	Any treelines or hedgerows removed will be replaced in-situ elsewhere in the project at appropriate locations (i.e. designed to maximise ecological connectivity and outside of bat mitigation buffers). All new treelines or hedgerows will be planted using native species and in a similar composition to treelines or hedgerows lost.	Construction
Biodiversity	To avoid widespread disturbance to habitats, access within the project will be restricted to the footprint of the proposed works corridor and no access between different parts of the project will be permitted, except via the proposed works corridor.	Construction
Biodiversity	An Ecological Clerk of Works (ECoW) will be employed throughout the construction phase to ensure that construction activities do not encroach, unnecessarily, into any important habitats.	Construction
Biodiversity	<p>In order to prevent the spread of invasive alien species into the working areas of the project site, the following biosecurity protocol shall be adopted at all times throughout the construction process.</p> <p>Awareness</p> <ul style="list-style-type: none"> Prior to working on the Site, all contractors will be briefed on invasive species and will be provided with information on identification, and of the need to prevent further spread of invasive species, as well as details of the biosecurity protocol. Any additional positive or suspected identification of invasive non-native species during Site works shall be reported to an ecologist for verification, so that appropriate advice can be given. <p>Machinery</p> <ul style="list-style-type: none"> Cleaning operations will take place in a designated area to prevent further spread. Mud and organic debris will not be allowed to accumulate on tracks, tyres or under wheel arches. <p>Personnel</p> <ul style="list-style-type: none"> Personnel shall check and clean their footwear and tools each day before leaving the area to work on other Sites, or other parts of the Site. 	Construction
Biodiversity	To avoid widespread disturbance to birds, access will be restricted to the footprint of the proposed works corridor.	Construction
Biodiversity	<p>The following will be implemented to reduce the possibility of damage and destruction (and disturbance to sensitive species) to occupied bird nests:</p> <ul style="list-style-type: none"> clearance of woodlands and uncultivated vegetation i.e. trees and hedgerows (including vegetation removal for creation/maintenance of bat mitigation buffers), will be undertaken outside the main breeding season from March to September inclusive; if other site clearance and construction activities are required to take place during the main 	Construction

	<p>breeding bird season, pre-commencement survey work will be undertaken to ensure that nest destruction and disturbance is avoided;</p> <ul style="list-style-type: none"> once vegetation has been removed from the works corridor, these areas will be retained in a condition that limits suitability for nesting birds for the remainder of the construction phase e.g. cover for ground nesting species will be made unsuitable for cutting vegetation or tracking over with an excavator; and a suitably experienced Ecologist will be employed for the duration of the construction period to make contractors aware of the ornithological sensitivities of the Project and to undertake surveys for nesting birds throughout the construction period, enforcing exclusion areas as required. 	
Biodiversity	Habitat features important for mammals will be retained as much as possible (e.g. hedgerows, treelines and scrub).	Construction
Biodiversity	A pre-construction walkover survey of the project will be undertaken. This will search for mammal resting/breeding places, which could change over time. If any are identified, then appropriate exclusion zone(s) will be implemented and construction activities timed to avoid sensitive periods, such as the breeding season or hibernation, as relevant.	Pre-Construction
Biodiversity	<p>The following will be implemented to reduce the possibility of direct and indirect effects on mammals:</p> <ul style="list-style-type: none"> limiting constructions works to daylight hours; providing exit points for any excavations (e.g. escape planks or spoil runs) so mammals do not become trapped; and a suitably qualified Ecologist will be employed for the duration of the construction period to make contractors aware of the mammalian sensitivities of the Proposed Project and to undertake surveys for breeding or resting mammals throughout the construction period, enforcing exclusion areas as required. These are 50 m for red squirrel, 100 m for pine marten, 150 m for otter and 50 m for badger. If in the unlikely event that exclusion zones cannot be implemented, advice will be sought from NPWS, and appropriate mitigation and compensation measures will be put in place and an application will be made to NPWS for a derogation licence if required. 	Construction
Biodiversity	All hedgerows and treelines that will be lost due to construction will be replaced within the Proposed Project. This will ensure that there is no net loss of commuting and foraging routes for bats.	Construction
Biodiversity	Along the grid connection, immediately in advance of construction works, an ecologist will undertake a comprehensive survey of bridges / structures / trees with moderate to high bat roosting potential and emergence surveys will be carried out to determine if bats are present following Collins (2023) guidelines.	Pre-Construction
Biodiversity	Pre-construction roost surveys will be undertaken to identify and protect any bats occupying roosts in vegetation earmarked for removal.	Pre-Construction

Biodiversity	Any trees identified as supporting moderate to high potential roost features within the works corridor will be targeted with further surveys, including emergence/re-entry surveys and/or roost inspections (using endoscopes and thermal imaging cameras). Surveys will determine occupancy, the type of roost (e.g. maternity, hibernation, mating, transitional), species using the roost and the level of occupancy. Surveys will be conducted by appropriately experienced ecologists. For any newly occupied roost sites, where vegetation removal is proposed, these surveys will inform a derogation license application process from the NPWS to undertake appropriate mitigation actions, as required, to ensure the conservation of bats. Such actions could include measures to exclude bats from potential roost holes prior to vegetation removal and provision of alternative roost sites.	Pre-Construction
Biodiversity	<p>Regarding felling of trees with moderate to high potential roost features, if emergence and roost inspection survey fail to detect bats, then 'soft felling' measures will be implemented (BCT, 2018). This will be carried out in suitable weather conditions and at appropriate times of year. Briefly, this involves the following:</p> <ul style="list-style-type: none"> • removal of the tree in sections, starting with the top branches and working down the trunk avoiding cutting through cavities; • lowering of any sections with potential roost features with care, positioning them on the ground with potential entrances to roosts facing upwards to allow bats to exist the roost; and • leaving these sections in place for at least 24 hours in suitable weather. 	Construction
Biodiversity	<p>For occupied roost sites where no vegetation removal is proposed, an exclusion zone will be implemented to avoid disturbance. This exclusion zone will only be implemented according to when and how the roost is used and will be proportional to the disturbance levels from the construction activity. For example, 30 m is an appropriate exclusion zone for piling. In general the following applies:</p> <ul style="list-style-type: none"> • maternity roosts: works will be carried out between 1 October to 1 May inclusive; • summer roost (not a maternity roost): works will be carried out between 1 September to 1 May inclusive; • hibernation roost: works will be carried out between 1 May to 1 October inclusive; and • mating/swarming roost: works will be carried out between 1 November to 1 August inclusive. 	Construction
Biodiversity	Pre-construction checks will be undertaken for spawning frogs if construction works are undertaken in February. Adults and spawn will be translocated under NPWS licence to suitable alternative locations if present. Pitfall traps and drift fences will be used to capture adult frogs. Amphibian-proof fencing close to any ponds/pools will be used to prevent frogs or smooth newts from accessing any parts of the Proposed Project most hazardous to amphibians during the construction phase.	Pre-Construction / Construction
Biodiversity	Maintenance of the wind farm drainage system will ensure the system is operating effectively and will be undertaken following the CIRIA C697 SuDS and Maintenance Manual. A review of the ecological mitigation measures will be required during the operational phase and project specific mitigation will be provided as appropriate where further measures are required to ensure no significant environmental	Operation

	<p>effects on aquatic receptors and designated sites. The following mitigation measures will be implemented and can be added to:</p> <ul style="list-style-type: none"> • site access will be restricted by gates to prevent illegal dumping, use by off road vehicles etc; and, • as during construction, any stockpiled material will be within the proposed site compound or a minimum of 50 m from any surface water drainage. 	
Biodiversity	<p>Mitigation to limit common kestrel foraging activity around turbines will be implemented i.e. this will deter kestrel to ensure no significant effects from collision on this species. This will include the following measures to reduce prey availability in an area of 74.16-110.70m² surrounding turbines:</p> <ul style="list-style-type: none"> • creation of uniformly short vegetation heights via infrequent mowing or trimming of vegetation; • removal of timber/brush from felling and chipping of tree stumps to ground level; • spread and compaction of chipped wood and spoil to create a flat surface to prevent rapid colonisation of new vegetation; and, • piping/filling over of open field/forestry drains. 	Operation
Biodiversity	<p>Curtailment will be implemented via a system of adaptive management. Thus, if bird carcasses are recorded during post-construction monitoring, curtailment will be implemented where appropriate during 'at-risk' time periods and as discussed and agreed with NPWS.</p>	Operation
Biodiversity	<p>The area where trees/scrub is cleared to create the bat mitigation buffers will be kept clear over the lifetime of the project and will be made as unfavourable to bats as possible. Felled timber and branches will be removed with stumps brushed to ground level. Excess soil will be deposited over stumps to flatten the ground.</p>	Operation
Biodiversity	<p>Bat mitigation buffers to be implemented and maintained in line with Table 5.14 of the EIAR. Bat buffers refers to the felling of vegetation around turbines to make the environment less attractive to bats. This measure will help avoid collision and barotrauma by removing habitat features used by commuting and foraging bats in proximity of turbines. NatureScot (2021) guidelines state that a 50 m distance from the blade tips of the turbine to the nearest habitat feature must be maintained free of trees and shrubs for the duration of wind farm operation.</p>	Operation
Biodiversity	<p>In addition, the following operational mitigation measures for bats may be implemented depending on the results of the proposed monitoring programme:</p> <ul style="list-style-type: none"> • Feathering of Blades: there is evidence that bat casualties at wind farms is reduced by pitching the blades out of the wind ("feathering") to reduce rotation speeds below 2 rpm. while idling. As such, the feathering of blades to prevent 'idling' during low wind speeds is proposed for all turbines based on the results of the post-construction monitoring programme. Feathering will be implemented via a system of adaptive management. Thus, if bat carcasses are recorded during post-construction monitoring, feathering will be implemented at the relevant turbines during the bat activity season (April-October) or where temperatures are optimal for bat activity; and • Curtailment: this involves raising the cut-in speed with associated loss of power generation. This 	Operation

	<p>also involves reducing the blade rotation below the cut-in speed, as above. The curtailment is achieved by feathering/pitching the blade out of the wind (not the actual braking of the turbine) so that the blades continue to rotate slowly (at ~2 r.p.m. or less). Curtailment will be implemented via a system of adaptive management. Thus, if bat carcasses are recorded during post-construction monitoring, cut-in speeds will be increased at the relevant turbines during the bat activity season (April-October) and where temperatures are suitable for bat activity.</p>	
<p>Biodiversity</p>	<p>To compensate for the loss of linear hedgerow habitats (including matrices of same), 1,978.87m of hedgerows will be replaced in-situ. There will also be 914.47m more hedgerow planted than will be needed to replace any due to be lost.</p>	<p>Operation</p>
<p>Biodiversity</p>	<p>Establishment of new hedgerows/treelines</p> <ul style="list-style-type: none"> • Plant 914.48m of new hedgerow x treeline habitat using native fruit and seed-bearing species (e.g. hawthorn <i>Crataegus monogyna</i>, blackthorn <i>Prunus spinosa</i>, dog rose <i>Rosa canina</i>, guelder rose <i>Viburnum opulus</i>, hazel <i>Corylus avellana</i>, holly <i>Ilex aquifolium</i>, spindle <i>Euonymus europaeus</i> and alder buckthorn <i>Frangula alnus</i> as hedgerow species, and bird cherry <i>Prunus padus</i>, crab apple <i>Malus sylvestris</i>, goat willow <i>Salix caprea</i>, grey willow <i>Salix cinerea</i>, rowan <i>Sorbus aucuparia</i>, wild cherry <i>Prunus avium</i>, hawthorn, Irish whitebeam <i>Sorbus hibernica</i>, sessile oak <i>Quercus petraea</i> and pedunculate oak <i>Quercus robur</i> for treeline species); • If planting a new hedgerow that will be topped, the species chosen must tolerate trimming, such as hawthorn and blackthorn; • Plants must be of Irish Origin or Irish Provenance and purchased from Department of Agriculture, Fishing and the Marine (DAFM) registered professional operators ; • New planting will be undertaken in the appropriate season, with bareroot stock planted October to December (avoiding periods when the ground is waterlogged or frozen) unless on clay, when planting should be delayed until March due to risk of heave during heavy frost; • Planting will not be undertaken until the first appropriate season post-construction to avoid damage to whips; • Cultivate the ground prior to planting and add organic matter if required; • To ensure new hedgerows are beneficial for biodiversity, there must be six plants per metre in a double-staggered row with >10 species per 30 m section. Overall, no one species will make up more that 70% of the total number of plants; • Any mix of native hedgerow and tree species can be chosen, with one tree at every 15 m; • Water during first year to assist with establishment. Frequency of watering to adapt to weather conditions; • If planting new hedgerows in a grass or tillage field, they must be protected from livestock with an appropriate permanent fence, which can be moved out further as the hedgerow matures and expands; 	<p>Construction / Operation</p>

	<ul style="list-style-type: none"> Trees will be left to mature without cutting and protected with a tree guard/shelter and fenced off from livestock if present; Cut hedgerows annually during establishment phase to encourage sideways growth and canopy closure. Some plants will not be cut / trimmed and allowed to grow into mature hedgerow trees; Competing vegetation will be controlled, preferably via mulching with organic matter, and avoiding the use of chemical herbicides; Failed or dead plants (identified during condition assessments) should be replaced the following planting season; and Should any newly planted hedgerows require temporary removal to allow for maintenance works to the wind farm, they will be reinstated following the criteria mentioned above. 	
Biodiversity	<p>Enhancing riparian zone of Rapemills River</p> <ul style="list-style-type: none"> Erection of fencing along the southern bank of the Rapemills River. This will exclude livestock, allowing for 'passive restoration' of the zone (Fleming et al., 2021), which is a proven technique that has been implemented at the rivers in Ireland by IFI; Fencing will be 10 m from the riverbank (IFI, 2020), which will allow the streamside zone to re-vegetate naturally and will prevent erosion/damage from cattle. 	Construction / Operation
Biodiversity	<p>Hedgerows/Treelines</p> <ul style="list-style-type: none"> Newly created or enhanced hedgerows will be subject to condition assessment following the Hedgerow Appraisal System each year after planting for the first 5 years (the establishment phase), and then every 5 years until (and including) year 20 (the maintenance phase). This will help identify ongoing management actions, such as weed control, gapping up and where fence maintenance is required; By Year 5 after planting, hedgerows should meet the criteria for 'Favourable' under the Hedgerow Appraisal System; and In addition to the condition assessment, the diversity of the tree / shrub / climber component (otherwise described in the Hedgerow Appraisal System as 'canopy' forming species) should be the same, or greater than, that at planting (>10 native species per 30 m length). 	Operation
Biodiversity	<p>Riparian vegetation</p> <ul style="list-style-type: none"> The effects of passive restoration on the streamside zone, including the river itself, will be subject to condition assessment each year after fencing for the first 5 years and then every 5 years until (and including) Year 20. This will help ongoing management actions, such as fence maintenance, where required; A series of lateral transects will be used to estimate plant frequency/distribution and physical attributes of the watercourse (depth, flow, and substrate type) following the methodology described by Fleming et al., (2021); and 	Operation

	<ul style="list-style-type: none"> Success will be defined by the presence of pioneer macrophyte species (e.g. <i>Nasturtium officinale</i> and <i>Helosciadium nodiflorum</i>), increased depth, flow and substrate diversity in Year 1 (stage 1); replacement of pioneers with other macrophyte species (e.g. <i>Phalaris arundinacea</i> and <i>Sparganium erectum</i>, filling the channel, impeding flow velocities in Years 2-5 (stage 2); and more naturalised channel form, increasing substrate coarseness and higher flow velocities in Years 5, 10, 15 and 20 (stage 3; although this third stage may occur sooner). 	
Biodiversity	<p>Provision of bat roosts</p> <ul style="list-style-type: none"> 10 no. bat boxes will be erected in ten mature trees, three boxes per tree. Trees near to known roosts will be preferentially selected, with groups of 3 or more adjacent trees housing the bat boxes in clusters; Boxes will be installed at least 4 m above ground level (AGL), each facing in a different (south, south-east or south-west) direction, and sheltered from strong winds; Boxes will be positioned such that there is a clear flight path to and from the box entrance (i.e. the box entrance is not obscured by vegetation); A mixture of bat boxes suitable for both maternity and hibernation roosting will be used. At least one 'gable end' box (see Pschonny et al., 2022) will be installed in each tree; Mature trees will be selected that are outside of bat mitigation buffers and that are located in treelines or along the edge of retained woodland habitat and adjacent to good quality foraging habitat. The locations and access arrangements will be agreed with the relevant landowner; Bat boxes will be subject to inspections for bats and maintenance checks once a year during Years 1-5 (post-construction), and then every five years to Year 20; Detritus (not including bat droppings) to be cleared from bat boxes during inspections and vegetation trimmed to ensure entrances do not become obstructed; and Where boxes have become damaged or are missing, these will be replaced immediately. If there is evidence of human vandalism, an alternative tree in a less prominent position will be identified (and permissions obtained) and three boxes will be reinstalled in the new tree. 	Operation
Biodiversity	<ul style="list-style-type: none"> Ten bat boxes available for use every year for 20 years following construction; Bat box inspections undertaken in every year post-construction Years 1-5, and then every 5 years to Year 20; Evidence of occupation by bats of at least 5 boxes within the first 5 years following construction; and All bat roosts records to be submitted to Bat Conservation Ireland online at https://www.batconservationireland.org/in-your-area/sightings. 	Operation
Biodiversity	<p>Provision of bird nesting habitat</p> <ul style="list-style-type: none"> Erection of one swift tower in the south western section of the project site. 	Operation

	<ul style="list-style-type: none"> • Erect tower with a gap of 15 m from the nearest major source of obstruction so there is clear access to the nest entrance; • Position nest boxes within the tower so they are not exposed to sun and are sheltered from the rain and are at least 7 m from the ground; • Ensure the nest chamber dimensions, material and construction follows the specifications outlined in Swift Conservation's guidance⁴ to exclude predators and competitor species. • Bird surveys / checks every year during years 1-5 post-construction to ensure that the swift tower is in good condition. 	
Biodiversity	<p>Provision of hibernacula for hedgehogs</p> <ul style="list-style-type: none"> • Eight no. hibernacula will be constructed for hedgehogs from logs arising from felled trees; • The hibernacula will be constructed in areas that are south facing, well-drained, undisturbed by humans/vehicles (e.g. paths and roads) adjacent to broad-leaved trees (to provide leaves for nest construction) and act as transitions between habitats (e.g. between scrub and woodland etc); • The logs will be laid in a hole 0.5 m deep, and at least 2 m wide and 4 m long, with turves of vegetation from the area excavated kept aside to be placed on top of the hibernacula. The hole will be filled to just below ground level with gravel or sand to facilitate drainage, with logs piled on top in a configuration that creates voids within the heap, with access gaps into these voids. Logs will be piled to a height of at least 1m. Soil arising from the hole and the salvaged turves of vegetation will be laid on top of the logs with the aim of establishing a cover of vegetation to provide insulation. • The locations of the hibernacula will be agreed in conjunction with landowners and the Planning Authority prior to the operation of the project. • Annual checks in Years 1-5 indicate hibernacula are in suitable condition for use by hedgehogs; • Evidence of use (droppings, nests) recorded within at least two hibernacula in the first 5 year after construction; and • All hedgehog records to be submitted to the Irish Hedgehog Survey online at Record sightings Hedgehog Survey (www.irishhedgehogsurvey.com). 	Operation
Biodiversity	<p>Provision of reptile and amphibian hibernacula</p> <ul style="list-style-type: none"> • Eight no. hibernacula will be constructed for reptiles and amphibians from logs formed from felled trees; • The hibernacula will be the same as those for hedgehogs; • The hibernacula will be located in a sunny position, orientated such that a long side faces south and near to watercourses / drainage ditches, within rough grassland or scrub and avoiding areas of intensively managed / grazed land; and 	Operation

	<ul style="list-style-type: none"> The locations of the hibernacula will be agreed in conjunction with landowners and the Planning Authority prior to the operation of the project. <p>Reptile and amphibian species richness and abundance will be measured via physical checks to ensure hibernacula are still present and functional in years 1-5 post-construction.</p>	
Biodiversity	<p>Provision of invertebrate foraging habitat and hibernacula</p> <ul style="list-style-type: none"> Maintain 5m rough grassland buffer along access tracks to provide habitat for pollinators; Erect insect hotels in the first year of operation. Insect hotels or bee boxes can be created by drilling holes into fence posts or pieces of wood and positioning appropriately. These sites can be created along dry hedgerows, access tracks and other field boundaries; Ensure insect hotels are maintained or replaced over the lifespan of the project as required; and Locate both insect hotels and bee hotels in sunny, sheltered areas, ideally no more than 300m from areas of food plants. The locations of the insect hotels will be agreed in conjunction with landowners and the Planning Authority prior to the operation of the Project. At least three insect hotels per 35 ha; Maintenance checks to ensure grassland buffer habitats, and insect hotels still present and functional, to be carried out annually in Years 1-5 post-construction. 	Operation
Biodiversity	<p>The implementation of enhancement measures will be overseen by an ecologist with the required experience and expertise, appointed by the project. All management tasks will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf, and all ecological monitoring will be undertaken by suitably qualified and experienced ecologists.</p>	Operational
Biodiversity	<p>To prevent accidental disturbance to resting places of mammals (badgers, red squirrel, pine marten, otter and hedgehog), an ecological walkover survey will be undertaken prior to any construction activities within the project footprint. Similarly, trees and structures within the works corridor will be re-assessed for bat roosting potential, with any inspections or emergence surveys carried out as required under licence.</p> <p>Checks for nesting birds will be required for construction undertaken during the bird breeding season. If nests are recorded, ongoing monitoring and appropriate exclusion zones will be implemented to determine when and where works can proceed. If exclusion zones cannot be implemented, NPWS will be contacted and based on their advice, additional mitigation and compensation will be implemented, with relevant licences applied for, if required.</p>	Pre-Construction
Biodiversity	<p>Water quality monitoring will be undertaken as outlined in Chapter 7 of the EIAR. This will check the efficacy of mitigation measures.</p>	Pre-Construction / Construction
Biodiversity	<p>Based on current best-practice guidelines (SNH, 2009), a targeted range of flight activity surveys and collision monitoring (carcass searching) will be undertaken during the breeding and non-breeding</p>	Operation

	<p>seasons in years 1, 2 and 3 post construction, to monitor the rate of avian turbine collisions and identify any significant unforeseen adverse effects. Thereafter, if the rate of turbine strikes is as low as predicted by the CRM (which is highly precautionary), the monitoring should no longer be required. If monitoring indicates potentially significant levels of collision mortality for IEF birds, potential mitigation measures will be developed and implemented (including the possibility of turbine curtailment), and further monitoring will also be identified, to ensure there are no significant effects on any IEF birds. Proposed mitigation and monitoring measures will be agreed with the planning authority prior to implementation.</p>	
Biodiversity	<p>To reinforce the baseline results and better inform the precise requirements for post-construction monitoring, a year of confirmatory surveys will be undertaken for bats immediately prior to wind farm construction. This will involve three rounds of static detector surveys (spring, summer and autumn) as per the latest NatureScot (2021) guidance. The results of these surveys will be used to provide an updated baseline environment, for bats, and will form the basis of the post-construction monitoring programme. For example, in the event of high levels of activity at certain locations across the project site, post-construction monitoring will be adapted to pay particular attention to this location.</p>	Operation
Biodiversity	<p>The post-construction monitoring programme will consist of:</p> <ul style="list-style-type: none"> • static detector surveys: these surveys will allow for a valid comparison of bat activity and project site usage with pre-construction levels. Following NatureScot (2021) guidance, the surveys are to be conducted during years 1, 2 and 3 post construction to allow for annual variation and cumulative effects. Reports will be submitted to the competent authority and NPWS following each year of surveys. Surveys will follow baseline survey methods, as outlined in NatureScot (2021) guidance. After three years of post-construction surveys, the monitoring programme may be extended or halted based on the results and following agreement with the competent authority and NPWS. • fatality monitoring: while not currently recommended, if this is determined to be required following the additional year of pre-construction monitoring (i.e. due to high levels of bat activity), this will initially be conducted during years 1, 2 and 3 post construction to allow for annual variation and cumulative effects. The comprehensive fatality monitoring programme for birds as described above will be extended and duplicated to bats for the first three years the post-construction monitoring requirements recommended by NatureScot (2021). After three years of post-construction surveys, the monitoring programme may be extended or halted following agreement with the competent authority and NPWS. 	Operation
Biodiversity	<p>Bat mitigation buffers will need to be monitored in years 1, 2 and 3 following construction to ensure vegetation clearance and management measures have resulted in the desired habitat conditions. Once these conditions have been achieved, habitats will be maintained in this manner for the duration of the project lifespan.</p>	Operation
Biodiversity	<p>Mitigation measures for decommissioning will be similar to those for the construction phase; however the magnitude required will be less, as track and turbine installation will not be required.</p>	Decommissioning

Land & Soil	The excavation and long term storage of materials will be completed in accordance with best practice for the management and treatment of such materials.	Construction
Land & Soil	<p>The following avoidance and design measures are proposed to reduce erosion effects at excavation and spoil storage areas:-</p> <ul style="list-style-type: none"> • Mats will be used, as necessary, to support construction plant and machinery on soft ground, thus reducing the likelihood of soil and subsoil erosion and avoiding the formation of rutted areas. This will substantially reduce the likelihood for surface water ponding to occur; • Excavated material will be side cast and stored temporarily adjacent to excavation areas for use during reinstatement and landscaping. Where material is not required for reinstatement or landscaping, it shall be immediately transported to the spoil deposition areas; • Silt fences, and all necessary surface water management measures (including upslope interceptor drains), will be installed around all temporary stockpiles to limit movement of entrained sediment in surface water runoff. All slopes will be sealed with the bucket of an excavator; • In order to minimise erosion during the construction phase, works will not take place during periods of intense or prolonged rainfall (to prevent increased silt laden runoff). Drainage systems, as outlined in Chapter 7 of the EIAR, will be implemented to limit runoff effects during the construction phase; • At the designated spoil deposition areas, material will be placed in layers to ensure stability is maintained and works will be undertaken in accordance with best practice construction methodologies. Works at the spoil deposition areas will be monitored, on a weekly basis during the construction phase and monthly for a 6 no. month period thereafter, by an appropriately qualified Geotechnical Engineer. In the event that any ground stability issues arise, the Engineer will have the power to cease works until such time as remedial works have been completed to his/her satisfaction; • Permanently mounded spoil; for example, berms surrounding turbines and hardstands, berms located along access tracks and at the spoil deposition areas; will be seeded and grassed over at the earliest opportunity to prevent erosion; and, • The electricity line (grid connection) trench will be reinstated to the required specification and in accordance with landowner requirements and will be reseeded or allowed to vegetate naturally (on agricultural land) or topped with tarmacadam (or similar along public roads) at the earliest opportunity to prevent erosion. 	Construction
Land & Soil	<p>The following measures are proposed to specifically prevent contamination of soils and subsoils:-</p> <ul style="list-style-type: none"> • The volume of fuels or oils stored on site will be minimised. All fuel and oil will be stored in an appropriately bunded area within the temporary construction compound. Only an appropriate volume of fuel will be stored at any given time. The bunded area will be roofed to avoid the ingress of rainfall and will be fitted with a storm drainage system and an appropriate oil 	Construction

	<p>interceptor;</p> <ul style="list-style-type: none"> • All bunded areas will have 110% capacity of the volume to be stored; • On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled at the temporary compound and will be towed around the site by a 4x4 jeep to where plant and machinery is located. The 4x4 jeep will also be fully stocked with fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated, trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations to avoid any accidental leakages; • All plant and machinery used during construction will be regularly inspected for leaks and fitness for purpose; • Spill kits will be available to deal with any accidental spillages within the temporary construction compound and during re-fuelling; • All waste tar material arising from road cuttings (from trenching in public roads and haul route temporary alteration works) will be removed off-site and disposed of at a licensed waste facility. Due to the potential for contamination of soils and subsoils, it is not proposed to utilise this material for any reinstatement works or to store it within the spoil deposition areas; and • An emergency plan for the construction phase to deal with accidental spillages is contained within the Planning-Stage Construction and Environmental Management Plan (Annex 3.4 of the EIAR). This emergency plan will be further developed by the contractor prior to the commencement of construction. 	
<p>Land & Soil</p>	<p>The following control measures incorporated into the construction phase of the project will ensure the management of the risks for this site:</p> <ul style="list-style-type: none"> • Appointment of experienced and competent contractors; • The site will be supervised by experienced and qualified personnel; • Allocate sufficient time for the project (be aware that decreasing the construction time has the potential to increase the risk of initiating a localised peat movement); • Prevent undercutting of slopes and unsupported excavations; • Maintain a managed robust drainage system; • Prevent placement of loads/overburden on marginal ground; • Implementation of safety buffers around deep peat areas; • Adhere to the spoil and peat storage restriction areas detailed in the Geotechnical and Peat Stability Risk Assessment (GDG, 2023); • Set up, maintain and report findings from monitoring systems as outlined in the Geotechnical 	<p>Construction</p>

	<p>and Peat Stability Assessment (FT, 2023);</p> <ul style="list-style-type: none"> • Ensure construction method statements are developed and agreed before commencement of construction and are followed by the contractor; and, • Revise and amend the Construction Risk Register as construction progresses to ensure that risks are managed and controlled for the duration of construction. 	
Land & Soil	<p>During and post-construction all excavated or raised areas (i.e. cut and fill) and reinstated/landscaped ground, including the spoil deposition areas, will be inspected for signs of erosion and instability by the Geotechnical Engineer appointed by the Developer. These inspections will be undertaken on a weekly basis during the construction phase and monthly, for a six-month period, post-construction.</p>	Construction / Operation
Land & Soil	<p>The substation transformer and oil storage tanks will be located in a roofed concrete bund capable of holding 110% of the stored oil volume. Turbine transformers will be located within the turbines, and any leaks will be fully contained within the turbine.</p>	Operation
Land & Soil	<p>During decommissioning, it may be possible to reverse or at least reduce some of the likely effects caused during construction by rehabilitating construction areas such as turbine foundations and hardstanding areas. This will be done by removing wind farm infrastructure and restoring disturbed ground with previously excavated material where possible.</p>	Decommissioning
Land & Soil	<p>Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some of the effects will be avoided by retaining some elements of the project in place where appropriate; for example, access tracks within the site may be retained for agricultural and forestry uses.</p>	Decommissioning
Land & Soil	<p>Mitigation measures, to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant and machinery, will be implemented as per the construction phase mitigation measures.</p>	Decommissioning
Water	<p>While the SuDS is an amalgamation of a suite of drainage infrastructure; the overall philosophy is straightforward. In summary:-</p> <ul style="list-style-type: none"> • All surface water runoff will be directed to specially constructed swales surrounding all areas of ground proposed to be disturbed (including the area for the temporary storage of material); • The swales will direct runoff into settlement ponds/silt traps where silt/sediment will be allowed to settle; and • Following treatment, clean water will be discharged indirectly to the local drainage network via buffered outfalls thus ensuring that no scouring occurs. 	Construction
Water	<p>The suite of surface water drainage infrastructure will include interception drains, collector drains swales, sediments, flow attenuation and filtration check dams, settlement ponds/silt traps, and buffered outfalls.</p>	Pre-Construction / Construction
Water	<p>The design criteria implemented as part of the SuDS are as follows:-</p>	Construction

	<ul style="list-style-type: none"> • To minimise alterations to the ambient site hydrology and hydrogeology; • To provide settlement and treatment controls as close to the site footprint as possible and to replicate, where possible, the existing hydrological environment of the site; • To minimise sediment loads resulting from the development run-off during the construction phase; • To preserve greenfield runoff rates and volumes; • To strictly control all surface water runoff such that no silt or other pollutants shall enter watercourses and that no artificially elevated levels of downstream siltation or no plumes of silt arise when substratum is disturbed; • To provide settlement ponds to encourage sedimentation and storm water runoff settlement; • To reduce stormwater runoff velocities throughout the site to prevent scouring and encourage settlement of sediment locally; • To manage erosion and allow for the effective revegetation of bare surfaces; • To manage and control water within the site and allow for the discharge of runoff from the site below the MAC of the relevant surface water regulation value; and, • The high sensitivity of downstream receptors along with WFD status. 	
Water	<p>Best practice methods related to water incorporated into the forestry management and mitigation measures have been derived from:-</p> <ul style="list-style-type: none"> • Department of Agricultural, Food and the Marine (2019) Standards for Felling and Reforestation; • Forestry Commission (2004) Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh; • Coillte (2009) Forest Operations and Water Protection Guidelines; • Coillte (2009) Methodology for Clear Felling Harvesting Operations; and, • Forest Service (2000: Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford. 	Construction
Water	<p>There is a requirement in the <i>Forest Service Code of Practice</i> and in the <i>FSC Certification Standard</i> for the installation of buffer zones adjacent to aquatic zones at planting stage. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document <i>Forestry and Water Quality Guidelines</i> are detailed at Chapter 7 (Table 7.34) of the EIAR.</p>	Construction
Water	<p>During the construction phase, a self-imposed conservative buffer zone of 50m will be maintained for all Rapemills River and West Galros Stream where possible.</p>	Construction
Water	<p>Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods, as follows:-</p>	Construction

	<ul style="list-style-type: none"> • Machine combinations (i.e. handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance; • Checking and maintenance of tracks and culverts will be ongoing through any felling operation. No tracking of vehicles through watercourses will occur. Where possible, existing drains will not be disturbed during felling works; • Ditches which drain from the areas to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (~0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and avoid being placed at right angles to the contour; • Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the spoil disposal areas. All new silt traps will be constructed on even ground and not on sloping ground; • In areas particularly sensitive to erosion or where felling inside the 50m buffer is required, it will be necessary to install double or triple sediment traps; • All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone; • Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled; • Brush or bog mats will be used to support vehicles on soft ground, reducing topsoil and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brush mat renewal will take place before they become heavily used and worn. Provision will be made for brush mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall; • Timber will be stacked in dry areas, and outside the 50m watercourse buffer. Straw bales and check dams will be emplaced on the down gradient side of timber storage/processing sites; • Works will be carried out during periods of no, or low, rainfall in order to minimise entrainment of exposed sediment in surface water run-off; • Checking and maintenance of roads/tracks and culverts will be ongoing through the felling operation; 	
--	--	--

	<ul style="list-style-type: none"> • Refuelling or maintenance of machinery will not occur within 50m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; • A permit to refuel system will be adopted; • Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors; • Trees will be cut manually from along streams and using machinery to extract whole trees; and • Travel will only be permitted perpendicular to and away from surface water features. 	
Water	Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time and allow settling of silt in a controlled manner.	Construction
Water	<p>The following items will be carried out during pre-felling inspections and regularly thereafter:-</p> <ul style="list-style-type: none"> • Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual waterlogging or bogging of machines; • Inspection of all areas reported as having unusual ground conditions; • Inspection of main drainage ditches and outfalls. During pre-felling inspections, the main drainage ditches will be identified. Where possible, the pre-felling inspection will be carried out during rainfall; • Following tree felling, all main drains will be inspected to ensure that they are functioning; • Extraction tracks within 10m of drains will be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground; • Culverts on drains exiting the site, if impeded by silt or debris, will be unblocked; and • All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall. 	Pre-Construction / Construction
Water	Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4-weeks of the felling activity commencing, preferably in medium-to-high water flow conditions. The 'during' sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as necessary to demonstrate that water quality has returned to pre-activity status (i.e. where an impact has been shown).	Pre-Construction / Construction
Water	The surface water sampling locations used in this EIAR for the project site and grid connection (i.e. SW1 – SW4) will also be used as sampling locations during felling activities. Also, daily surface water monitoring forms (for visual inspections and field chemistry measurements) will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.	Pre-Construction / Construction
Water	The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas	Construction

	by using a 50m buffer. Additional mitigation in the form of double silt fencing will be placed around all infrastructure that encroaches the 50m buffer zone. As described above and at Chapter 3 , specific mitigation measures, incorporated into the design of the project (embedded mitigation) and through implementation of best practice methodologies will be employed where work inside buffer zones is proposed.	
Water	<p>The generally large setback distance from sensitive hydrological features ensures that sufficient space is provided for the installation of drainage mitigation measures (discussed below) and to ensure their effective operation. The proposed buffer zone will ensure:-</p> <ul style="list-style-type: none"> • Avoidance of physical damage to watercourses, and associated release of sediment; • Avoidance of excavations within close proximity to surface water courses; • Avoidance of the entry of suspended sediment from earthworks into watercourses; and, • Avoidance of the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone. 	Construction
Water	<p>Source controls to limit the likelihood for 'dirty water' to occur:-</p> <ul style="list-style-type: none"> • Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with clean washed gravel, filter fabrics, and other similar/equivalent or appropriate systems; • Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures. 	Construction
Water	<p>In-Line controls to ensure appropriate management of silt laden water:-</p> <ul style="list-style-type: none"> • Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems. 	Construction
Water	<p>Treatment systems to fully attenuate silt laden waters prior to discharge:-</p> <p>Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Silbuster, and/or other similar/equivalent or appropriate systems. It should be noted for this site that an extensive network of bog and forestry drains already exists, and these will be integrated and enhanced as required and used within the wind farm drainage system. The integration of the existing land drainage network and the proposed wind farm network is common practice in wind energy developments and will also result in benefits to surrounding agricultural lands.</p>	Construction
Water	The main elements of interaction with existing drains will be as follows:-	Construction

	<ul style="list-style-type: none"> • Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction and attenuation for flow management) of runoff from the wind farm drainage into the existing site drainage network. This will reduce the likelihood of any increased risk of downstream flooding or sediment transport/erosion; • Silt traps will be placed in the existing drains upstream of any streams where construction works is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area; and • Buffered outfalls, which will be numerous over the site, will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site. 	
Water	While the silt/sediment ponds and lagoons are assessed as providing a sufficient level of protection to avoid any deterioration in downstream water quality; a final line of defence can be provided by a water treatment train such as a 'Siltbuster', if required. If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train [sequence of water treatment processes]) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This water treatment train will apply for the entirety of the construction phase.	Construction
Water	Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be emplaced within drains down-gradient of all construction areas inside the 50m hydrological buffer zones to provide an additional layer of protection in these areas.	Construction
Water	Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats (sediment entrapment mats, consisting of coir or jute matting) placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.	Construction
Water	It is proposed that excavated overburden/spoil will be utilised for reinstatement of excavated areas etc. and for landscaping purposes. Excess material, or material which is unsuitable for this purpose, will be stored, permanently, at the dedicated spoil deposition areas. The main spoil deposition area is located outside the 50m stream buffer zone. A small section of the spoil deposition area at turbine T5 encroaches the 50m buffer zone. Additional mitigation in the form of double	Construction

	silt fencing will be placed around all infrastructure that encroaches the 50m buffer zone.	
Water	During the initial placement of spoil in the deposition areas, silt fences, straw bales and biodegradable matting will be used to control surface water runoff. Double silt fencing will be placed along the edge of the bog drain that intercepts the deposition areas.	Construction
Water	Drainage from the overburden deposition areas will ultimately be into to the existing bog drain network where it is proposed that check dams will be installed every 20m or so to create a series of settlement ponds, before being discharged.	Construction
Water	Spoil deposition areas will be sealed with a digger bucket and allowed to revegetate as soon possible to reduce sediment entrainment in runoff. Once re-vegetated and stabilised, spoil deposition areas will no longer be a likely source of silt laden runoff. Surface water protection infrastructure will be left in place until the areas have stabilised.	Construction
Water	Temporary silt fencing/silt trap arrangements will be placed within existing roadside/field drainage features along the grid connection route to remove any suspended sediments from the works area. The trapped sediment will be removed and disposed of at an appropriate licenced facility. Any bare-ground will be re-seeded/reinstated immediately and silt fencing temporarily left in place if necessary.	Construction
Water	<p>The works programme for the initial construction stage of the development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if prolonged or intense rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.</p> <p>The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities:-</p> <ul style="list-style-type: none"> • General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates; • Meteo Alarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale; • 3 hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events; • Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3 hour record is given and is updated every 15 minutes. Radar images are not predictive; and, • Consultancy Service: Met Eireann provide a 24 hour telephone consultancy service. The 	Construction

	forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.	
Water	<p>Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of an impending high rainfall intensity event.</p> <p>Works will be suspended if forecasting suggests either of the following is likely to occur:-</p> <ul style="list-style-type: none"> • >10 mm/hr (i.e. high intensity local rainfall events); • >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, • >half monthly average rainfall in any 7 days. <p>Prior to works being suspended the following control measures will be completed:-</p> <ul style="list-style-type: none"> • Secure all open excavations; • Provide temporary or emergency drainage to prevent back-up of surface runoff; and, • Avoid working during heavy rainfall and for up to 24-hours after heavy events to ensure drainage systems are not overloaded. 	Construction
Water	The construction of the site drainage system will be carried out, at the respective locations, prior to other activities being commenced. The construction of the drainage system will only be carried out during periods of, where possible, no rainfall, therefore avoiding runoff. This will avoid the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and functional for all subsequent construction works.	Pre-Construction / Construction
Water	Prior to the commencement of development, a detailed Site Drainage Plan and SWMP will be prepared to detail the siting and composition of the surface water management measures. The respective plans, which will form part of a detailed Construction Environmental Management Plan (CEMP), will be prepared prior to the commencement of development.	Pre-Construction / Construction
Water	<p>The CEMP will also include a detailed Water Quality Monitoring Plan for the monitoring of surface waters in the vicinity of the construction site by a designated Environmental Manager. The monitoring programme will comprise field testing and laboratory analysis of a range of agreed parameters. The civil works contractor, who will be responsible for the construction of the site drainage system, and Environmental Manager will undertake regular inspections of the drainage system to ensure that all measures are functioning effectively. The surface water sampling locations used in this EIA (i.e. SW1 – SW4) will be used during construction activities. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.</p> <p>Any excess build-up of silt levels that may decrease the effectiveness of the drainage feature, will be removed and disposed of in an appropriate manner.</p>	Pre-Construction / Construction
Water	The management of excavation dewatering (pumping), particularly in relation to any accumulation of	Construction

	<p>water in foundations or electricity line trenches, and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:-</p> <ul style="list-style-type: none"> • Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations, will be put in place; • The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters to ensure that Greenfield runoff rates are mimicked; • If required, pumping of excavation inflows will prevent build-up of water in the excavation; • The pumped water volumes will be discharged via volume and silt/sediment ponds and settlement lagoons adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit; • There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur; • Daily monitoring of wind farm excavations by the Environmental Manager will occur during the construction phase. If high levels of seepage inflow occur, excavation work at this location will cease immediately and a geotechnical assessment undertaken; and, • A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as final line of defence if needed. 	
<p>Water</p>	<p>Mitigation measures proposed to avoid release of hydrocarbons at the site are as follows:-</p> <ul style="list-style-type: none"> • The volume of fuels or oils stored on site will be minimised. All fuel and oil will be stored in an appropriately bunded area within the temporary construction compound. Only an appropriate volume of fuel will be stored at any given time. The bunded area will be roofed to avoid the ingress of rainfall and will be fitted with a storm drainage system and an appropriate oil interceptor; • All bunded areas will have 110% capacity of the volume to be stored; • On site refuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled at the temporary compound and will be towed around the site by a 4x4 jeep to where plant and machinery is located. No refuelling will be permitted at works locations within the 50m hydrological buffer. The 4x4 jeep will also be fully stocked with fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations to avoid any accidental leakages; • All plant and machinery used during construction will be regularly inspected for leaks and fitness 	<p>Construction</p>

	<p>for purpose;</p> <ul style="list-style-type: none"> • Spill kits will be readily available to deal with and accidental spillages; • All waste tar material arising from road cuttings (from trenching or other works in public roads) will be removed off-site and taken to a licensed waste facility. Due to the potential for contamination of soils and subsoils, it is not proposed to utilise this material for any reinstatement works; and • An outline emergency plan for the construction phase to deal with accidental spillages is contained within the Planning-Stage CEMP (Annex 3.4). This emergency plan will be further developed prior to the commencement of development, and will be agreed with the Planning Authority as part of the detailed CEMP. 	
Water	<p>Measures to avoid contamination of ground and surface waters by wastewaters will comprise:-</p> <ul style="list-style-type: none"> • Self-contained port-a-loos (chemical toilets) with an integrated waste holding tank will be installed at the site compound, maintained by the providing contractor, and removed from site on completion of the construction works; • Water supply for the site office and other sanitation will be brought to site and removed after use to be discharged at a suitable off-site treatment location; and, • No water will be sourced on the site, nor will any wastewater be discharged to the site. 	Construction
Water	<p>The following mitigation measures are proposed to ensure that the release of cement-based products is avoided:-</p> <ul style="list-style-type: none"> • No batching of wet-cement products will occur on site. Ready-mixed concrete will be brought to site as required and, where possible, emplacement of pre-cast products will be utilised; • All watercourse crossings will utilise pre-cast products and the use of wet-cement products within the hydrological buffer will be avoided; • Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. Chute cleaning will be undertaken at lined cement washout ponds with waters being stored in the temporary construction compound, removed off site and disposed of at an approved licensed facility. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed; • Weather forecasting will be used to ensure that prolonged or intense rainfall is not predicted during concrete pouring activities; and, • The concrete pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event. 	Construction
Water	<p>The following mitigation measures are proposed:-</p> <ul style="list-style-type: none"> • All proposed new stream crossings will be clear span bridges (bottomless culverts) and the 	Construction

	<p>stream beds will remain undisturbed. No in-stream excavation works at the crossing locations are proposed and therefore there will be no impact on the stream at the proposed crossing location;</p> <ul style="list-style-type: none"> • All internal wind farm electrical cabling or grid connection cabling will pass above or below the existing culvert and will not directly interfere with the culvert; • At the time of construction, all guidance/best practice requirements of the OPW or Inland Fisheries Ireland will be incorporated into the design/construction of the proposed watercourse/culvert crossings; • As a further precaution, in-stream construction work (if/where required) will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to <i>Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016)</i> (i.e., July to September inclusive). This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI); • During the near stream construction works (i.e. within the 50m buffer zone), double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase; • The new watercourse crossings at the wind farm site will require a Section 50 license application to the OPW in accordance with the Arterial Drainage Act 1945. The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent; and, • No instream works are proposed at the grid connection watercourse crossings. 	
Water	The proposed mitigation measures for protection of surface water quality, which will include buffer zones and robust drainage control measures (i.e. interceptor drains, swales, silt/settlement ponds, settlement lagoons), will ensure that the quality of runoff from development areas will be very high.	Construction
Water	<p>The operational phase drainage system of the project is described below:-</p> <ul style="list-style-type: none"> • Interceptor drains will be installed up-gradient of all infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader; • Swales/road side drains will be used to collect runoff from access tracks, turbine hardstanding areas and substation compound areas which may contain entrained suspended sediment, and channel it to settlement ponds for sediment settling; • Transverse drains ('grips') will be constructed, where appropriate, in the surface layer of access tracks to divert any runoff into swales/track side drains; • Check dams will be used along sections of access tracks drains to intercept silts at source. Check dams will be constructed from a 40mm non-friable crushed rock or similar; • Swales and check dams will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus 	Operation

	<p>reducing the hydraulic loading to watercourses; and,</p> <ul style="list-style-type: none"> • Settlement ponds will be designed in accordance the greenfield runoff rate requirements; and, • Imported rock for construction purposes and road surfacing will be strong, well-graded limestone which will be resistant to erosion and have a low likelihood to generate fines in hardstand runoff. 	
Water	<p>Mitigation measures relating to oils and fuels are as follows:-</p> <ul style="list-style-type: none"> • Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction; • The substation transformer and oil storage tanks will be located in a concrete bund, impervious to rainwater ingress, capable of holding 110% of the stored oil volume; • Turbine transformers will be located within the turbines, and any leaks will be fully contained within the turbine thus eliminating any pathway for leakages to affect land and soil; • Maintenance vehicles will be regularly inspected for leaks and fitness for purpose; and • An emergency plan for the operational phase to deal with accidental spillages will be contained within an Environmental Management Plan. Spill kits will be available to deal with accidental spillages. 	Operation
Water	<p>The design criteria implemented as part of the SuDS are as follows:-</p> <ul style="list-style-type: none"> • To minimise alterations to the ambient site hydrology and hydrogeology; • To provide settlement and treatment controls as close to the site footprint as possible and to replicate, where possible, the existing hydrological environment of the site; • To minimise sediment loads resulting from the development run-off during the construction phase; • To preserve greenfield runoff rates and volumes; • To strictly control all surface water runoff such that no silt or other pollutants shall enter watercourses and that no artificially elevated levels of downstream siltation or no plumes of silt arise when substratum is disturbed; • To provide settlement ponds to encourage sedimentation and storm water runoff settlement; • To reduce stormwater runoff velocities throughout the site to prevent scouring and encourage settlement of sediment locally; • To manage erosion and allow for the effective revegetation of bare surfaces; • To manage and control water within the site and allow for the discharge of runoff from the site below the MAC of the relevant surface water regulation value; and, • The high sensitivity of downstream receptors along with WFD status. 	Operation
Water	<p>The site-specific flood zone modelling shows that only short sections of proposed access road at 2 no. watercourse crossing locations will potentially be affect by fluvial flooding. One crossing is on the Rapemills River itself and the second is a large land drain on the south of the site which drains into the Rapemills River.</p> <p>For these new crossing works a consent will be sought under Section 50 of the Arterial Drainage Act, 1945</p>	Operation

	<p>to install a new culvert/bridge with the hydraulic capacity to accommodate a 100-year flood flows while maintaining at least a 300mm freeboard above the flood level.</p> <p>The proposed access road surface level will be close or at the existing ground level to prevent obstruction of surface water flow paths.</p>	
Water	<p>Proposed mitigation measures relative to piling works will comprise:</p> <ul style="list-style-type: none"> • Strict QA/QC procedures for piling works will be followed; • Piles will be kept vertical during piling works; • Good workmanship will be employed during all piling works; and, • Where required use bentonite seal to prevent upward/downward movement of surface water/groundwater. 	Construction / Operation
Water	<p>To ensure downward flow of peat water and/or pollutants from the piling works does not occur, a bentonite seal will be used in a starter pit for each driven pile, and the mitigation measures outlined above will be implemented. The concrete added to the bored pile will seal the pile annulus.</p>	Construction / Operation
Water	<p>No upwelling of groundwater to the peat surface water recorded in any of the site investigation locations recorded across the proposed site. Notwithstanding this, to ensure upward flow of underlying groundwater via potential pathways created by piling works does not occur, a bentonite seal will be used in a starter pit for each driven pile, and the mitigation measures outlined above will be implemented. The concrete added to the bored pile will seal the pile annulus.</p>	Construction / Operation
Water	<p>As in the construction phase, temporary surface runoff control measures will again be put in place during decommissioning works. The drainage system will remain operational during the decommissioning phase and will serve to treat any sediment laden surface water run-off due to a renewed disturbance of soils. Following decommissioning, re-vegetation will be implemented as soon as practicable and monitored to ensure vegetation is established.</p>	Decommissioning
Water	<p>Following decommissioning, turbine foundations, hardstanding areas and access tracks will be rehabilitated in accordance with the methods outlined at Chapter 3. The access tracks may be left in place, subject to agreement with the Planning Authority and the landowner. It is considered that this approach will result in lesser effects that would their removal.</p>	Decommissioning
Air Quality & Climate	<p>A detailed Dust Management Plan will be formulated prior to the construction phase of the project, and will include the following:-</p> <ul style="list-style-type: none"> • Access tracks and public roads in the vicinity of the site shall be regularly cleaned to remove mud, aggregates and debris and maintained as appropriate. All road sweepers shall be water assisted; • Any road that has the potential to give rise to fugitive dust shall be regularly watered, as appropriate, during dry and/or windy conditions; • Public roads in the vicinity of the site shall be regularly inspected for cleanliness and cleaned as 	Construction

	<p>necessary;</p> <ul style="list-style-type: none"> • In the event of dust nuisance occurring outside the site boundary, movement of materials will be immediately terminated and satisfactory procedures implemented to rectify the problem before the resumption of operations; • If issues persist and the above measures are not satisfactorily control dust emissions, a wheel washing system with rumble grids to dislodge accumulated dust and mud prior to leaving the site should be installed; • During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions; • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; and • The Dust Management Plan shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. <p>At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.</p>	
Air Quality & Climate	<p>Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. Measures to reduce the embodied carbon of the construction works include:</p> <ul style="list-style-type: none"> • Creating a construction program which allows for sufficient time to determine reuse and recycling opportunities; • Following IEMA mitigation hierarchy; • Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled; • Materials will be reused on site within the new build areas where possible; • Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods; • Ensure all plant and machinery are well maintained and inspected regularly; • Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site; and • Sourcing materials locally where possible to reduce transport related CO₂ emissions. 	Construction
Landscape	<p>Aside from construction stage mitigation measures to minimise land and vegetation disturbance and dust emissions (which may reduce visual amenity), there are no specific mitigation measures to be</p>	Construction

	implemented. The appropriate management and reinstatement of excavations, in a timely manner, will ensure that any adverse effects caused, for example at site entrances or road upgrade locations, are minimised insofar as possible. Similarly, the progressive reinstatement and landscaping of the site will remediate any short term adverse effects on the local landscape.	
Landscape	Given the highly visible nature of commercial wind energy developments it is not generally feasible to screen them from view using on-site screening measures typically employed for other forms of development during the operational phase. Instead, landscape and visual mitigation measures have been incorporated into the siting and design of the project at an early stage (see Chapter 2). In the case of the wind farm, the guidance provided in the <i>Wind Energy Development Guidelines for Planning Authorities 2006</i> (and 2019 revision) was the principal consideration. The relevant guidance for the landscape types that constitute the landscape and visual setting of the wind farm are discussed in detail in Chapter 9 (Section 9.3.2.1) . It is considered that the wind farm is broadly in line with the recommendations contained within the Guidelines.	Pre-Construction
Landscape	The colour will be industry standard off-white/light grey semi-matt non-reflective finish.	Construction / Operation
Landscape	Electricity lines between individual turbines and the substation, and the grid connection infrastructure, will be placed underground.	Construction / Operation
Landscape	Special care will be taken to preserve any features, insofar as possible, which contribute to the landscape character of the study area.	Construction / Operation
Landscape	Counter rotation of blade sets will be avoided.	Construction / Operation
Landscape	The turbines are expected to be fully operational for up to 35-years. After this period, and if planning permission is not sought for an extension of this use at the site, the turbines and ancillary developments will be deconstructed and removed from the site with the exception of electricity grid infrastructure which may remain as part of the national grid network in perpetuity. Aspects of the ancillary site development including the access tracks may be retained in-situ. These may facilitate the use of the site for, as stated, suitable future rural development uses including animal grazing.	Decommissioning
Cultural Heritage	Archaeological monitoring of all excavations associated with the construction of the wind farm shall be carried out. Monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring.	Construction
Cultural Heritage	Archaeological monitoring of all excavations associated with the grid connection infrastructure shall be carried out. Monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during	Construction

	monitoring.	
Cultural Heritage	Archaeological monitoring of all excavations within the temporary haul route works at the N52/N62 junction shall be carried out. Monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring.	Construction
Cultural Heritage	Archaeological monitoring of all excavations at townland, parish, barony or county boundaries shall be carried out. Monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage and the National Museum of Ireland. Provision will be made for the full excavation and recording of any archaeological features or deposits that may be exposed during monitoring.	Construction
Cultural Heritage	Written and photographic records will be created of any townland, parish, barony or county boundaries that may be impacted on. The written and photographic records will be created in advance of excavations commencing on site.	Pre-Construction
Cultural Heritage	A redundant record (RMP MO020-024) is located with the southern forestry replant lands. Even though this feature is now considered to be non-archaeological, a 30m buffer zone will be established around its perimeter.	Pre-Construction
Noise & Vibration	Construction activities will be completed in accordance with the provisions, where relevant, of <i>BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise</i> which offers detailed guidance on the control of noise & vibration from demolition and construction activities. The relevant practices to be adopted during construction shall include:- <ul style="list-style-type: none"> • Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; • Establishing channels of communication between the contractor/developer, Local Authorities and residents; • Appointing a site representative responsible for matters relating to noise and vibration; • Monitoring typical levels of noise and vibration during critical periods and at sensitive locations; and • Keeping site access tracks even to mitigate the potential for vibration from HGVs. 	Pre-Construction / Construction
Noise & Vibration	A variety of practical noise control measures will be employed. These include:- <ul style="list-style-type: none"> • Selection of plant with low inherent potential for generation of noise and/or vibration; • Placing of noisy/vibratory plant as far away from sensitive properties as permitted by site constraints, and; • Regular maintenance and servicing of plant items. 	Pre-Construction / Construction
Noise & Vibration	The following list of measures will be implemented, as relevant, to ensure compliance with the relevant construction noise criteria:-	Construction

	<ul style="list-style-type: none"> • No plant or machinery will be permitted to cause a 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. • 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 may be required to operate outside of general construction hours will be surrounded by an acoustic enclosure or portable screen; • During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed using methods outlined in <i>BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise</i>; and • The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations, including the delivery of construction materials, shall generally be restricted to between 07:00hrs and 19:00hrs Monday to Friday and between 07:00hrs and 13:00hrs on Saturdays, with no operations on Sundays or public holidays. However, to ensure that optimal use is made of good weather periods, at occasional critical periods within the construction programme (i.e. concrete pours, turbine component deliveries and turbine erection) or in the event of an emergency; activities may be necessary outside out of these hours. 	
Noise & Vibration	<p>If rock breaking is required, the following measures will be implemented, where necessary, to mitigate noise emissions:-</p> <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 air lines are sealed; • Use a dampened bit to eliminate a 'ringing' sound; • Erect an acoustic screen between compressors or generators and noise sensitive area. When possible, line of sight between top of machine and reception point will be obscured; and • Enclose the breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation. 	Construction
Noise & Vibration	<p>If alternative turbine technologies are considered for installation, an updated noise assessment will be prepared to confirm that the associated noise levels comply with the noise criteria curves and/or the relevant operational noise criteria associated with any condition of consent.</p>	Pre-Construction
Noise & Vibration	<p>In the unlikely event that an issue with low frequency noise is associated with the project, an appropriate detailed investigation, by an independent acoustic consultant, shall be undertaken. Due consideration shall be given to guidance on conducting such an investigation which is outlined in Appendix VI of the EPA document entitled <i>Guidance Note for Noise: Licence Applications, Surveys and Assessments in</i></p>	Operation

	<p><i>Relation to Scheduled Activities</i> (NG4) (EPA, 2016). This guidance is based on the threshold values outlined in the Salford University document Procedure for the assessment of low frequency noise complaints, Revision 1, December 2011.</p>	
Noise & Vibration	<p>In the unlikely event that a complaint is received which indicates potential amplitude modulation (AM) associated with turbine operation, an independent acoustic consultant shall be employed to assess the level of AM in accordance with the methods outlined in the IOA Wind Turbine Noise Amplitude Modulation Working Group (AMWG) document <i>A Method for Rating Amplitude Modulation in Wind Turbine Noise</i> (IOA, 2016) or subsequent revisions, and suitable measures implemented as necessary.</p>	Operation
Noise & Vibration	<p>Post-commissioning operational noise monitoring will be undertaken to demonstrate compliance with the relevant noise criteria. In relation to the assessment of operational phase wind turbine noise, the guidance outlined in the IOA GPG and <i>Supplementary Guidance Note 5: Post Completion Measurements</i> (July 2014) will be followed. Should the assessment identify any exceedances of the appropriate criteria, relevant corrective actions will be immediately implemented by the Developer.</p>	Operation
Noise & Vibration	<p>The mitigation measures to be implemented during the decommissioning of the project are the same as those proposed for the construction phase of the development.</p>	Decommissioning
Shadow Flicker	<p>Technological mitigation is available, and widely implemented, on wind farm developments where shadow flicker levels are proven to be in excess of the recommended limits. These mitigation measures effectively limit (curtail) the operation of turbines during the infrequent and rare periods when shadow flicker occurs. In short, if a particular turbine is creating shadow flicker effects at a particular receptor, then the operation of that turbine may be temporarily curtailed. This is usually achieved by turning off the turbines at predetermined times, as predicted by the shadow flicker model, when shadow flicker is proven to occur.</p> <p>The wind turbines will each be fitted with shadow flicker curtailment software, inherent to their design, to facilitate their shut down as required. If the sun is shining, the software will turn off the turbine at the predetermined times when shadow flicker is predicted to occur based on the prediction model. This approach will be implemented, as necessary, to ensure that actual levels of shadow flicker do not exceed either of the relevant limits, i.e. 30-minutes per day or 30-hours per year at any of the receptors located within 10-times tip height (2,000m) of a proposed turbine.</p> <p>The level of turbine curtailment required to ensure that shadow flicker limit values are not exceeded will have an imperceptible effect on the overall renewable energy output of the project.</p>	Operation
Shadow Flicker	<p>Within 12-months of the commencement of commercial operations, a shadow flicker survey will be undertaken by a suitably qualified person to verify the results of the prediction model and to ensure the effective operation of the curtailment software. Monitoring will be undertaken when and where the model predicts shadow flicker is expected to occur.</p> <p>The data which will be collected during the survey will include:-</p> <ul style="list-style-type: none"> • The date, time, location (turbine ID) and duration of the measurement; 	Operational

	<ul style="list-style-type: none"> • Sunlight intensity and direction; • Wind speed and direction/rotor angle; and • Time, date and duration of any sensor triggered curtailment. <p>A site visit will be carried out by a suitably qualified person during each calendar season, to obtain representative samples of year-round conditions, to monitor the site when shadow flicker is predicted to occur to verify the effectiveness of the technological solutions.</p> <p>In addition, should any third party complaints be raised in respect of shadow flicker at any time during the lifetime of the project, additional specific monitoring will be undertaken as per the methods described above.</p>	
Shadow Flicker	An Outline Shadow Flicker Monitoring Programme has been prepared and is provided at Annex 12.4 of the EIAR. This programme will be further developed, and agreed in writing with the Planning Authority, as part of the discharge of pre-commencement conditions process.	Pre-Construction
Material Assets (Transport & Access)	<p>In order to ensure the avoidance of significant effects and reduce the predicted magnitude and significance of effects to the greatest possible extent during the construction and decommissioning phases, the following mitigation measures will be implemented:-</p> <ul style="list-style-type: none"> • Traffic movements will be limited to 07:00-19:00 Monday to Friday and 07:00-13:00 on Saturdays with no movements on Sundays or public holidays. It may be occasionally necessary to undertake works outside of these hours to avail of favourable weather conditions or during extended concrete pours. Where construction activities are necessary outside of the normal working hours, local residents and the Planning Authority will receive prior notification; • A wheel washing facility will be provided, as necessary, to prevent any debris being transferred from site to the adjacent public roads. All drivers will be required to ensure that their vehicle is free from dirt and stones prior to departure from the project site. Where conditions exist for dust to become friable, techniques such as damping down of the affected areas will be employed and vehicles/loads will be covered to reduce dust emissions; • A Traffic Management Plan shall be agreed as part of the Construction Environmental Management Plan (CEMP) with the Planning Authority prior to the commencement of development. The Traffic Management Plan shall include <i>inter alia</i> confirmed details of construction material haul routes; confirmed details of vehicle specifications; a materials delivery programme; traffic management measures including details of 'Stop/Go' systems, signage, road closures and diversionary routes; and road reinstatement details; • All works to the public road shall be undertaken in consultation with, and agreed in advance with, the relevant local authority; • All reasonable steps shall be taken to ensure that only national and regional routes are used to transport all materials to the site, in so far as is possible; • Prior to, and post, construction; pavement condition surveys will be undertaken along all non-national access routes proposed to be utilised in the delivery of construction materials. Given the high-quality and well-maintained nature of motorways and national routes, it is not 	Construction / Decommissioning

	<p>assessed as necessary to carry out surveys of these carriageways or structures. Following the completion of the pre-construction survey, any works which are assessed as necessary to facilitate the delivery of components and materials to the project site shall be undertaken, while any deterioration of carriageways or structures identified in the post-construction survey shall be put right at the expense of the developer and to the satisfaction of the relevant local authority;</p> <ul style="list-style-type: none"> • The pavement on the private road at the operation phase site entrance, from the L300321, on the east of the project site, shall be made good and maintained throughout the operation phase of the project; • Appropriate and adequate signage shall be provided at all entrances providing access, safety and warning information; • Speed limit compliance; particularly along the L30033, L70151, L701521, and L70152 grid connection route; will be emphasised to all staff and contractors prior to the commencement of construction during site induction, and will be strictly enforced throughout the construction phase; • Sufficient car parking spaces will be available at the temporary construction compound during the construction phase. Additionally, during construction of the proposed grid connection, it is likely that agricultural premises will be used for the temporary storage of materials (e.g. ducting, cabling, etc.) and for the parking of construction plant, machinery, and work vehicles (cars, vans, etc.). No parking of cars by persons associated with the project will be permitted on any part of the public road that is not closed to traffic. All staff will be instructed to ensure that private entrances remain unobscured (particularly along the grid connection route); • Road sweeping, particularly along the proposed grid connection route, will be carried out as appropriate to ensure construction traffic does not adversely affect road conditions; • Traffic restrictions shall be kept to minimum duration and extent; • Appropriate traffic management; including maintenance of local access, pedestrian access (where safe to do so) and diversions (where required); shall be implemented to facilitate continued public use of roads where temporary traffic restrictions have to be put in place. Precise details of these measures will be detailed in the Traffic Management Plan to be agreed with the Planning Authority prior to the commencement of development; • The timing of oversized/abnormal loads shall be agreed with the relevant local authorities and An Garda Síochána, and all relevant licenses and permits shall be obtained in advance. All oversized/abnormal loads shall be accompanied by escort vehicles to ensure the maintenance of public safety; • Maximum axle loadings for abnormal/oversized loads shall be strictly enforced in accordance with the Road Traffic (Construction and Use of Vehicles) Regulations 2003 (S.I. No. 5 of 2003); • A designated contact point and coordinator will be put in place to manage all access arrangements and to interface with the public and the respective local authorities; and, • The site shall be closed, and strictly secured, to the public during the construction phase. 	
--	--	--

Material Assets (Transport & Access)	Prior to and post construction, pavement condition surveys will be undertaken along all non-national access routes proposed to be utilised in the delivery of construction materials. Following the completion of the pre-construction survey, any works (additional to those which have been identified and described at Chapter 3) which are assessed as necessary to facilitate the delivery of components and materials to the project site shall be undertaken. Any deterioration of carriageways or structures identified in the post-construction survey shall be put right at the expense of the Developer and to the satisfaction of the relevant local authority.	Pre-Construction / Operation
Material Assets (Aviation)	Due to the absence of likely effects, there are no specific mitigation measures proposed during the construction phase. As requested by the IAA in its consultation response, a minimum of 30-days prior notification will be provided regarding the commencement of crane operations at the project site. Additionally, as is best practice and implemented as standard, warning lights will be fitted to cranes during the erection of the wind turbines.	Pre-Construction / Construction
Material Assets (Aviation)	At a maximum of 30-days following the installation of all proposed turbines, 'as-constructed details' will be provided to the IAA to allow for the updating of mapping charts, including:- <ul style="list-style-type: none"> • The number of wind turbines; • WGS-84 coordinates of each turbine; • Ground elevation of each turbine (Malin Head OD); • Blade tip elevation of each turbine (Malin Head OD); • Height of Turbine; • Contour maps at the requisite scale; and • A note of which turbines have been fitted with obstacle warning lights. 	Operational
Material Assets (Aviation)	In the event that the obstacle warning lights fail or if there are plans to withdraw them from use for a period of time, the IAA will be contacted, via AISOPs@iaa.ie , as a matter of urgency, to request that a NOTAM (Notice to Airmen) is issued concerning the absence of obstacle lighting. The following information will be provided to the IAA:- <ul style="list-style-type: none"> • Obstacle ID; • Obstacle type; • Obstacle Position; • Elevation; and • Colour of Light. <p>It should also be noted, however, that the proposed wind turbines will be fitted with an uninterruptable power supply (UPS) to ensure that the aviation warning lights remain operational even in the event of a power outage. This UPS is sufficient for a period of 12-hours; after which, the warning lights can be powered by a small generator should the power outage continue.</p>	Operational
Material Assets (Aviation)	Mitigation measures proposed during the construction phase will also be implemented during the decommissioning phase.	Decommissioning

Material Assets (Telecommunications)	With regards to Enet, following extensive consultation, a technical solution has been identified and agreed with the service provider. The solution comprises the re-routing of the affected microwave link to avoid the project site. The cost of the solution shall be borne by the Developer and shall be implemented and operational prior to the erection of the proposed wind turbines. The implementation of this measure shall be undertaken in consultation with Enet to ensure that there is no interruption to broadcast services.	Pre-Construction / Construction
Material Assets (Telecommunications)	In its consultation response, 2rn recommended that a protocol agreement be entered into to ensure that any complaints received from members of the public are appropriately managed, addressed, and remediated. This is a standard protocol for wind energy developments and has been agreed between the parties. A signed copy of the protocol is enclosed at Annex 13.4 .	Operational
Material Assets (Telecommunications)	While assessed to be unlikely, if significant signal interference in any form is identified and is directly attributed to the project, appropriate remedial measures will immediately be undertaken. A range of technical measures are available to mitigate any instances of interference including signal amplifiers, active deflectors and relay transmitters, repeater stations, booster units, realignment of domestic aerials, installation of higher quality aerials and the installation of suppression equipment. Remedial works will be promptly undertaken, at the Developer's expense, to ensure uninterrupted telecommunication, broadcasting and mobile phone service provision.	Operational



