17 SCHEDULE OF MITIGATION

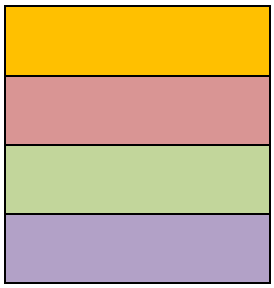
17.1 INTRODUCTION

The Chapter sets forth the implementation programme of all environmental mitigation measures recommended in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) regarding the proposed Carrownagowan wind energy project.

17.2 Format of the Mitigation Schedule

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

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



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

i. the environmental aspect or resource for which mitigation is required,
ii. the required or proposed mitigation measure to undertake or to be implemented,
iii. the persons responsible for implementing the recommenced mitigation
iv. the relevant actions, procedures and plans relating to implementation of the mitigation

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Construction Environmental Management Plan (CEMP)**	A Construction Environmental Management Plan (CEMP) has been prepared for the project and will be implemented during construction in order to ensure that the project is constructed in accordance with best practice, with the minimum impact on the surrounding environment. The implementation of proposed mitigation measures, environmental commitments of the project and the monitoring and supervision of these measures will be managed through the CEMP. It includes, but is not limited to, measures to control/manage various elements of the development including the following: • Management of Excavations • Surface Water Management and Run-off Control (Sediment and Erosion Control) • Fuels and Oils Management • Management of Concrete • Construction Waste Management • Construction Traffic Management Plan • Wheel wash Management Procedure • Construction Dust Management • Construction Noise Management • Archaeological & Heritage Protection • Ecological Management Plan Protection of Habitats and Fauna • Invasive Species Management Plan • Emergency Response • Site Environmental Training and Awareness • Monitoring and Auditing • Environmental Accidents, Incidents and Corrective Actions • Environmental Complaints	Developer	Chapter 2 Project Description Appendix 3-1 CEMP To be communicated to Principal Contractor and incorporated into final CEMP. Chapters 5 to 16 NIS

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Construction & Environmental Management Plan (CEMP)**	A final Construction and Environmental Management Plan will be prepared by the appointed Contractor in advance of works commencing and will be submitted to the local authority(s) for approval. Construction method statements will be prepared prior to commencement of construction and incorporated into the CEMP.	Principal Contractor and Responsible personnel identified in the CEMP	Develop final CEMP and submit to planning authority for comment.
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Traffic Management Plan (TMP)**	A final TMP will be prepared by the Principal Contractor. It will take account of the measures specified in the TMP submitted with the planning application, and any measures agreed with the relevant authorities.	Principal Contractor	Develop final CTMP and submit to planning authority for comment.
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Best Practice**	**Environmental Manager / Ecological Clerk of Works (ECoW)** A suitable qualified and experienced Environmental Manager (or Ecological clerk of works or Ecologist) will be employed during the construction phase of the project and must be appointed prior to commencement of construction works.	Developer Principal Contractor	Chapters 5 to 16 Appendix 3-1 CEMP Appoint Project Team NIS
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Management of invasive species**	Species identified include Himalayan Knotweed, Rhododendron, Japanese Knotweed and Giant Rhubarb. An outline Site Specific Invasive Species Management Plan has been developed and will be incorporated into the finalised Contractors CEMP. The project proponent will engage the services of an Invasive Alien Species Specialist to prepare and oversee the implementation of the Site Specific Management Plan. The Management Plan will be in place for the duration of the construction phase of the proposed project. The Management Plan will describe the best practice measures that will be adhered to during the construction phase of the proposed project, including the installation of the grid connection in proximity to infestations of IAS. An invasive species survey shall be undertaken prior to commencement of construction. Should newly established invasive species be identified the Invasive Species Management Plan will be updated. Areas where invasive species are present will be identified and demarcated prior to commencement of construction.	Developer Principal Contractor Project Ecologist Alien Species Specialist	Appendix 3-1 CEMP Appendix 6-9 Invasive Species Report
PRIOR TO COMMENCEMENT OF CONSTRUCTION	**Ornithology – Tree Felling**	It is recommended that an Ornithologist with appropriate expertise and recognised long-term ornithological experience will conduct pre-construction bird surveys at the site, including the monitoring of hen harrier.	Principal Contractor	Chapter 7 Ornithology

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WORKS		Where construction work is required in the breeding season, a survey for Hen Harrier nests within 500m of planned activities will be conducted by a suitably experienced Ornithologist in February, March and April, prior to any construction work being carried out. If a hen harrier nest is discovered within 500m of planned construction work, heavy duty construction activities within 500m from the nest site will be excluded during the hen harrier breeding season (April to August) to allow for successful breeding. Hen harrier activity at any such nest will also be monitored throughout the breeding season.		
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Biodiversity – Non-volant mammals**	Pre-construction mammal surveys will be completed to identify evidence of protected mammals within the footprint, and work areas of the proposed project. Pre-construction surveys will be completed in accordance with NRA/TII Guidelines. Should the resting or breeding places of any protected species be discovered within the site during construction works, the NPWS will be informed. Site specific mitigations will be prepared in agreement with NPWS prior to commencement of works. Any mitigations required for badgers will be carried out under license from NPWS, and in accordance with NRA/TII Guidelines. In the event that protected faunal species are found actively using the site for breeding, or resting sites during the construction phase, works will cease immediately, and the area will be cordoned off until advice is sought from the NPWS. Habitat disturbance to fauna will be limited by controlling the movement of plant, and vehicles. Construction vehicles will not encroach onto habitats beyond the proposed project footprint.	Developer Ecologist	Chapter 6 Biodiversity Appendix 3-1 CEMP
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Biodiversity – Bats**	Pre-construction bat roost surveys will be carried out at the project site, including structures along the proposed grid connection. In the event that a new bat roost is identified mitigation will follow best practice guidance as per: • Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (TII, 2005). • Guidelines for the treatment of bats during the construction of National Road Schemes (TII, 2006). • NPWS Irish Wildlife Manuals, No. 25: Bat Mitigation Guidelines for Ireland (Kelleher & Marnell, 2006). A felling distance of 86m around each proposed turbine will be maintained to comply with	Developer Ecologist	Chapter 6 Biodiversity Appendix 3-1 CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		Natural England (2014) guidelines for minimising impacts to foraging bats. Lighting will be avoided where possible. Where lighting is required, directional lighting will be used to prevent overspill on to forestry edges. This will be achieved with the use of covers and shields to divert lighting to the intended area.		
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS	**Roads and Traffic**	Pre-construction surveys will be carried out to ensure the structural integrity of the proposed haulage route road network.	Developer; Principal Contractor	Chapter 15 Material Assets
PRIOR TO COMMENCEMENT OF CONSTRUCTION WORK	**Residential Amenity /Material Assets**	As standard practice, a signed Protocol between the developer and Raidió Teilifís Éireann (RTÉ) will be put in place, in which the developer will be responsible to resolve any issue of interference with television reception as a result of the proposed development.	Developer	Chapter 15 Material Assets

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
DURING CONSTRUCTION	**Protection of the Land and Soil**	• Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station; • On site re-fuelling will be undertaken using a double skinned bowser with spill kits on the ready for accidental leakages or spillages; • Fuels stored on site will be minimised. Storage areas where required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor; • The electrical control building will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; • The plant used will be regularly inspected for leaks and fitness for purpose; and, • An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan. Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area. • Excess excavated material from all works areas will be removed off site to a suitably licenced waste facility	Principal Contractor	Chapter 9 Land and Soil Appendix 3-1 CEMP NIS
DURING CONSTRUCTION	**Management of Road Construction**	Approximately 7.6km of new excavated road construction will be required. These will be constructed (per method in CEMP and Peat and Spoil Management Plan) using site won stone aggregate obtained from the proposed borrow pits and placed over a layer of geogrid, after all organic and soft subsoil material is excavated to formation level. Geotextile material, will be used to separate the road building material from the subsoil, laid at formation level. For the construction of the wind farm it is proposed to utilise approximately 8.4km of existing internal roads. These roads will be widened by removing organic material and soft subsoil to formation level and constructing a road on a layer of geogrid or geotextile as required by site conditions. This road construction will be similar in build up to the excavated road construction. The new width of road and the existing road surface, where required, will be capped with a 150mm layer of hard wearing Class 6F stone or similar.	Principal Contractor	Chapter 8 Water Chapter 9 Land and Soil Appendix 3-1 CEMP Appendix 3-3 Peat and Spoil Management Plan

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		This road type will have a crossfall of 2.5% from one edge to the other. The existing roadside drains on the lower side of the road will be used as part of the dirty water drainage system for the site. The existing roadside drains on the higher side of the road will be retained as clean water drains.		
DURING CONSTRUCTION	**Management of Ground/Slope/Peat Stability**	The level of peat monitoring which will be implemented for the site reflects the strategy of placing infrastructure in low risk areas of the site. With the systematic siting of infrastructure using mitigation by avoidance ensuring that deep peat has been avoided, peat stability monitoring methodology can best be achieved using Sightline Monitoring. Monitoring by sightlines entails driving a series of posts at ~5m centres, exactly aligned, across the section of bog being monitored. Any signs of distress or deformation in the bog will quickly manifest itself by some of the posts moving out of alignment. Early discovery of stress in the peat will give the developer a chance to implement emergency procedures to prevent the onset of a bog burst or localised peat slide. While the risk of such occurrence is low in this instance, the precautionary principle dictates that monitoring posts will be installed in work areas where there are areas of lower Factor of Safety adjacent to the works areas, as defined above. The Construction Manager for the project will impart the philosophy that everyone on the site is aware of peat stability and report any sign of misalignment in monitoring posts. Vigilance is a fundamental requirement when working on peat where inappropriate construction methodology can cause instability in otherwise benign conditions. A geotechnical engineer experienced in working in the upland peat environment will be employed full time to ensure the implementation of best practice in this environment. The methodology of all civil works will be reviewed by this engineer and the monitoring posts will be the subject of a dedicated inspection on a weekly basis by the geotechnical engineer. The following general measures incorporated into the construction phase of the project will assist in the management of the risks for this site: • Appointment of experienced and competent contractors; • The site will be supervised by experienced and qualified personnel; • Ensure construction method statements are followed or where agreed modified/ developed. • Allocate sufficient time for the project (be aware that decreasing the construction	Principal Contractor	Chapter 8 Water Chapter 9 Land & Soils Appendix 3-1 CEMP Appendix 9-2 Peat Stability Risk Assessment Report

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		time has the potential to increase the risk of initiating a peat movement); • Set up, maintain and report findings from monitoring systems, including sightline monitoring; • Maintain vigilance and awareness through Tool-Box-Talks (TBTs) on peat stability; • Prevent undercutting of slopes and unsupported excavations; • Prevent placement of loads/overburden on marginal ground; and, • Maintain a managed robust drainage system.		
DURING CONSTRUCTION	**Protection of Water Quality - Felling activities**	All felling will take place prior to site mobilisation for wind farm construction works. So there will be an avoidance of felling works and construction works occurring at the same time. Also, all felling will be completed in line with a felling licence from the Forest Service and with the application of Forestry Guidelines (Department of Agriculture, Food and the Marine, 2019, Standards for Felling and Reforestation), in line with the mitigation outlined below. Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods which are set out as follows: • Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; • Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works; • Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked temporarily, while 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 will 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 peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground;	Principal Contractor	Chapter 6 Biodiversity Chapter 8 Water Chapter 9 Land and Soils Appendix 3-1 CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		• In areas particularly sensitive to erosion or where felling inside the 75 metre buffer is required, it will be necessary to install double or triple sediment traps. This measure will be confirmed on site during construction; • Double silt fencing will also be put down slope of felling areas which are located inside the 75 metre buffer zone; • All drainage channels will taper out before entering the aquatic 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; • Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring from natural rainfall events (refer to Section **Error! Reference source not found.**), e xtraction will be suspended in advance of forecasted periods of high rainfall; • Timber will be stacked in dry areas, and outside a local 75 metre watercourse buffer. Straw bales and check dams to 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 runoff; • Checking and maintenance of roads and culverts will be on-going through the felling operations; • Refuelling or maintenance of machinery will not occur within 100m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required; and, • Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when felling operations have been completed, but care will be taken to avoid removing natural debris deflectors.		

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		Silt Traps: 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. **Drain Inspection and Maintenance:** The following items shall be carried out during inspection pre-felling and after: • Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging 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 shall be identified. Ideally the pre-felling inspection shall be carried out during rainfall; • Following tree felling all main drains shall be inspected to ensure that they are functioning; • Extraction tracks nears drains need to 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 proposed development site 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.		
DURING CONSTRUCTION	**Surface Water Quality Monitoring:** **- Felling activities**	Sampling will be completed before, during and after the felling activity. The 'before' sampling willbe conducted within 4 weeks of the felling activity, 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). Criteria for the selection of water sampling points include the following: • Avoid man-made ditches and drains, or watercourses that do not have year round flows, i.e. avoid ephemeral ditches, drains or watercourses; • Select sampling points upstream and downstream of the forestry activities; • It is advantageous if the upstream location is outside/above the forest in order to evaluate the impact of land-uses other than forestry; • Where possible, downstream locations will be selected: one immediately below the forestry activity, the second at exit from the forest, and the third some distance from	Principal Contractor	Chapter 6 Biodiversity Chapter 8 Water Chapter 9 Land and Soils Appendix 3-1 CEMP

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		the second (this allows demonstration of no impact through dilution effect or contamination by other land-uses where impact increases at third downstream location relative to second downstream location); and, • The above sampling strategy will be undertaken for all on-site sub-catchments streams where tree felling is proposed.		
DURING CONSTRUCTION	**Protection of Water Quality – Earthworks**	**Source controls:** • Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with 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. **In-Line controls:** • Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems. **Treatment systems:** • 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 forestry and roadside drains already exists, and these will be integrated and enhanced as required and used within the wind farm development drainage system. The integration of the existing forestry drainage network and the proposed wind farm network is relatively simple. The key elements being the upgrading and improvements to water treatment elements, such as in line controls and treatment systems, including silt traps, stilling ponds and buffered outfalls. The main elements of interaction with existing drains will be as follows: • 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	Principal Contractor	Chapter 7 Water Chapter 8 Land and Soils Chapter 3 Civil Engineering Chapter 6 Biodiversity Appendix 3-1 CEMP NIS

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		runoff from the proposed wind farm drainage into the existing site drainage network. This will reduce the potential for 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 / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area; • During the construction phase of the wind farm, runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through stilling ponds and buffered outfalls onto vegetated surfaces; • Buffered outfalls which will be numerous over the proposed development 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 proposed development site; • Drains running parallel to the existing roads that requiring widening will be upgraded. Velocity and silt control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters; and, • Existing culverts will be lengthened where necessary to facilitate road widening. Larger culverts will be installed as required. **Water Treatment Train** A final line of defence can be provided by a water treatment train such as a "Siltbuster with chemical treatment" 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 will apply for all of the construction phase. **Silt Fences** 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 water courses 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		

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		functioning (weekly inspections will be completed). They will remain in place throughout the entire construction phase. Double silt fences will be emplaced within drains down-gradient of all construction areas inside the hydrological buffer zones. **Silt Bags** 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 Sediment entrapment mats, consisting of coir or jute matting, will be 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 sedimats will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.		
DURING CONSTRUCTION	**Protection of Water Quality – Excavation**	Management of groundwater seepages and subsequent treatment prior to discharge into the drainage network will be undertaken as follows: • Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place; • If required, pumping of excavation inflows will prevent build-up of water in the excavation; • The interceptor drainage will be discharged to the proposed development site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters; • The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit; • There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur; • Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken; and, • A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies in order to treat sediment polluted waters from settlement ponds or excavations should they occur. 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	Principal Contractor	Chapter 8 Water Chapter 9 Land and Soils Chapter 3 Civil Engineering Chapter 6 Biodiversity Appendix 3-1 CEMP NIS

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		on construction-sites. They can be used in combination with chemical dosing, and these systems are proven to be very effective in management of heavy contaminated site runoff from construction sites. They will be used as a final line of defence if needed.		
	Protection of Water Quality – Hydrocarbons	Mitigation measures proposed to avoid release of hydrocarbons at the proposed development site are as follows: • On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser will travel around the proposed development site by a 4x4 jeep to where machinery is located. The fuel truck (bowser) will also carry fuel absorbent material and pads in the event of any accidental spillages. Mobile towable fuel bowsers (if used) 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; • Onsite refuelling will be carried out by trained personnel only; • Fuels stored on site will be minimised. Fuel storage areas if required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor; • The plant used during construction will be regularly inspected for leaks and fitness for purpose; and, • An emergency plan for the construction phase to deal with accidental spillages is included within the Construction and Environmental Management Plan (CEMP). Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.	Principal Contractor	Chapter 8 Water Chapter 9 Land and Soils Chapter 3 Civil Engineering Chapter 6 Biodiversity Appendix 3-1 CEMP NIS
DURING CONSTRUCTION	**Protection of Water Quality – Cement**	• No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place; • Where possible pre-cast elements for culverts and concrete works will be used; • Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be undertaken at lined	Principal Contractor	Chapter 8 Water Chapter 9 Land and Soils Chapter 3 Civil Engineering Chapter 6 Biodiversity Appendix 3-1 CEMP

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		cement washout ponds; • Weather forecasting will be used to plan dry days for pouring concrete; and, • The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.		NIS
DURING CONSTRUCTION	**Management of Site Drainage – Weather events**	Construction of the proposed development site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works. The works program (~18 months) for the construction stage of the development will also take account of weather forecasts and predicted rainfall in particular. Large excavations and movements of peat/subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast. The following forecasting systems are available and will be used on a daily basis at the proposed development site to direct proposed construction activities: • General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates; • MeteoAlarm: 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,	Principal Contractor	Chapter 8 Water Chapter 9 Land and Soils Chapter 3 Civil Engineering Chapter 6 Biodiversity Appendix 3-1 CEMP Appendix 3-2 Surface water Management Plan Appendix 3-3 Peat and Spoil Management Plan

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		• 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. Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event. Works will be suspended if forecasting suggests either of the following is likely to occur: • >10 mm/hr (*i.e.* high intensity local rainfall events); • >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, • >half monthly average rainfall in any 7 days. Prior to works being suspended the following control measures will be completed: • Secure all open excavations; • Provide temporary or emergency drainage to prevent back-up of surface runoff; and, • Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.		
DURING CONSTRUCTION	**Management of Runoff from Peat and Subsoil Reinstatement Areas**	Excavated peat will be used for landscaping throughout the proposed development site and any excess peat will be used to reinstate the 3 no. proposed borrow pits. All the proposed borrow pits are located outside the 75m stream buffer zone. During the initial placement of peat and subsoil, silt fences, straw bales and biodegradable matting will be used to control surface water runoff from the reinstatement areas. 'Siltbuster' treatment trains (with chemical dosing if required) will be employed if previous treatment is not to a high quality. Drainage from peat reinstatement areas will ultimately be routed to an oversized swale and a number of stilling ponds pond and a 'Siltbuster' with appropriate storage and settlement designed for a 1 in 100-year 6 hour return period before being discharged to the on-site drains. Peat/subsoil reinstatement areas will be sealed with a digger bucket and vegetated as soon	Principal Contractor	Chapter 10 Water Chapter 3 Civil Engineering Appendix 3-1 CEMP Appendix 3-2 Surface water Management Plan Appendix 3-3 Peat and Spoil Management Plan NIS

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		possible to reduce sediment entrainment in runoff. Once re-vegetated and stabilised peat/subsoil reinstatement areas will no longer be a potential source of silt laden runoff.		
DURING CONSTRUCTION	**Protection of Water Quality – Grid Route**	A buffer zone will be maintained for all crossing locations where possible. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse. The purpose of the buffer zone is to: • Avoid physical damage to surface water channels; • Provide a buffer against hydraulic loading by additional surface water run-off; • Avoid the entry of suspended sediment and associated nutrients into surface waters from excavation and earthworks; • Provide a buffer against direct pollution of surface waters by pollutants such as hydrocarbons; and, • Provide a buffer against construction plant and materials entering any watercourse. General Best Practice Pollution Prevention Measures will also include: • Protection of the riparian zone watercourses by implementing a constraints zone around stream crossings, in which construction activity will be limited to the minimum, i.e. works solely in connection with duct laying at the stream crossing; • No stockpiling of construction materials will take place within the constraints zone. No refuelling of machinery or overnight parking of machinery is permitted in this area; • No concrete truck chute cleaning is permitted in this area; • Works shall not take place at periods of high rainfall, and shall be scaled back or suspended if heavy rain is forecast; • Plant will travel slowly across bare ground at a maximum of 5km/hr. Bog mats will be employed to protect tracked areas as necessary; • Machinery deliveries shall be arranged using existing structures along the public road; • All machinery operations shall take place away from the stream and ditch banks,	Principal Contractor	Chapter 6 Biodiversity Chapter 10 Water Chapter 3 Civil Engineering Appendix 3-1 CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		apart from where crossings occur. Although no instream works are proposed or will occur; • Any excess construction material shall be immediately removed from the area and taken to an appropriately licensed facility; • No stockpiling of materials will be permitted in the constraint zones; • Spill kits shall be available in each item of plant required to complete the stream crossing; and, • Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required. Mitigation Measures relating to the use of a mixture of a natural, inert and fully biodegradable drilling fluid and water for directional drilling: • The area around the drilling fluid batching, pumping and recycling plants shall be bunded using terram and sandbags in order to contain any spillages; • One or more lines of silt fences shall be placed between the works area and adjacent rivers and streams on both banks; • Accidental spillage of fluids shall be cleaned up immediately and transported off site for disposal at an appropriately licensed facility; and, • Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works. This will ensure containment of drilling arisings and drilling flush. Mitigation Measures relating to the use and storage of fuels and chemicals in terms of groundwater protection: • Onsite re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser, as described in Section 8.4.2.5 below. No maintenance of construction vehicles or plant will take place along the grid connection or temporary junction works areas; • The plant used will be regularly inspected for leaks and fitness for purpose; and, • Spill kits will be available to deal with accidental spillage.		

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
DURING CONSTRUCTION	**Best Practice - Protection of biodiversity and habitats**	**Environmental Manager / Ecological Clerk of Works (ECoW)** • A suitable qualified and experienced Environmental Manager (or Ecological clerk of works or Ecologist) will be employed during the construction phase of the project. Duties will include the review of all method statements, delivery of toolbox talks and monitoring of construction phase to ensure all environmental controls and EIAR mitigation is implemented in full. The manager will be awarded a level of authority and will be allowed to stop construction activity if there is potential for adverse environmental effects other than those predicted and mitigated in the EIAR.	Developer and/or Principal Contractor	Chapters 5 to 16 Appendix 3-1 CEMP Appoint Project Team Personnel
DURING CONSTRUCTION	**Protection of biodiversity and habitats**	• The main potential for impacts is during the construction phase. Silt and pollution by accidental concrete and fuel and oil spill, will be a primary concern during construction stage. A CEMP and a site-specific Surface Water Management Plan has been designed for the proposed Carrownagowan Wind Farm to avoid and minimize impacts to water quality within the site. • Where hedgerow and treeline removal is required for the proposed haul-route, these will be reinstated with native hedgerow, and tree species which are indigenous to the local area. • Where oak-birch-holly woodland removal is required for the proposed haul-route, this will be reinstated with native tree species. • The sensitive habitats will be marked by secure posts and robust high visibility tape. These areas will be marked out with reference to design drawings, under supervision of the Project Manager, Project Engineer, and the Site Ecologist. This will ensure that sensitive areas will be excluded from the proposed project. Machinery will not be permitted breach these excluded areas, and there shall be no side casting of material within these areas. • In accordance with Section 40 of the Wildlife Acts, vegetation removal, including the hedgerow and tree removal will be conducted outside of the restricted period (March 1st to 31st August). The provisions of Section 40 of the Acts do not relate exclusively to birds, but a range of biodiversity factors that contributes to food chains and wider ecosystems. • All tree felling will be undertaken in accordance with a tree felling licence, using good working practices and in accordance with Forest Service Guidelines. • Forestry operations within the Carrownagowan forestry Site will be suspended	Developer Principal Contractor Environmental Manager / Ecological clerk of works / Ecologist	Chapter 3 Civil Engineering Chapter 6 Biodiversity Appendix 3-1 CEMP Appendix 3-2 Surface Water Management Plan

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		during the construction phase of the proposed project. **Reinstatement** The following methodology shall be employed in relation to the habitat reinstatement at the peat deposition area and bare areas around turbines. • Wherever good quality acrotelm is identified, it will be carefully excavated, stored for re-use in accordance with best practice. Once works are complete, the acrotelm can be used to cover exposed areas of peat. • Where there is insufficient acrotelm a peat layer (c.500mm) will be spread evenly over the surface area. • These areas shall then be temporarily fenced off and allowed to regenerate naturally. • Where vegetation is slow to regenerate, planting of native plant species will be undertaken. The project ecologist will advise on the appropriate species and planting requirements to mimic the existing nature of the semi-natural habitats in the area. • No fertiliser or herbicide shall be applied; • Potential scrub encroachment will be monitored and appropriate measures adopted if required to manage any potential encroachment. Silt ponds will be constructed for water quality protection, in line with the drainage design for the proposed project. A number of ponds and ancillary features (including stock proof fences) will be retained. During operation, silt ponds and other water holding features will act as wetland areas for aquatic and terrestrial macro-invertebrates, and amphibians. Physical variation and heterogeneity is a key influence in biodiversity richness. Therefore, sinuosity in pond plan is preferable to linearity, so during reinstatement banks and stone filter beds will be manipulated to vary in shape and angle. Wetland habitat creation guidance in Gilbert and Anderson (1998) will be followed. These features can be used by a range of invertebrates, and common frog. Any trees cut down to facilitate the turbine delivery route will be stacked in piles to create hedgehog resting habitat. Dead wood also creates a damp habitat for invertebrates and their larvae which can be a nutritious food source for fauna, including mammals and birds. These features will be constructed under ECoW supervision.		

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
DURING CONSTRUCTION	**General protection of Biodiversity and Ornithology**	The following lists general construction mitigation measures: • The felling of forestry will take place outside the breeding season (April to August, inclusive). • Any vegetation clearance required, including the cut back, and any clearance of hedgerows, and scrub will take place outside the breeding season (April to August, inclusive). • Where possible, construction will take place outside the breeding season (April to July, inclusive) to minimise disturbance, and or displacement to breeding birds. • Where it is not possible to restrict construction work in this way, work will commence prior to the breeding season, to ensure that any incubating birds or birds with young are not displaced by work commencing during, or within the breeding season. • Off-road vehicle activity will be minimised. Habitat disturbance to birds will be limited by controlling the movement of plant, and site vehicles during the construction and operational phases of the wind farm. Plant, and other site vehicles will not encroach onto habitats beyond the project footprint and, with the exception of maintenance works on the site drainage and settlement ponds, will not enter the bogland habitats. • All plant and equipment will conform with the Construction Plant and Equipment Permissible Noise Levels Regulations 1996 (SI 359/1996) and other relevant legislation. • Plant and equipment will be turned off when not in use, with no unnecessary revving. • Plant washed regularly and inspected to prevent invasive species such as Japanese knotweed from entering the site.	Principal Contractor Ecologist/ Ornithologist	Chapter 3 Civil Engineering Chapter 6 Biodiversity Chapter 7 Ornithology Appendix 3-1 CEMP
DURING CONSTRUCTION	**Ornithology - Monitoring**	It is recommended that an Ecologist with appropriate expertise and recognised long-term ornithological experience will conduct construction phase bird surveys at the site, including the monitoring of hen harrier. The construction phase of the project will likely be spread across the summer and winter survey periods and Vantage Point surveys will be carried out. If it is the case that a hen harrier nest is detected within 500m of the permitted construction works or within the general location of the wind farm site, the following will be carried out;	Principal Contractor Ecologist/ Ornithologist	Chapter 7 Ornithology Appendix 3-1 CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		• The Ecologist will immediately notify NPWS; • The location of the nest will be treated as an Ecological Sensitive Area, and will be kept from the public domain; • All high impact, and heavy construction works will be suspended within 500m of any hen harrier breeding nest site; • Management measures for the protection of any hen harrier breeding site at the site will be discussed, and agreed with NPWS; • Following the implementation of management measures, an exclusion zone will be installed and enforced throughout the construction phase of the project; • The Project Ecologist will monitor the Ecological Sensitive Area and will liaise with NPWS to ensure all mitigations measures agreed with NPWS are fully implemented.		
DURING CONSTRUCTION	**Management of invasive species**	Species identified include Himalayan Knotweed, Rhododendron, Japanese Knotweed and Giant Rhubarb. An outline Site Specific Invasive Species Management Plan has been developed and will be incorporated into the finalised Contractors CEMP. The project proponent will engage the services of an Invasive **Alien Species Specialist** to prepare, and oversee the implementation of the Site Specific Management Plan. The Management Plan will be in place for the duration of the construction phase of the proposed project. The Management Plan will describe the best practice measures that will be adhered to during the construction phase of the proposed project, including the installation of the grid connection in proximity to infestations of IAS. An invasive species survey shall be undertaken prior to commencement of construction. Should newly established invasive species be identified the Invasive Species Management Plan will be updated. Areas where invasive species are present will be identified and demarcated prior to commencement of construction. All plant and equipment will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of IAS. Any materials, including spoil and any top soil required will be sourced from a sits that has been screened for the presence of any IAS and it is confirmed that no IAS are present. Best practice and mitigation will be incorporated into the project design. The measures followed to avoid the spread of invasive alien species will follow guidelines issued by the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA/TII 2010).	Developer Principal Contractor Project Ecologist Alien Species Specialist	Appendix 3-1 CEMP Appendix 6-9 Invasive Species Report NIS

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		Non-native species control will be practised according to the following IFI documents, noting that some works components are located in the proximity of rivers and streams or drains that feed these watercourses: • IFI Bio-security Protocol for Field Survey Work (IFI, 2010) • Disinfection of scuba diving equipment (IFI, 2011) • Invasive species bio-security guidelines for boaters (IFI, 2013) • Set back at least 50m from watercourses.		
DURING CONSTRUCTION	**Roads and Traffic**	• Repairs will be carried out on the public roads, as necessary, during the construction phase, to ensure that the condition does not deteriorate below a standard that could affect the use of the site, as required • Ensure a strict protocol for HGV drivers to follow the designated haulage route and timing restrictions, as detailed; • Haulage traffic would share the same route with local residents, tourists, and other road users, which would present risks. Advance warning should be given to the local residents and other users (i.e. cyclists) for specific times when large volumes of HGV traffic may occur; • All signage relating to the proposed construction traffic routes for construction traffic will be agreed with Clare County Council; • A well planned and executed delivery programme avoiding peak traffic on typical days will be ensured (i.e. local school start and finish times); • Adequate parking will be provided on site for both employees and visitors to ensure parking would not occur on the public road; and • A road sweeping vehicle will be provided as required to remove any mud that is deposited on the local road in the vicinity of the site access.	Developer Principal Contractor	Chapter 15 Material Assets Appendix 3-1 CEMP
DURING CONSTRUCTION	**Noise & Vibration**	The measures will be adopted from best practice described in BS5228-1&2 +A1 2014. It will include a nominated community liaison officer tasked with responding in a prompt manner to any noise and vibration complaints which may arise. Wherever possible the contractor will inform residents where appropriate of the proposed blasting times and any deviation from this programme in advance. Where blasting takes place, it will be restricted to regular times. Each blast will be carefully designed to maximise its efficiency and reduce transmission of noise. These details will be finalised by the	Principal Contractor	Chapter 10 Noise Chapter 9 Land and Soil Appendix 3-1 CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		appointed contractor in agreement with the local authority and design team prior to any blast taking place and documented in a Blast Management Plan. Should blasting be utilised, a Blast Management Plan will be completed prior which will include full details of the locations of the bores for the blasts, the types of materials to be used, details of the necessary controls and responsibilities, and compliance with the relevant safety legislation. Vibration levels will not exceed those described in BS5228 –1&2:2009 + A1 2014, *Code of Practice for the Control of Noise and Vibration on Construction and Open Sites* and this chapter.		
DURING CONSTRUCTION	**Waste Management**	• Waste is to be managed in accordance with the waste hierarchy in Council Directive 98/2008/EC on waste and section 21A of the Waste Management Act 1996, as amended, as follows: (a)Prevention; (b)re-use; (c)Recycling; (d)Other recovery (including energy recovery); and (e) Disposal; • All waste for offsite treatment/disposal is to be stored temporarily in appropriate dedicated storage areas. The areas in which wastes are stored on site are segregated to prevent material and contaminated surface water runoff entering local surface water drains. • All chemical, hydrocarbon or other controlled wastes are to be stored in designated areas in appropriate approved containers within bunds or on spill pallets, as required. • All waste to be removed from site is to be undertaken by authorised waste contractors and transported to an authorised facility in accordance with best practice.	Principal Contractor	Chapter 15 Material Assets Chapter 9 Land & Soil Appendix 3-1 CEMP
DURING CONSTRUCTION	**Cultural Heritage**	It is recommended that all ground disturbances across the proposed turbine locations, associated infrastructure and turbine delivery areas be monitored by a suitably qualified archaeologist. Excavations associated with the grid connection will be located within the existing local and regional roads. These excavations should be subject to intermittent monitoring by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works the Department of Culture, Heritage and the Gaeltacht will be informed immediately and a buffer zone of at least 20m will be established around the archaeological site. Any further mitigation will require approval from the Department. It is recommended that all ground disturbances across the replacement lands be monitored by a suitably qualified archaeologist. As per the Code of Practice between Coillte and the Department of Culture, Heritage and the Gaeltacht, an exclusion zone will be established	Principal Contractor Project archaeologist	Chapter 13 Cultural Heritage Appendix 3-1 CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		around any recorded monument on site. If any features of archaeological potential are discovered during the course of the works the Forestry Service archaeologist will be informed immediately and a buffer zone of at least 20m will be established around the archaeological site. Any further mitigation will require approval from the Forestry Service archaeologist of the Department of Agriculture.		
DURING CONSTRUCTION	**Management of emissions to air**	It is recommended that best practice is adhered to during the construction phase in order to minimise fugitive dust emissions in particular. Construction phase generated dust will be minimised by the following measures, which are also incorporated into the site specific Construction and Environmental Management Plan (Volume III, Appendix 3-1): • The use of water as a dust suppressant, e.g. a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise; • Public roads will be inspected regularly for cleanliness and cleaned as necessary; • All loads entering and leaving the site will be covered during dry periods if dust becomes a nuisance on site; • Control of vehicle speeds passing over access roads and crane hardstanding areas within the site; • Wheel wash facilities will be implemented at the site entrance from the public road to facilitate removal of any material collected by vehicles entering or leaving the site and preventing its deposition on public roads; • Site stockpiling of materials will be designed and laid out to minimise exposure to wind; • Daily site inspections will take place to examine dust measures and their effectiveness. Construction traffic emissions will be reduced using the following measures: • Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently; • Implementation of the Traffic Management Plan (Volume III, Appendix 3-4) to minimise congestion; and • All site vehicles and machinery will be switched off when not in use - no idling. The majority of aggregate materials for the construction of the Wind Farm will be obtained from on-site borrow pits. This will reduce the number of delivery vehicles to site, thereby	Principal Contractor Environmental/ECoW	Chapter 14 Air and Climate Change Appendix 3-1 CEMP

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSON(S) RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		reducing the amount of emissions associated with vehicle movements.		

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
POST CONSTRUCTION /OPERATIONAL PHASE	**Benefit to the local community (Community fund)**	In relation to the local community, Coillte will fully take into account the updated Wind Energy Development Guidelines and the Renewable Energy Support Scheme (RESS) in terms of a community fund and will build on those in Coillte's approach to community benefit. Coillte expects that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2 into a community fund for the RESS period i.e. first 15 years of operation and €1 per MWh for the remaining lifetime of the wind farm. If this project is constructed as currently designed, Coillte estimate that a total of approximately 10 million euro will be available in the local area for community funding over the lifetime of the project. The above figure is indicative only and will be dependent on the generation capacity of the wind farm. Refer to section 8.1 in the **Community Report** included as Appendix 5-1 of Volume III and in particular to **Ref 5.35 Community Benefit Fund Framework** as agreed in April 2020.	Developer	Appendix 5-1 Community Report
POST CONSTRUCTION /OPERATIONAL PHASE	**Water Quality – Sediment Control**	The operational phase drainage system of the Proposed Development will be installed and constructed in conjunction with the road and hardstanding construction work as described below: • Interceptor drains will be installed up-gradient of all proposed 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	Wind Farm Operator Appointed Ecologist	Chapter 6 Biodiversity Chapter 8 Water Chapter 9 Land and Soils

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		spreader; • Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the proposed development site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling; • On steep sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/road side drains; • Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; • Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and, • Settlement ponds will be designed in consideration of the greenfield runoff rate. Mitigation measures for sediment control and control of hydrocarbons during maintenance works are similar to Construction Phase.		
POST CONSTRUCTION /OPERATIONAL PHASE	**Biodiversity – Monitoring (bats)**	Post construction bat monitoring will be developed in line with recommendations in Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (SNH 2019). A minimum of three years post construction bat monitoring is recommended. These surveys will monitor any changes in foraging, commuting and roosting bat behaviour at the project site. The results will inform on any bat collisions. (Note biodiversity enhancement measures are included in Chapter 6, but these are <u>not</u> a mitigation requirement and therefore not included in this schedule; Refer to Chapter 6 and Appendix 6-10 for details.)	Wind Farm Operator Appointed Ecologist	Chapter 6 Biodiversity
POST CONSTRUCTION /OPERATIONAL PHASE	**Habitat Improvement Lands for Hen Harrier**	It is proposed to provide foraging and potentially suitable nesting habitat for hen harrier over the lifetime of the wind farm through the ecological improvement of existing areas of conifer plantation and the rehabilitation of peatland habitats. Two areas for habitat improvement have been identified and are described below in the context of the rationale for selection and the desired ecological objectives and outcomes of the prescribed improvement actions. The aim of the habitat enhancement is to identify forestry plots, occurring on peatland that could be reverted to suitable open moorland by permanent deforestation.	Developer	Chapter 7 Ornithology

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		For both areas, the objective is to rehabilitate the blanket bog and heath habitats to provide suitable habitat for hen harrier prey such as meadow pipit, skylark and small mammals. The main objective of the rehabilitation measures is to restore conditions to allow blanket bog and wet heath vegetation to recover in felled areas depending on localised site conditions (slope, peat depth, drainage, forestry modifications) and, by doing so, provide foraging habitat for hen harrier, improve connectivity with adjacent open peatland habitat protect and enhance the adjacent bog by improving hydrological conditions within the habitat improvement areas. The rehabilitation of lowland blanket bog from afforested areas will also prevent further drying out of adjacent peatland along the edges of the conifer stand and result in a better water quality outcome than continuing forestry operations. Raising of the water table and removal of trees will improve the site for amphibians. These areas have been selected on the basis of their potential suitability for foraging hen harrier, availability to the applicant for the provision of hen harrier improvement lands, and proximity to Slieve Bernagh SAC and open peatland habitat, and the proximity to a previously successful hen harrier nesting area. The proposed permanent felling of this forestry will increase the amount of contiguous open habitat available to foraging hen harrier and potential for suitable nesting habitat. There are two parcels of land proposed to the northwest of the proposed wind farm site and these are referred to in **Chapter 7** as "Habitat Improvement – Area A" and "Habitat Improvement – Area B", which lies to the south of the former. Refer to **Chapter 7** for full details and figures.		
POST CONSTRUCTION /OPERATIONAL PHASE	**Operational Phase Avian Monitoring**	Bird surveys will continue during the operational phase and will be carried out by an ecologist with appropriate expertise and recognised long-term ornithological experience. The timing and extent of bird surveys will be agreed with NPWS. A detailed Operational Avian Monitoring Programme will be prepared for the operational phase of the project. The monitoring programme at a minimum will include: • Breeding Surveys (with particular focus on hen harrier); • Winter Bird Surveys; • Hen Harrier Roost Surveys; • Targeted bird collision surveys (corpse searches). Whether the project proceeds or not, the forestry operations will continue at the site. If	Developer Ecologist/ Ornithologist	Chapter 7 Ornithology

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		the project proceeds, it is that any future felling timed for breeding season, will include pre-felling monitoring for breeding hen harrier. This monitoring can coincide with the operational phase monitoring described in the previous section. Operational phase monitoring can inform on any hen harrier breeding activity at the overall forestry site. Consultations will remain ongoing with NPWS throughout the operational phase of the project to report on monitoring.		
POST CONSTRUCTION /OPERATIONAL PHASE	**Noise**	As the proposed turbines are predicted not to exceed DoEHLG noise limit criteria in standard operating mode mitigation measures are not required. In the unlikely event that a complaint of Amplitude Modulation arises during the operation of the wind farm, an investigation into the phenomenon will be carried out in accordance with best practice, specifically the Institute of Acoustics' (IoA) Noise working Group (Wind Turbine Noise) Amplitude Modulation Working Group (AMWG), Method for Rating Amplitude Modulation in Wind Turbine Noise (August 2016). If required, mitigation measures will be put in place to eliminate any nuisance that is found to occur. These mitigation measures will be applied during the specific meteorological conditions which causes the AM to happen and typically involve one or more of the following: • slowing down or stopping the relevant wind turbine. • altering the pitch of the blades (i.e. changing the amount of rotation of the blade along its length). • realigning the yaw of the rotor (i.e. changing the angle at which the turbine rotor faces into the wind). In the unlikely event an issue regarding low frequency arises, the matter will be fully investigated with regard to best practice and guidance at the time.	Wind Farm Operator	Chapter 10 Noise
POST CONSTRUCTION /OPERATIONAL PHASE	**Telecoms and Aviation** **Material Assets**	If interference to the telecommunication services arises from the wind farm development, the Developer will work with telecommunication providers to remedy any issues of interference to affected communication links. Appropriate mitigation measures can be implemented such that there will either be an imperceptible effect, or no effect, on surrounding reception as a result of the proposed development, with the solution to interference with TV reception or communication links dependent on where the residence receives signal from.	Wind Farm Operator	Chapter 15 Material Assets

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
		As standard practice, a signed Protocol between the developer and RTÉ will be put in place, in which the developer will be responsible to resolve any issue of interference with television reception as a result of the proposed development. Whilst the proposed development will not impede aircraft flying the test trajectories, the navigational aids assessment recommends that it would be prudent to ensure that pilots of test aircraft are fully aware of the presence of wind turbines, and any associated anemometry masts, before undertaking any test flights. The following mitigation measures are therefore recommended: • All turbines and meteorological masts having a height of 100m or more are promulgated in the Irish Air Navigation Obstacle database; • The extremities of the wind farm are lit; • Meteorological masts are lit; • Meteorological masts are painted red and white to aid visibility to pilots; • Locations of meteorological masts having a height of less than 100m are promulgated to the pilots of test aircraft; • Test aircraft are fitted with Terrain Awareness and Warning System (TAWS); • Test aircraft TAWS obstacle databases are regularly updated to ensure they contain the wind turbine and met mast locations prior to construction. Having regard to the above: • The developer shall agree an aeronautical obstacle warning light scheme for the wind farm development • The developer shall provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location; • The developer shall notify the IAA of intention to commence crane operations with a minimum of 30 days prior notification of turbine erection.		
POST CONSTRUCTION /OPERATIONAL PHASE	**Roads and Traffic**	Post-construction surveys will be carried out to ensure the structural integrity of the proposed haulage route road network.	Developer; Principal Contractor	Chapter 15 Material Assets

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
POST CONSTRUCTION /OPERATIONAL PHASE	**Shadow Flicker**	Once operational, the occurrence of shadow flicker will not exceed the limit criteria for the protection of residential amenity as described in the 2006 DoEHLG Wind Energy Development Guidelines. Additionally, the installation of SFCM will ensure that exposure to shadow flicker can be controlled as required or eliminated completely.	Wind Farm Operator	Chapter 11 Shadow Flicker

TIME FRAME / SCHEDULE	ENVIRONMENTAL MITIGATION / RECOMMENDATION		PERSONS RESPONSIBLE	RELEVANT CHAPTER /ACTION REQUIRED
DECOMMISSIONING	**Removal of Wind Farm Components & Site Reinstatement**	The wind farm has been designed to have an operational life of 30 years and any further proposals for wind farm development at the site after this time will be subject to a new planning permission application. If planning permission is not sought after 30 years, the site will be decommissioned and reinstated with all wind turbines and towers removed. Upon decommissioning, all that will remain will be the roads. The substation will also likely remain in place as part of the permanent electrical infrastructure. When the site is to be decommissioned, cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed. The turbines, cabin and monitoring masts will also be removed from site. It is likely that any turbine component will be reused as they have a life well in excess of the wind farm proposal i.e. greater than 30 years. Wind farm components may also be recycled. Underground cables will likely be cut back and left underground as removal may do more harm than leaving them *in situ*. Hardstand areas will be remediated to match the existing landscape thus requiring peatland restoration or reforestation. Access roads will be left for use by the landowner. The current view is that the disturbance associated with the removal and disposal of the elements (hard core and sediment) would be more deleterious than leaving them in place. Any structural materials suitable for recycling will be disposed of in an appropriate manner. Prior to wind turbine removal, due consideration will be given to any potential impacts	Wind Farm Operator	Chapter 2 Project Description

		arising from these operations. Some of the potential issues include: • Potential disturbance by the presence of a crane, heavy goods vehicles and personnel on-site; • On-site temporary compound would need to be located appropriately; • Time of year and time-scale (to be outside sensitive periods); and • Roads (site tracks may remain in use for the benefit of the landowner). Best practice will be adopted during the decommissioning phase in order to minimise the noise generated by construction activities and nuisance to neighbours. Prior to the decommissioning work, a plan will be drawn up to ensure the safety of the public and workforce and the use of best available techniques at the time. Prior to the decommissioning work, a comprehensive reinstatement proposal, including the implementation of a program that details the removal of all structures and landscaping, will be submitted to the planning authority for approval. Wastes generated during the decommissioning phase will be taken off site and disposed of appropriately by a licensed waste operator. The grid cable will remain a permanent part of the national grid and therefore decommissioning is not foreseen. In the event of decommissioning, it will involve removing the cable from the ducting but leaving the ducting and associated supporting structure in place. It is also likely the substation will remain in place and will previously have been taken in charge by the system operator, after the wind farm is connected to the national electricity grid.		
DECOMMISSIONING	**Water Quality**	Some of the impacts will be avoided by leaving elements of the proposed development in place where appropriate, for example the roads, substation and grid cable will likely remain in situ. Roadside drains will carry run-off. The turbine bases will be rehabilitated by covering with local topsoil/peat to regenerate vegetation which will reduce runoff and sedimentation effects. Internal roads will remain as forest roads. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase (outlined above) mitigation measures through management of best practice. Moreover, due to the relative long life of the wind farm infrastructure, it is likely that a revised/updated environmental assessment will be required at the time of decommissioning to account for any changes in baseline conditions at the proposed development site, and potential changes in assessment guidelines and legislation.	Developer Wind Farm Operator	Chapter 2 Project Description Chapter 8 Water

17.4 References

Bat Conservation Ireland (BCI) (2012) *Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8, December 2012*. Bat Conservation Ireland, North Brunswick Street, Dublin 7.

Bat Conservation Ireland (BCI) (2015) *Guidance Notes for Agri-environmental Schemes*. Bat Conservation Ireland, North Brunswick Street, Dublin 7.

Caffrey, J. (2010) *IFI Biosecurity Protocol for Field Survey Work*. Inland Fisheries Ireland.

Clabby, K.J., Bowman, J.J., Lucey, J., McGarrigle, M.L. & Toner, P.F. (1992) *Water Quality in Ireland 1987-1990*. Environmental Research Unit, Dublin.

Construction Industry Research and Information Association (CIRIA 2015). '*Environmental Good Practice on Site'*.

Department of Agriculture, Food and the Marine (DAFM) (2016) *Environmental Requirements for Afforestation*. The Forest Service of the Department of Agriculture, Food and the Marine. Johnstown Castle Estate Co. Wexford.

Department of Agriculture, Food and the Marine (DAFM) 2019, *Standards for Felling and Reforestation.* The Forest Service of the Department of Agriculture, Food and the Marine. Johnstown Castle Estate Co. Wexford.

Department of Agriculture, Food and the Marine (DAFM) (2019) *Forestry Standards Manual*. The Forest Service of the Department of Agriculture, Food & the Marine. Johnstown Castle Estate Co. Wexford.

Department of the Marine and Natural Resources (DMNR) (2000a) *Forest Harvesting and Environmental Guidelines*. Forest Service Division of Department of the Marine and Natural Resources, Kildare Street, Dublin 2.

Department of the Marine and Natural Resources (DMNR) (2000b) *Forestry and Water Quality Guidelines*. Forest Service Division of Department of the Marine and Natural Resources, Kildare Street, Dublin 2.

Gilbert, O. L. & Anderson, P.A. (1998) *Habitat Creation and Repair*. Oxford University Press.

Inland Fisheries Ireland (IFI) (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.* Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus Co. Dublin. IFI/2016/1-4298.

Irish Wind Energy Association (IWEA) (2017) *Best Practise Guidelines for the Irish Wind Energy Industry*. Irish Wind Energy Association, Millenium Park, Osberstown, Naas, Co. Kildare.

Kelleher, C. & Marnell, F. (2006) *Bat Mitigation Guidelines for Ireland*. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Kelly, F., Champ, T., McDonnell, N., Kelly-Quinn, M., Harrison, S., Arbuthnott, A., Giller, P., Joy, M., McCarthy, K., Cullen, P. & Harrod, C. (2007) *Investigation of the Relationship between Fish Stocks,*

Ecological Quality Ratings (Q-values), Environmental Factors and Degree of Eutrophication. Environmental Research Technological Development and Innovation (RDTI) Programme 2000-2006, Environmental Protection Agency, Johnstown Castle, Co. Wexford, Ireland.

Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) *Best practice in raised bog restoration in Ireland*. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

National Parks and Wildlife Service (NPWS) (2017) *National Peatlands Strategy*. National Parks and Wildlife Service, Newtown Road, Wexford.

National Roads Authority (NRA) (2008) *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.* National Roads Authority, Parkgate Street, Dublin 8.

National Roads Authority (NRA) (2010) *Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*. National Roads Authority, Parkgate Street, Dublin 8.

National Roads Authority of Ireland (NRA 2011) *Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan.*

Reid, N., Dingerkus, S.K., Stone, R.E., Pietravalle, S., Kelly, R., Buckley, J., Beebee, T.J.C. & Wilkinson, J.W. (2013) *National Frog Survey of Ireland 2010/11*. Irish Wildlife Manuals, No. 58. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Smithfield, Dublin 7.

Ryan, T., Phillips, H., Ramsay, J. and Dempsey, J. (2004) *Forest Road Manual. Guidelines for the design, construction and management of forest roads*. Council for Forest Research and Development (COFORD), Department of Agriculture, Food and the Marine. Johnstown Castle Estate Co. Wexford.

Scottish Natural Heritage (SNH) (2019). *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (Version January 2019)*. Prepared jointly by Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (BCT).

Transport Infrastructure Ireland (TII) (2005a) *Guidelines for the Treatment of Bats Prior to the Construction of National Road Schemes*. Transport Infrastructure Ireland (formerly known as National Roads Authority), Parkgate Street, Dublin 8.

Transport Infrastructure Ireland (TII) (2005b) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. Transport Infrastructure Ireland (formerly known as National Roads Authority), Parkgate Street, Dublin 8.

Transport Infrastructure Ireland (TII) (2006) *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes.* Transport Infrastructure Ireland (formerly known as National Roads Authority), Parkgate Street, Dublin 8.

Woods-Ballard B., Wilson S., Udale-Clarke H., Illman S., Scott T., Ashley R., & Kellagher R. (2015) *C753 The Sustainable Drainage Systems (SuDS) manual.* Construction Industry Research and Information Association (CIRIA), 15 Long Lane, London, U.K