

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED LITTLETON WIND FARM, CO. TIPPERARY

Volume 2 - Main EIAR

Chapter 17 - Schedule of Mitigation and Monitoring Measures

Prepared for:

Littleton Wind Farm DAC



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17. SCHEDULE OF MITIGATION AND MONITORING MEASURES

17.1 Introduction

All mitigation and monitoring measures relating to the pre-commencement, construction, operational and decommissioning phases of the Proposed Development are set out in the relevant chapters of this EIAR.

The design of the Proposed Development has been an informed and collaborative process from the outset, involving the engineers, environmental, hydrological, geotechnical, archaeological and transport specialists. The objective of which is the avoidance of significant environmental effects (i.e. mitigation by design) while designing a project which is technically feasible and maximising wind resource. Throughout the preparation of the EIAR, the layout of the Proposed Development has been revised and refined to take account of the findings of all site investigations and surveys, consultation and impact assessment, all of which have brought the design from its first initial layout to the current proposed layout.

Constraints and environmental sensitivities were first identified, and buffers applied in order to determine appropriate areas within the site to accommodate development. This constraints exercise resulted in a developable area being defined. Once the developable area is established, the siting requirements of the wind turbines in terms of separation distances etc. are considered and a preliminary layout can be developed for the site.

The mitigation proposals in the below format provides an easy to audit list that can be reviewed and reported on during the future phases of the Project. The proposal for site inspections and environmental audits are set out in the Construction and Environmental Management Plan (CEMP) which is included as Appendix 4.1 of this EIAR. The tabular format in which the below information is presented, can be further expanded upon during the course of future phases of the Proposed Development to provide a reporting template for site compliance audits. All construction stage mitigation measures will be implemented under the supervision of an Ecological Clerk of Works (ECoW) to be appointed for the duration of the construction works.

Mitigation is prescribed in accordance with the Environmental Protection Agency EPA guidance on EIAR (EPA, 2022) which requires mitigation by avoidance as a first approach. Where impacts cannot be avoided e.g. generation of noise, mitigation by reduction of impact is required to limit the exposure of the receptor to an acceptable level (often achieved by interrupting the pathway between the source and receptor).

All monitoring measures which will be implemented during the pre-commencement, construction, operational and Decommissioning phases of the Project are also outlined in Table 17.1. All monitoring measures were set out in the relevant chapters of this EIAR. The monitoring proposals are presented in terms of the monitoring requirement, frequency of monitoring and the mechanism for reporting results where applicable. By presenting the monitoring proposals in the below format, it is intended to provide a monitoring schedule that can be reviewed and tracked during all phases of the Proposed Development to ensure all required monitoring is completed as required.

It is intended that the CEMP will be updated where required prior to the commencement of construction to include all mitigations and monitoring measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process and would be submitted to the Planning Authority for written approval.

All works will be carried out in accordance with the mitigations outlined in the CEMP, which includes a preliminary Traffic Management Plan, Waste Management Plan, Dust Management Plan, and Emergency Response Plan (Appendix 4.1).



Table 17-1: Summary of Mitigation and Monitoring Measures

Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
Pre-Construction Phase					
MM01	Chapter 5: Population and Human Health	5.8.3: Mitigation Measures - Land Use	Prior to the grid connection (GC) installation works within public roads, all access points (domestic, business, farm) are considered when finalising the temporary road closures and diversions, in order to maintain local access as much as possible and avoid effects on various land uses. All proposed works and deliveries along the TDR route will also be controlled by a Construction and Environmental Management Plan to avoid undue effects to adjacent land uses.		
MM02	Chapter 6: Biodiversity	6.10.2.2.2: Management of the Spread of Non-Native Invasive Species	Giant Hogweed A pre-construction survey will be conducted to confirm the continued absence of this species from the GC prior to construction. The ISMP contains a suite of measures for the control and eradication of this species, which will be implemented if required (see Appendix 6.4). Japanese Knotweed To be managed in accordance with the Invasive Species Management Plan (ISMP) for the Proposed Development (see Appendix 6.4, Volume 3) which describes the detailed treatment/management of the invasive species within the Site with particular attention provided to the bell-mouth entrance to the Site from the Longfordpass North local road (AP 4).		
MM03	Chapter 6: Biodiversity	6.10.2.4: Non-Volant Mammals	A pre-construction mammal survey will be undertaken no later than 12 months pre-construction to reconfirm the findings of the EIAR		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM04	Chapter 6: Biodiversity	6.10.2.4.1: Badger	Exclusion zone fencing and appropriate signage will be put in place around the setts. Tool box talks will be given to ensure site operatives are familiar with this constraint. No exclusion or hard blocking of setts is proposed. As per NRA Guidance, during the breeding season (December to June inclusive) no works will be undertaken within 50m of an active sett or pile driving within 150m of active setts. All supervision and surveys will be undertaken or supervised by an appropriately qualified ecologist in advance of construction. The Consenting Authority will be contacted immediately should any of the following events occur: • A new sett is recorded within the Study Area during works; • There is evidence of badger persecution during surveys.		
MM05	Chapter 6: Biodiversity	6.10.2.4.2: Otter	A pre-construction mammal survey will be undertaken (no later than 12 months prior to construction) alongside other mammal surveys within the Site and the GC crossing points to reconfirm the status of otter and if an otter holt should be encountered at any point, then NPWS will be informed and NRA Guidelines for the Treatment of Otters Prior To the Construction of National Road Schemes will be followed.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM06	Chapter 6: Biodiversity	6.10.2.4.3: Pine Marten	A pre-construction survey for pine marten will be undertaken (no later than 12 months prior to construction) alongside other mammal surveys within the Site and along the GC. In the event that an active den is found, measures will be implemented to avoid it during the breeding season.		
MM07	Chapter 6: Biodiversity	6.10.2.1.4: Pre-Construction Surveys	If three years lapse between EIAR/planning-stage surveys and installation of the wind turbines, it will be necessary to repeat one season of surveys during the bat activity period (EUROBATS, 2014). Future survey work will be completed according to best practice guidelines available (Hundt, 2012; Collins, 2016; NatureScot, 2021; NIEA, 2021) and includes static detector, activity and roost inspection surveys. If new bat roosts are present in areas affected by proposed felling, a bat derogation license will be sought from the National Parks and Wildlife Service.		
MM08	Chapter 6: Biodiversity	6.10.2.2: Marsh Fritillary	Pre-construction surveys for marsh fritillary will be undertaken to reconfirm the findings of the EIAR.		
MM09	Chapter 8: Land, Soils and Geology	8.7.1: Mitigation by Design and Best Practice	Any excavation and construction related works will be subject to a design risk assessment at detailed design stage to determine risk levels for the construction, operation and maintenance and decommissioning of the works. Identified impacts will be minimised by the application of principles of avoidance, prevention, and protection. Information on residual impacts will be recorded and relayed to appropriate parties. A detailed method statement for each element of the works will be prepared by the Contractor prior to any element of the work being conducted.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM10	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of the commencement of any works and will be included in the CEMP.		
MM11	Chapter 14: Archaeological, Architectural and Cultural Heritage	14.5.1.1: Wind Farm Site	At the borrow pit site, a programme of advance geophysical survey followed by targeted test trenching investigations of any identified features of archaeological potential will be carried out in advance of the construction phase. In the event that any archaeological sites, features or objects are identified during these advance site investigations, they will be securely cordoned off and recorded. The NMS will then be notified and consulted to determine further appropriate mitigation measures, which may include preservation in situ by avoidance or preservation by record through systematic, licensed archaeological excavations.		
MM12	Chapter 15: Material Assets (to include Traffic and Transportation, Aviation and Telecommunications)	15.4.5: Material Assets - Mitigation Measures	Existing services along the proposed GC route have been predicted through a desktop study and will be confirmed in the pre-construction surveys prior to construction..		
MM13	Chapter 15: Material Assets (to include Traffic and Transportation, Aviation and Telecommunications)	15.5.7.1.1: Main Wind Farm Site	The Preliminary Traffic Management Plan (TMP) found in the Construction Environmental Management Plan, located in Appendix 4.1, Volume 3 of the EIAR will be agreed with the road's authority and An Garda Síochána prior to commencing construction.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
Construction Phase					
MM14	Chapter 5: Population and Human Health	5.8.3: Mitigation Measures - Land Use	The construction and decommissioning works will be planned and controlled by a Construction and Environmental Management Plan (CEMP). The CEMP for the construction phase is included in Appendix 4.1 of Volume 3 of this EIAR. This provides details on day-to-day work and methodologies. As part of these works, the public and other stakeholders will be provided with updates on construction activities which will affect access to lands. This will be communicated to members of the public through a community liaison officer employed for the duration of the construction period, as set out in Chapter 15 – Material Assets, which includes information on traffic and Transportation.		
MM15	Chapter 5: Population and Human Health	5.8.5.1: Mitigation Measures – Construction & Decommissioning	A CEMP is included in Appendix 4.1, which details construction protocols and methodologies. This CEMP will be adopted and further developed in consultation with the local authority and other competent bodies prior to implementation. Furthermore, site investigation has been completed, and mitigation has been proposed as detailed in Chapter 8 – Land, Soils and Geology. Public safety is addressed by restricting access to the public in the vicinity of the site works during the construction and decommissioning stage. The construction site will be closed to the public for the 24-month construction period as well as the decommissioning period. This measure aims to avoid potential injury to members of the public as a result of construction activities.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Appropriate warning signage will be posted at the construction site entrance during both the construction and decommissioning phases, directing all visitors to the site manager. Appropriate warning signage shall be provided on public roads approaching site entrances and along haul routes including clear signage relating to the development, both temporary and permanent will be provided for accessing the site. In relation to the TDR, extra safety measures will be employed when large loads are being transported, for instance, Garda escort will be requested for turbine delivery, and a comprehensive turbine delivery plan will be utilised to avoid potential effects on human safety for road users and pedestrians. A Construction Traffic Management Plan is included in the CEMP in Appendix 4.1 of this EIAR.		
MM16	Chapter 6: Biodiversity	6.10.2.2.1: Mitigation or Compensation of Habitat Loss	Dust Control Dust control measures such as dust suppression to dampen down haul roads alongside setting a speed limit for vehicles on the access road are presented in Chapter 4 – Project Description proposes and will be adopted to ensure the protection of the surrounding sensitive environments including raised bogs within the Site during construction.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM17	Chapter 6: Biodiversity	6.10.2.2.1: Mitigation or Compensation of Habitat Loss	Mitigation for Raised Bog in the Northernmost Section of Wind Farm site To minimise and mitigate the indirect effect on the water table of the raised bog in the northernmost section due to the installation of internal access track and associated drains, the following measures will be implemented: The internal access road in the northernmost section will be constructed via floating method (as outlined in Chapter 4 – the Project Description) to allow the depth of peat excavation to be minimised. No roadside drain will be installed on the western side of the proposed access track at this location. No access will be permitted beyond the western edge of the proposed access track at this location.		
MM18	Chapter 6: Biodiversity	6.10.2.2.1: Mitigation or Compensation of Habitat Loss	Dry Calcareous Grassland Translocation and Enhancement To mitigate the effects on the local calcicoles due to the removal of calcareous grassland within the Site, it is proposed to re-use material excavated from under the existing rail line to landscape roadside areas such as drain edges in order to retain this soil and the associated seedbank close to its current location. To avoid accidentally discharging this soil during the mitigation works near drains, water protection measures will be used such as temporary silt traps (silt fences) around the existing drains.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			The main temporary compound in the north of the Proposed Wind Farm will be surfaced with limestone. As an enhancement measure, following the removal of temporary facilities at the end of the construction phase, the exposed limestone shall be left in situ and covered with a thin layer of neutral/calcareous soil layer thereby allowing the local calcicoles to establish there and to establish the eventual establishment of neutral/calcareous grassland.		
MM19	Chapter 6: Biodiversity	6.10.2.2.1: Mitigation Compensation or of Habitat Loss	Woodland Re-planting at Substation Compound To mitigate the effects due to the removal scrub/immature woodland habitats, the mitigation measures and enhancement plan proposed within the Biodiversity Enhancement Management Plan will be conducted during the construction and post-construction phases as follows: As mitigation, following construction, the area of immature woodland removed from the substation compound footprint will be replanted with whips of downy birch, which is the primary pioneer tree species of woodlands on cutover bogs within the Site. In addition, a line of downy birch or other suitable native trees in the local area of standard size will be planted along the western margin bordering the existing rail line/proposed access track to restore connectivity for bats in advance of the re-planted woodland re-establishing. Tree protection will be provided to protect trees from grazing animals during the establishment phase.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM20	Chapter 6: Biodiversity	6.10.2.2.1: Mitigation or Compensation of Habitat Loss	Hedgerow Reinstatement Where hedgerow removal is required for the Proposed Borrow Pit within the Site, these will be reinstated with native hedgerow and tree species which are indigenous to the local area and will include elm <i>Ulmus</i> spp., willows <i>Salix</i> spp. and downy birch as the main canopy species and hazel, hawthorn and blackthorn as the smaller shrub layer in order to create a well-developed layered structure which provide the similar function and diversity with native woodlands. In addition, as the pioneer species to support the early succession stage, willow, elder or downy birch are recommended to be planted, where possible. To achieve favourable conditions of hedgerows, a cutting regime which allows at minimum the development and maintenance of highly favourable structure and ecological status outlined in the HAS guidance, i.e. over 4m height, over 3m width, overgrown, top heavy and undercut with outgrowth and dense base profile, connected with semi-natural habitats or woodlands will be observed during the operational phase.		
MM21	Chapter 6: Biodiversity	6.10.2.2.1: Mitigation or Compensation of Habitat Loss	Water Quality Change Control for Lakes/Rivers Mitigation measures to control runoff, leaks or spillages of hydrocarbons and release of cement-based products are presented in Chapter 9 – Hydrology and Water Quality and will be adopted to ensure the protection of the aquatic environment during construction.		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM22	Chapter 6: Biodiversity	6.10.2.2.2: Management of the Spread of Non-Native Invasive Species	The importation of all construction material to Site will be in accordance with Ireland's Invasive Alien Species Soil and Stone Pathway Action Plan 2023 – 2027 (NPWS, June 2023) which requires implementation of biosecurity measures in advance of bringing material to site.		
MM23	Chapter 6: Biodiversity	6.10.2.3: Aquatic Ecology	Mitigation to control runoff from Site is presented in Chapter 9 – Hydrology and Water Quality and will be adopted to ensure the protection of the aquatic environment during construction, as follows: Mitigation Measures for Directional Drilling for Grid Connection Although no in-stream works are proposed, the drilling works will only be done over a dry period between July and September (as required by IFI for in-stream works) to avoid the salmon spawning season and to have more favourable (drier) ground conditions; The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance; There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone; Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the 15m buffer zone boundary; Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the watercourse;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered; The area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages; Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area; Spills of drilling fluid will be clean up immediately and stored in an adequately sized skip before been taken off-site; If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works); This will be completed using a shallow swale and sump down slope of the disturbed ground; and water will be pumped to a proposed percolation area at least 50m from the watercourse; The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing; Any sediment laden water from the works area will not be discharged directly to a watercourse or drain;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Works shall not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted; Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse; If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied; On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion; The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated; There will be no batching or storage of cement allowed at the watercourse crossing; There will be no refuelling allowed within 100m of the watercourse crossing; and, All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing. Fracture Blow-out (Frac-out) Prevention and Contingency Plan		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used); The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage; One or more lines of silt fencing will be placed between the works area and the adjacent river; Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility; Adequately sized skips will be used where temporary storage of arisings are required; The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse; This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped; Any frac-out material will be contained and removed off-site; The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and, If the risk of further frac-out is high, a new drilling alignment will be sought at the crossing location.		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM24	Chapter 6: Biodiversity	6.10.2.3: Aquatic Ecology	Leakages or Spillages and Release of Sediments and Pollutant into Watercourses Sediment Control within the Existing Drains within the Site Interceptor drains will convey clean runoff water around works areas to the existing downstream drainage system (field drains and main drains). Where required, interceptor drains will be installed in advance of any construction works commencing. This will ensure that clean water is kept clear by diverting surface water flow around excavations, construction areas and temporary storage areas. Where possible (depending on orientation), existing field drains can be used as interceptors drains; Collector drains will be used to intercept and collect runoff from construction areas (from turbine base/hardstand areas, construction compounds, and the substation). During the construction phase temporary settlement ponds will be used to attenuate and treat runoff from the construction areas (from turbine base/hardstand areas, construction compounds, and the substation) and treated water will then discharge into existing field drains and main drains. Temporary settlement ponds will be removed at the end of the construction phase (end of high risk period), and wind farm runoff will discharge into existing field drains and main drains; During the construction phase, temporary silt traps (silt fences) will be used as an additional water protection measures around the existing bog drainage network, particularly where works are proposed within 50m of a natural watercourse. The silt fences will be placed in the existing drains downstream of construction works, and the associated construction area run-off water will be diverted into proposed interceptor drains, or culverted under/across the works area;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			During the construction phase, dewatering silt bags will also be used as required. They can be used downgradient of turbine bases, where temporary pumping is required. Discharge from dewatering silt bags will flow into settlement ponds and treated water from settlement ponds will outfall to existing field drains and main drains; Within the Site layout there are section of proposed floating road between turbine infrastructure. In these sections, and depending on intermediate topography, a collector drain (dirty water system as described above) may be used during construction stage, or over the edge (OTE) drainage will occur. Over the edge drainage allows runoff from access tracks to flow into local field drains and be managed via the existing site drainage system. OTE drainage will only occur where topography allows, and it is only proposed in areas of low risk and remote from outfall locations (at least 150m from bog outfall locations. Silt traps and check dams will be installed in field drains downstream of OTE drainage areas, and these will provide attenuation and treatment of dirty water; and, Culverts will be required where site roads and proposed hardstands cross the main bog drainage networks. These will be installed with a minimum gradient to reduce the entrainment of suspended solids. All culverts will be inspected regularly and maintained where appropriate. Culverts will remain in-situ during the Operational Phase of the Proposed Development.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Hydrocarbon Leaks or Spills All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site; 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 or truck will be re-filled at the construction compound and will be towed/driven around the Site to where machinery is located. All machinery will carry spill kits for the event of any accidental spillages. The fuel bowser will be parked in a designated location 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 available during all refuelling operations and used when required; Fuel volumes stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume during the construction phase; and, An emergency preparedness and response procedure is required to prevent environmental pollution incidents. Emergency Silt Control and Spillage Response Procedures are included in Section 4 of the Surface Water Management Plan, which is included in Appendix of the CEMP.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			A comprehensive spill response plan and procedures will be actioned in the event of an accident or emergency. Suitable spill kits and absorbent material for dealing with oil spills will be maintained on site and will be provided in all construction vehicles. In the event of pollution or potential risk of pollution the Local Authority and Inland Fisheries Ireland will be informed immediately. Refer to the Surface Water Management Plan, which is included in the Appendix of the CEMP, for more information on spill response procedures. Release of Cement-Based Products No batching of wet-cement products on-site is proposed. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will be the design approach; Where possible pre-cast elements for culverts and concrete works will be used; No washing out of the main body of any plant used in concrete transport or concreting operations will be allowed on-site; Where concrete is delivered on site, only the concrete truck chute will be cleaned, using the smallest volume of water possible. 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 isolated in temporary lined wash-out pits located near Site compounds. These temporary lined wash-out pits will be removed from the site once their utility is no longer required or at the end of the construction phase;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Any washing out of concrete pumping plant will also be into the temporary lined wash-out pits; Weather forecasts will be used to plan dry days for pouring concrete; and, Construction contractors will ensure each concrete pour site is free of standing water and plastic covers will be available in case of a sudden rainfall event.		
MM25	Chapter 6: Biodiversity	6.10.2.3: Aquatic Ecology	Groundwater Pollution relevant to the Loughnan's Turlough Site drainage will be put in place in order to prevent any poor quality drainage water reaching the local karst features. Mitigation measures mentioned above, and within Chapter 6: Biodiversity, 6.10.2.3: Aquatic Ecology, for the control of sediments, hydrocarbon and cementitious products to be implemented will as well ensure the protection of the groundwater water quality to avoid any significant impacts on that.		
MM26	Chapter 6: Biodiversity	6.10.2.3: Aquatic Ecology	General Measures Works within and adjacent to watercourses, as part of HDD, culvert and new bridge construction, will adhere the guidelines set out in the best practice documents as listed below for the control of water pollution: CIRIA (2001). Control of water pollution from construction sites - Guidance for consultants and contractors (C532). Construction Industry Research and Information Association, London.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			CIRIA (2006). Control of Pollution from Linear Construction Project; Technical Guidance (C648). Construction Industry Research and Information Association, London. CIRIA (2015). Manual on scour at bridges and other hydraulic structures, second edition (C742). Construction Industry Research and Information Association, London. CIRIA (2015). Environmental Good Practice on Site (4th edition) (C741). Construction Industry Research and Information Association, London. CIRIA (2019). Culvert, screen and outfall manual (C786). Construction Industry Research and Information Association, London. DHPLG (2019). Draft Revised Wind Energy Development Guidelines. Department of Housing, Planning and Local Government. December 2019 Enterprise Ireland (unknown). Best Practice Guide (BPGCS005) Oil storage guidelines. IFI (2016). Guidelines on Protection of Fisheries during Construction Works in and adjacent to waters. Inland Fisheries Ireland, Dublin. IFI (2019) Windfarm scoping document (draft). Inland Fisheries Ireland, Dublin. IWEA (2012). Best Practice Guidelines for the Irish Wind Energy Industry. Guidance prepared by Fehily Timoney and Company for the Irish Wind Energy Association.		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Kilfeather, P.K. (2007). Maintenance and protection of the Inland Fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board. Southern Regional Fisheries Board, Clonmel, Co. Tipperary Murphy, D.F. (2004). Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin. NRA (2008). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority. PPG1 - General Guide to Prevention of Pollution (UK Guidance Note); PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note); SNH (2012). Assessing the cumulative impact of onshore wind energy developments. Scottish Natural Heritage, March 2012. SNH (2019). Good Practice during Wind Farm Construction (4th edition). Scottish Natural Heritage.		
MM27	Chapter 6: Biodiversity	6.10.2.4: Non-Volant Mammals	An ecologist (the ECoW) will supervise areas where vegetation removal and tree felling will occur immediately prior to and during construction as appropriate (e.g., an ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site-specific issues in relation to wildlife not currently present on Site will be reconfirmed prior to commencement of works to allow appropriate mitigation measures to be put in place.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			In the event that protected mammals, or their resting places are recorded, the consenting authority will be updated, consulted with, relevant guidelines will be followed for the management of such species. Construction operations shall be restricted to between 08:00 and 19:00 Monday to Saturday. It should be noted that it will be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Work on Sundays or public holidays will only be conducted in exceptional circumstances or in an emergency.		
MM28	Chapter 6: Biodiversity	6.10.2.1.1: Vegetation Buffer	Existing treelines, hedgerows and scrub within the bat buffers for any proposed turbine locations will be removed (note these habitat have been assessed for suitability to support other flora and fauna and have been determined as having local value – mitigation pertaining to site clearance will be employed at these areas). Buffers will be maintained throughout the lifetime of the wind farm as tree-free areas. This will be achieved through mechanical means only; the use of chemical substances is prohibited.		
MM29	Chapter 6: Biodiversity	6.10.2.1.2: Supervision of Vegetation Clearance	An ecologist/ECOW will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any Site-specific issues in relation to wildlife not currently present (e.g., Bat roost locations) on Site will be discovered prior to commencement of works to allow appropriate mitigation measures to be put in place. In the unlikely event that a bat roost is found, the NPWS will be informed, and the relevant guidelines will be implemented as appropriate (e.g. NRA guidelines).		
MM30	Chapter 6: Biodiversity	6.10.2.1.3: Lighting Restrictions	Construction operations within the Wind Farm Site will take place during the hours of daylight where possible to minimise disturbances to faunal		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			species at night. Some works along the cable route and Wind Farm Site may occur at night but the project ecologist/ECOW will limit night-time works to sections of the route / Site which avoid sensitive features (e.g. mature treelines, conifer plantation edge and tracks). Where lighting is required, directional lighting (i.e. lighting which only shines on work areas and not nearby countryside) will be used to prevent overspill. This will be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only.		
MM31	Chapter 6: Biodiversity	6.10.2.2: Marsh Fritillary	Areas of suitable marsh fritillary habitat within the Proposed Wind Farm footprint will be translocated to suitable locations in adjacent areas. These areas are identified in (replicated below) and Figure 6-13 (Volume 4), and any changes to the baseline will inform the translocation effort. Receptor areas will be prepared as required to ensure the successful establishment of translocated turves. Translocation will be achieved through the excavation and relocation of turves with vegetation comprising suitable larval habitat. If larval webs are present in any of the areas selected for translocation, translocation of turves and larval webs to suitable receptor areas outside the footprint will be undertaken. This will be achieved by marking the location of pupae/larvae, and carefully excavating the surrounding sod under ecological supervision. If required, translocation will be carried out immediately following the survey during September to ensure pupae/larvae can be relocated at the time of translocation.		



			Areas of marsh fritillary habitat requiring translocation						
			id	X (ITM)	Y (ITM)	Area (ha)	Translocation/Notes		
			2	623034	659388	0.09	Partial translocation required		
			3	623084	659310	0.01	Partial translocation required		
			5	623154	659176	0.02	Partial translocation required		
			6	623188	659156	0.05	Partial translocation required		
			7	623257	658769	0.02	Partial translocation required		
			11	623672	658843	0.01	Partial translocation required		
			14	623344	658405	0.07	Partial translocation required		
			15	623383	658265	0.02	Partial translocation required		
			16	623457	657948	0.05	Partial translocation required		
			17	623654	657174	0.02	Partial translocation required		
			22	623686	656711	0.01	Partial translocation required		
			23	623761	656569	0.19	Partial translocation required		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure					Audit Result	Action Required
			id	X (ITM)	Y (ITM)	Area (ha)	Translocation/Notes		
			26	623574	656114	0.00	Full translocation required		
			27	623143	656081	0.14	Partial translocation required		
			28	623088	655984	0.05	Partial translocation required		
			30	622971	655768	0.05	Partial translocation required		
			31	623058	655573	0.07	Partial translocation required		
			34	623543	655338	0.20	Partial translocation required		
			35	622813	655534	1.39	Partial translocation required		
			38	622284	654774	0.06	Partial translocation required		
			40	621813	654030	0.01	Partial translocation required		
			43	620481	652189	0.09	Partial translocation required		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM32	Chapter 6: Biodiversity	6.10.2.3: Herpetofauna	At the vegetation clearance stage, areas will be methodically disturbed prior to clearance in order to disturb these species so they leave the area prior to clearance works, reducing potential for individuals to remain in areas where they are at risk of injury or death. Mechanical disturbance to create noise and vibration can be used, in addition to human presence (walkover of vegetation clearance areas). A combination of both methods may be required, depending on site conditions. In the event that construction is required to proceed during the breeding season of common frog (approximately January to midsummer), smooth newt (approximately February to June) and common lizard (approximately March to May), a pre-construction herpetofauna survey will be completed. If these species are present in areas with potential to be affected by vegetation clearance where it is not feasible to delay works until froglets, efts and juvenile lizards have dispersed from breeding sites, translocation under licence will be completed by a qualified ecologist. Measures to exclude newts from areas affected by scrub clearance and active construction zones will be implemented to prevent injury or mortality of adult newts.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM33	Chapter 6: Biodiversity	6.10.2.4: Project Ecologist/Ecological Clerk of Works (ECoW)	A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed for the duration of the construction phase to ensure that all the mitigation measures set out in the EIAR, NIS and any conditions of consent pertaining to biodiversity are employed. The Project Ecologist/ECoW will advise on environmental effects and communicate with the project owner and contractor to ensure the required actions to implement the mitigation prescribed in this EIAR are carried out. The Project Ecologist/ECoW will be awarded a level of authority and will be allowed to stop construction activity if there is potential for significant environmental effects other than those predicted and mitigated in the EIAR. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Development (Appendix 4.1 of the EIAR). The CEMP will be finalised and implemented by the appointed contractor. The implementation of proposed mitigation measures, environmental commitments, as well as the monitoring and supervision of these measures will be managed through the CEMP. Mitigation measures to prevent significant negative effects to the key ecological receptors (KERs) identified in this chapter will be incorporated into the development through the CEMP.		
MM34	Chapter 7: Ornithology	7.9.2.2: Project ecologist / ECoW	A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise (in implementing ecological mitigation measures for wind farm developments) will be employed for the duration of the construction phase to ensure that all the mitigation measures outlined in relation to the environment are implemented. The Project Ecologist/ECoW will be awarded the authority to stop construction activity if there is potential for significant adverse ecological effects to occur.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM35	Chapter 7: Ornithology	7.9.2.3: Avifauna	1. The turbines will be constructed in a phased approach to limit areas of disturbance. 2. The removal of vegetation and scrub at the Site as well as trimming of trees along the TDR will be undertaken outside of the bird breeding season (March 1st to August 31st inclusive). This will help protect nesting birds. This is in line with NPWS (2025) guidance on hedgerow management. 3. Construction operations will take place primarily during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. Limited operations generally consisting of but not limited to concrete pours, turbine erection and installation of the grid connection may occasionally require night-time operating hours; these works will be agreed with and supervised by the project ecologist/ECOW, with suitable additional mitigation also being implemented. 4. In the event that construction related disturbance to areas used by breeding waders and waterbirds (see Figure 7-7) cannot be avoided during breeding season, mobile visual screens will be put in place between the works and breeding wader/waterbird habitats in locations where existing vegetation is absent to minimise disturbance to birds within 500m. 5. Toolbox talks will be undertaken with construction staff on disturbance to key species during construction. This will help minimise disturbance. This is in line with best practice recommendations for mitigation measures with regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt and Langston, 2006).		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			6. Where removed or altered at TDR Nodes, re-instated hedgerows will be planted with locally sourced native species. This will result in habitat enhancement for local species of conservation importance such as meadow pipit. This is in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt and Langston, 2006). 7. A re-confirmatory pre-construction survey (March/April) will be conducted to assess any evidence of target species activity or occupation of new territories (e.g. in the case of breeding snipe and barn owl). Should any nesting locations be recorded, works at these locations will be restricted to outside the breeding season (March 1st to August 31st inclusive) or until chicks are deemed to have fledged (following monitoring). In the event of barn owl returning to the abandoned roost/nest site, an ECoW must be present to assess the potential for disturbance to the individuals. If barn owl are present, all construction works will be halted within 250m of the nest until breeding is complete. 8. The use of white lights on the turbines will not occur as these can attract night flying birds such as migrants, and insects, which in turn can attract bats. Turbines will be illuminated with medium intensity fixed red obstacle lights of 2000 candelas where required by the Irish Aviation Authority / Irish Air Corps. Lighting will be fitted with baffles to ensure that the light is directed skywards and will not be discernible from the ground.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			9. Construction works within 500m of Derryhogan Lakes will occur outside the breeding season (March 1st to August 31st) due to the potential disturbance caused by construction noise disturbance and visual disturbance for curlew and other species utilising this area for breeding. Works in this area will be limited to daylight hours as these lakes are also important roosting habitats for wintering birds. A permanent 2m high berm will be installed along the alignment shown in Figure 7-7 during the non-breeding season in order to prevent noise and visual disturbance to curlew and other bird species breeding at Derryhogan Lakes. The embankments will be covered with turves/vegetation removed from the adjacent amenity trail/access track footprints. Site traffic will be permitted to travel on access tracks within 500m of Derryhogan lakes once the 2m berm is in place. 10. The construction compound adjacent to the Derryhogan Lakes is just under 500 m from the nearest significant breeding/roosting bog lake. The 2m berm will extend around the western boundaries of the construction compound to reduce the noise and visual disturbance to the key habitat area of Derryhogan Lakes. 11. Where construction works are required within 500m of Longfordpass Lakes and Bawnreagh Lakes, in areas where existing vegetation screening is absent, mobile screening will be positioned to prevent visual disturbance to breeding and non-breeding birds utilising these areas. 12. Turbine T08 and the section of internal access track between T06 and T08 will not be constructed during the non-breeding season (September 1st to February 28th) in order to avoid effects on roosting hen harrier. 13. A bird hide constructed to RSPB specifications will be incorporated within the embankment protecting Derryhogan Lakes (see Figure 7-7).		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			14. Mammal fencing as per TII specification CC-SCD-00324 will be installed along all amenity trail and access track sections where barriers are required to prevent dogs and walkers from accessing key habitat areas for breeding birds (see Figure 7-7). 15. 2m high willow fence screening will be installed where access tracks and amenity trails are adjacent to key bird habitats to prevent visual disturbance arising from recreational use (see Figure 7-7). 16. Temporary screening will be installed along the northern access track west of the proposed substation in the areas indicated in Figure 7-7. Tree planting will also be provided outside the temporary screening. These measures will provide screening of existing gaps and prevent visual disturbance to Longfordpass Lakes from recreational users. 17. Signage will be installed to ensure recreational users understand the requirement to remain on the trails and maintain control over dogs near key bird habitats, and are aware of the location of these habitats. 18. The placement of barriers and hides has taken 'desire lines' into account, and the fencing and barriers have been designed to discourage recreational users from deviating from the trails in key areas.		
MM36	Chapter 8: Land, Soils and Geology	8.7.2.2: Clearance	Site Storage tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling of plant and equipment will be conducted from these tanks or from delivery vehicles at designated refuelling areas. Specific mitigation measures relating to the management of hydrocarbons are as follows: Any diesel, fuel or hydraulic oils stored on site will be stored in bunded storage tanks – the bund area will have a volume of at least 110 % of the volume of such materials stored.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Refuelling of plant during construction will only be conducted at designated refuelling station locations on site. Emergency drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site. The emergency response procedure is provided in Section 1.8 of SWMP.		
MM37	Chapter 8: Land, Soils and Geology	8.7.2.3: Earthworks	The project will be constructed in a phased manner to reduce the potential impacts on the Land, Soils and Geology. Phased construction reduces the amount of open, exposed excavations at any one time. Given that the works comprises a significant proportion of excavation and earthworks, suitably qualified and experienced geotechnical personnel will be present on site to supervise the works throughout the earthworks phase of construction. Some temporary stockpiles (not exceeding 2m in height) of material will be necessary adjacent to the excavation areas prior to reinstatement, however no long-term stockpiles of material will remain after construction and no surplus/waste soil or rock will be removed from the proposed project site. Temporary stockpiles will be shaped and sealed to prevent the ingress of water from rainfall and placed away from open excavations, sloping / soft ground as not to create an instability risk during temporary works. To mitigate against the compaction of soil at the site, prior to the commencement of any earthworks, the work corridor will be pegged, and machinery will stay within this corridor so that soils outside the work area are not damaged. Excavations will then be conducted from access tracks as they are constructed in order to reduce the compaction of soft ground.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			To mitigate against erosion of the exposed soil or rock, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or prior to heavy rainfall events (>10mm/hour). To mitigate against possible contamination of the exposed soils and bedrock, refuelling of machinery and plant will only occur at designated refuelling areas. Soil excavated from trenches along the GCR will be taken to a licenced facility for disposal or recycling where required. If feasible, the upper layers of tarmac and asphalt will be excavated separately to the lower engineered fill layers. The lower engineered fill layers will be reused. The tarmac/asphalt layers will be taken to a licenced facility for disposal or recycling. All temporary cuts/excavations will be conducted such that they are stable or adequately supported. Gravel fill will be used to provide additional support to temporary cuts/excavations where appropriate. Unstable temporary cuts/excavations will not be left unsupported. Where appropriate and necessary, temporary cuts and excavations will be protected against the ingress of water or erosion.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM38	Chapter 8: Land, Soils and Geology	8.7.2.4: Control of Sediment Laden Runoff	Best practices will be employed in the prevention of silt laden run-off from entering watercourses as discussed below. To minimise the impact to surface water quality will be maintained outside the immediate site area, and where appropriate, additional site drainage and settlement ponds will be installed as required prior to construction activities. Silt fencing will be installed in new drainage and monitoring of water quality will be undertaken by the Contractor during the construction phase. Final drainage will be constructed following the completion of these activities with silt fencing maintained until such time as a vegetation cover has become established. Chapter 9 of this EIAR discusses surface water issues in more detail.		
MM39	Chapter 8: Land, Soils and Geology	8.7.2.5: Measures for Spills	Storage tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling of construction vehicles will be conducted from these tanks or from delivery vehicles at designated refuelling areas. Specific mitigation measures relating to the management of hydrocarbons are as follows: - Fuels, lubricants, and hydraulic fluids for equipment used on the construction site will be carefully handled to avoid spillage. - Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of; - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling; and		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Appropriate spill control equipment, such as oil soakage pads, will be kept within the construction area and in each item of plant to deal with any accidental spillage.		
MM40	Chapter 8: Land, Soils and Geology	8.7.2.6: Slope Stability	With regard to slope stability issues, detailed design and construction phase best practice will be implemented as follows: • The earthworks will be supervised by a suitably qualified and experienced geotechnical engineer or engineering geologist, and hydrologist or drainage engineer. • Drainage infrastructure will be put in place in advance of excavations. Drains will divert surface water and groundwater away from excavations into the existing and proposed surface drainage network. Uncontrolled, direct, and concentrated discharges of water onto the ground surface will be avoided. • Loading or stockpiling of materials on the surface of soft ground will be avoided. Loading or stockpiling on other deposits will not be undertaken without first establishing the adequacy of the ground to support loads by an appropriately qualified geotechnical engineer experienced in construction within upland conditions. No stockpiling of material shall take place on steep excavated slopes. • Excavation will be conducted from access tracks or hardstanding areas to avoid tracking of construction plant across areas of soft ground.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- An assessment of the stability at proposed infrastructure locations has been carried out as part of this EIAR based on worst case conditions in accordance with the principals of Eurocode 7 (IS EN 1997-1) A further assessment will be undertaken at detailed design stage by a suitably qualified and experienced geotechnical engineer prior to the commencement of all excavations to confirm the findings of this assessment. - Blasting of rock will not be permitted. - Excavations which could have the potential to undermine the up-slope component of an existing slope will be sufficiently supported to resist lateral slippage and careful attention will be given to the existing drainage. - Earthworks will not be commenced when heavy or sustained rainfall (orange or red weather warnings) is forecast. A series of rainfall gauges will be installed across the site to provide a record of rainfall intensity. An inspection of site stability and drainage by the Geotechnical Engineer will be conducted on site when a daily rainfall of over 10mm/hr or 25mm/day is recorded on site, works will only recommence after heavy rain with the prior approval of the Geotechnical Engineer following their inspection. - An emergency plan (included in Section 6 of the CEMP – Appendix 4.1 of Volume 3 of this EIAR) will be updated at pre-construction stage detailing the action plan which would be implemented in the unlikely event of a landslide/slope failure. Should a landslide/slope failure occur or if signs of instability/ground movement are observed, work will cease immediately.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM41	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	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 system) will be used to filter and treat all required surface discharge water collected in the dirty water drainage system. This will apply to all of the construction phase.		
MM42	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	Silt fences will be located within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to the existing drainage network of sand and gravel-sized sediment, released from the excavation of mineral sub-soils of glacial and glacio-fluvial origin and entrained in surface water runoff. Regular inspection and maintenance of silt fences during the construction phase are critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.		
MM43	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	Silt bags will be used where small to medium volumes of water need to be pumped from excavations (e.g. the proposed underpass locations). As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through.		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM44	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	The works programme for the construction stage of the development will also take account of weather forecasts and predicted heavy rainfall events in particular. Large excavations and movements of peat/subsoil or peat 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/weekly basis, as required, to allow site staff to manage construction activities: • General Forecasts: Available on a national, regional and county level from the Met Éireann website (www.met.ie/forecasts). These provide general information on weather forecasts 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 Éireann 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,		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- Consultancy Service: Met Éireann provide a 24-hour telephone consultancy service. The forecaster will provide an interpretation of weather data and give the best available forecast for the area of interest. Using the safe threshold of rainfall values given below will allow planned works to be safely executed (from a water quality perspective) or works to be postponed if a high rainfall intensity event is forecast. Earthworks will be suspended if forecasting predicts any 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 earthworks being suspended the following further control measures will be completed: - All open peat/spoil excavations will be secured and sealed; - Temporary or emergency drainage will be created to prevent back-up of surface runoff; and, - Working during heavy rainfall and for up to 24 hours after heavy events will not be allowed to ensure drainage systems are not overloaded.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM45	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	It is proposed that excavated soil, peat and spoil will be used in landscaping around the proposed infrastructure, will be used to reinstate the proposed borrow pit or will be stored in the designated peat deposition areas. During the initial placement of peat and spoil, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from the storage areas as required. Interceptor and collector drains will be used at storage areas. 'Siltbuster' treatment trains will be employed if previous treatment is not of a high quality.		
MM46	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	Construction of the 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 low rainfall periods will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.		
MM47	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.1: Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters	Regular inspections of all installed drainage systems will be undertaken, especially before and 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 sediment levels at dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			During the construction phase field testing (visual, supplemented with pH, electrical conductivity, temperature, dissolved oxygen and turbidity monitoring), sampling and laboratory analysis of a range of parameters ¹ with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events (i.e. weekly, monthly and event-based). The data will be processed and analysed and works will cease if elevated turbidity concentrations are recorded. In this event, all upstream silt traps and drainage routes will be inspected to identify the cause of the elevated turbidity levels. Works will not recommence until any issues have been resolved and the turbidity concentrations have returned to background concentrations.		
MM48	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.3: Potential Effects on Surface Water Quality from Excavation Dewatering	Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place; If required, pumping of excavation inflows will prevent the build-up of groundwater in the excavation; The interceptor drainage will be discharged to the existing drainage system or onto the bog surface within the overall bog drainage and treatment system; The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas;		

¹ example suite: pH (field measured), Electrical Conductivity (field measured), temperature (field measured), Dissolved Oxygen (field measured), Turbidity (NTU) (sonde measured), Flow (m/s), Total Suspended Solids (mg/l), Ammonia, Nitrite (NO₂) (mg/l), Ortho-Phosphate (P) (mg/l), Nitrate (NO₃) (mg/l), Phosphorus (unfiltered) (mg/l), Chloride (mg/l), and BOD (mg/l).



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
			There will be no direct discharge to the existing bog drainage network and therefore no risk of hydraulic loading or contamination will occur; and, Daily monitoring of excavations and the water treatment system 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 will be undertaken.		
MM49	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.4: Potential Effects Associated with Leakages or Spillages of Hydrocarbons	- All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site; - 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 or truck will be re-filled off site and will be towed/driven around the Site to where machinery is located. The 4x4 jeep/fuel truck will also carry fuel absorbent materials for the event of any accidental spillages. The fuel bowser will be parked in a designated location 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 ; - Fuel volumes stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume during the construction phase; and, - An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (Appendix 4.3). Spill kits will be available to deal with accidental spillages.		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM50	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.5: Potential Effects Associated with the Release of Cement-Based Products	- No batching of wet-cement products on-site is proposed. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will be the design approach; - Where possible pre-cast elements for culverts and concrete works will be used; - No washing out of the main body of any plant used in concrete transport or concreting operations will be allowed on-site; - Where concrete is delivered on site, only the concrete truck chute will be cleaned, using the smallest volume of water possible. 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 isolated in temporary lined wash-out pits located near Site compounds. These temporary lined wash-out pits will be removed from the site their utility is no longer required or at the end of the construction phase; - Any washing out of concrete pumping plant will also be into the temporary lined wash-out pits; - Weather forecasts will be used to plan dry days for pouring concrete; and, - Construction contractors will ensure each concrete pour site is free of standing water and plastic covers will be available in case of a sudden rainfall event.		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM51	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.7: Potential Effects Associated with Piled Foundations	Proposed mitigation measures relative to piling works will comprise: - Where driven piles are used, they will have a cross section without re-entrant angles; - 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.		
MM52	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.1.14: Potential Effects from the Use of Siltbuster System	Measures employed to prevent overdosing and potential chemical carryover: - The siltbuster system comprises an electronic in-line dosing system which provides an accurate means of adding reagents, so overdosing cannot occur; - Continued monitoring and water analysis of pre and post treated water by means of an inhouse lab and dedicated staff, means the correct amount of chemical is added by the dosing system; - Dosing rates of chemical to initiate settlement is small, being in the order of 2-10 mg/L and the vast majority of the chemical is removed in the deposited sediment; - Final effluent not meeting the discharge criteria is recycled and retreated, which has a secondary positive effect of reducing carryover; and, - Use of biodegradable chemical agents can be used at very sensitive sites (i.e. adjacent to SACs).		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM53	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.2.1: Potential Morphological Changes to Surface Watercourses	The construction methodology for the Grid Connection route crossings over local rivers and streams was chosen to avoid in stream works and morphological changes to these watercourses. The following mitigation measures will be implemented in relation to the crossing over the Clomantagh Stream which will be completed within the road carriageway: • A double silt fence perimeter will be placed along the road verge on the down-slope side of works areas that are located inside the watercourse 50m buffer zone; • No stockpiling of construction materials will take place along the grid route; • 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 will not take place at periods of high rainfall, and will be scaled back or suspended if heavy rain is forecast; • Local road drainage, culverts and manholes will be temporarily blocked during the works; • Machinery deliveries will be arranged using existing structures along the public road; • All machinery operations will take place away from the stream and ditch banks, apart from where crossings occur. Although no instream works are proposed or will occur; • Any excess construction material will be immediately removed from the area and sent to a licenced waste facility; • Spill kits will be available in each item of plant required to complete the works; and,		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Silt fencing will be erected on ground sloping towards the watercourse at the stream crossing if required.		
MM54	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.1.2.6: Potential Effects During Directional Drilling	<u>Mitigation Measures for Directional Drilling on Grid Connection Route</u> - Although no in-stream works are proposed, the drilling works will only be done over a dry period between July and September (as required by IFI for in-stream works) to avoid the salmon spawning season and to have more favourable (drier) ground conditions; - The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance; - There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone; - Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the 15m buffer zone boundary; - Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the watercourse; - Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered; - The area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages; - Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area; - Spills of drilling fluid will be clean up immediately and stored in an adequately sized skip before been taken off-site;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			• If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works); • This will be completed using a shallow swale and sump down slope of the disturbed ground; and water will be pumped to a proposed percolation area at least 50m from the watercourse; • The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing; • Any sediment laden water from the works area will not be discharged directly to a watercourse or drain; • Works shall not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted; • Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse; • If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied; • On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated; - There will be no batching or storage of cement allowed at the watercourse crossing; - There will be no refuelling allowed within 100m of the watercourse crossing; - All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; - The ECoW will monitor the implementation of all mitigation measures relating to HDD with regular reporting to the client; and, - The Developer's Engineer will be present on site to supervise all HDD works. Mechanical Stabilisation Mechanical Stabilisation will be required where HDD is proposed in gravelly, non-cohesive subsoils. This will be managed by installing steel conductor casing through the shallow gravels to bypass the cover zone (i.e. the material above the bore depth) where fluid would be most likely to breach the surface. This casing acts as a physical barrier, protecting the riverbed from pressure spikes and ensuring returns are directed back to the entry pit rather than into the sensitive substrate. Note that mechanical stabilisation may only be needed on the River Nore crossing.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Fracture Blow-out (Frac-out) Prevention and Contingency Plan: - The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used). Biocompatible Drilling Fluids (European Standards) utilize NSF/ANSI Standard 60 or CE-marked additives which are high-performance, biodegradable viscosifiers and will be used to provide the necessary "gel strength" to suspend heavy gravel cuttings. Fluid loss will be controlled using biodegradable sealants, which create a thin, flexible filter cake on the borehole wall to prevent fluid migration into the aquifer. These products break down naturally, ensuring no permanent alteration to the hydraulic conductivity of the aquifer. - The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage; - One or more lines of silt fencing will be placed between the works area and the adjacent river; - Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility; - Adequately sized skips will be used where temporary storage of arisings are required; - The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse; - This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped;		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- Real-time annular pressure monitoring will be completed. By keeping pressures below the Delft Equation limits, operators can detect lost circulation before it becomes a surface frac-out; - Any frac-out material will be contained and removed off-site; - The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and, - If the risk of further frac-out is high, a new drilling alignment will be sought at the crossing location. The above mitigation measures are standard best practice measures for HDD works and have been successfully employed in multiple projects across Ireland.		
MM55	Chapter 10: Air Quality and Climate	10.5.1.1: Construction Phase	While no likely significant effects have been identified in respect of air quality from the Proposed Development during the construction phase, the CEMP (included in Volume 3, Appendix 4.1) includes mitigation measures during the construction phase of the Proposed Development relevant to air quality as follows: - The internal access tracks will be constructed prior to the commencement of other major elements of the Proposed Development. These tracks will be finished with graded aggregate which compacts, preventing dust; - A water bowser will be used to spray work areas (wind turbine area and grid connection) and haul roads as required, especially during periods of excavations works coinciding with dry periods of weather, to suppress dust migration from the Site;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			• All loads which could cause a dust nuisance will be covered to minimise the potential for fugitive emissions during transport; • Earthworks and exposed areas/soil stockpiles will be re-vegetated (with removed turves) to stabilise surfaces as soon as practicable; • The access and egress of construction vehicles will be controlled to designated locations, along defined routes, with all vehicles required to comply with onsite speed limits, which shall be reduced in periods of dry, windy weather; • Construction vehicles and machinery will be serviced and maintained in good working order to avoid hydrocarbon (fuel/lubricant) leaks; • Wheel washing facilities will be provided within the site near the site entrance points of the Site as described in Chapter 4; and all vehicles entering or leaving the site will be required to use these facilities and the water will be managed and controlled as outlined in the CEMP; • The contractor will be required to implement the dust control plan as part of the CEMP. Subject to Planning consent, the CEMP will be amended and finalised in consultation with Tipperary County Council and other key statutory agencies; it will include relevant planning conditions, including any additional mitigation measures which are conditioned by the Planning Authority; • Receptors which have the potential to be affected by dust from the temporary works at TDR nodes located adjacent to dwellings; and dwellings directly adjacent to the construction associated with the grid connection infrastructure that experience dust soiling, where appropriate, and with the agreement of the landowner, will have the facades of their dwelling cleaned if required should soiling occur; • All construction vehicles will be required to switch off engines when stationary and no idling of vehicles will be permitted.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			For more information on the measures to minimise and control dust and the complaints procedure for dust, please refer to the CEMP, within Volume 3 of the EIAR.		
MM56	Chapter 11: Noise and Vibration	11.5.1: Construction	The noise impact for construction works traffic will be mitigated by generally restricting movements along access routes to the standard working hours and exclude Sundays, unless specifically agreed otherwise. If turbine deliveries are required at night it will be ensured that vehicles on local roads do not wait outside residential properties with their engines idling, and that the local residents will be informed of any activities likely to occur outside of normal working hours. Consultation with the local community is important in minimising the impacts and therefore construction will be undertaken in consultation with the local authority as well as the residents being informed of construction activities. The construction works on site will be carried out in accordance with the guidance set out in BS 5228:2009+A1:2014. Proper maintenance of plant will be employed to minimise the noise produced by any 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 project. Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use. The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 07:00 - 19:00 hours Monday to Friday and 07:00 - 13:00 hours on Saturdays. However, to ensure that optimal use is made of fair-weather windows, or at critical periods within the programme, it could occasionally be necessary to work outside these hours. Any such out of hours working would be agreed in advance with the local planning authority.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			In terms of specific mitigation for Borrow pit activities, the construction noise limit has the potential to be exceeded at 150m from the works, assuming all plant operates at once. In terms of mitigation, a bund and noise barrier to the south of the site is required to mitigate noise from the site (see Figure 11-3). It is proposed that soil from the borrow pit excavation will be placed around the borrow pit for later re-instatement to form a bund 1m high. The combined bund/noise barrier will be required to have a minimum height of 3m above current ground level. This will require a 2m high barrier to be constructed on top of the bund. In addition to the north east of the borrow pit a 3m high combined bund/noise barrier will be installed to screen activities in the southern section of the borrow pit from properties to the north east. Again, this will comprise a 1m high bund and 2m high barrier. This bund with barrier extends between the existing disused quarry area at the centre of the borrow pit and the eastern edge of the borrow pit area. The eastern edge of the main borrow pit area will not be used simultaneously with the north west section of the borrow pit to avoid potential cumulative noise at the properties north east of the borrow pit. The bunds/barrier identified in Figure 11-3 as necessary for noise mitigation will be constructed at the start of the project and will be kept in place until the borrow pit is reinstated. For the 1m bund with 2m barrier to the south, this is predicted to provide a noise reduction of 7 dB. With this mitigation, noise from the borrow pit is predicted to be 63 dB LAeq, at R303, which is below the daytime construction noise limit of 65dB LAeq, 1hr,. For the 1m bund with 2m barrier to the northeast of the borrow, this is predicted to provide a noise reduction of 7 dB. With mitigation, noise from		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			the borrow pit is predicted to be 58 dB LAeq, at R302, which is below the daytime construction noise limit of 65dB LAeq, 1hr,. The noise barrier will have a minimum mass per unit surface area of greater than 7kg/m2, with no gaps at the joints.		
MM57	Chapter 11: Noise and Vibration	11.5.1.1: Grid Connection	Screening to be implemented between works and adjacent properties within 50 m of grid connection works		
MM58	Chapter 14: Archaeological, Architectural and Cultural Heritage	14.5.1.1: Wind Farm Site	A suitably qualified archaeologist will be employed to monitor construction phase ground works, including advance geotechnical investigations, turbine foundations, site access tracks (including profiling for floating roads), cable trenches, compounds, under licence by the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage within overgrown areas of the Site. This will include archaeological supervision of vegetation clearance works and inspection of cleared areas in advance of ground excavation works within the Site. In the event that any archaeological sites, features or objects are identified during monitoring of ground works will halt at the relevant location, and the archaeological remains will be securely cordoned off and recorded. The NMS will then be notified and consulted to determine further appropriate mitigation measures, which may include preservation in situ by avoidance or preservation by record through a systematic, licensed archaeological excavation.		
MM59	Chapter 14: Archaeological, Architectural and Cultural Heritage	14.5.1.2: Grid Connection	A programme of licensed archaeological monitoring of ground works during the construction phase will be carried out within sections of road within the environs of the recorded archaeological sites.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM60	Chapter 15: Material Assets (to include Traffic and Transportation, Aviation and Telecommunications)	15.5.7.1.2: Grid Connection Works	Mitigation measures that will be implemented in full for the grid connection works include: Road Opening: The road works associated with cable trenching works will be completed in line with the requirements of a road opening license as agreed with the local authority. Route Proofing: In advance of the cabling works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road. Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used, when necessary, to ensure that the public road network remains clean. Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the Local Authority. Trench Reinstatement: Trench reinstatement will be carried out in accordance with the Guidelines for Managing Openings in Public Roads, Department of Transport, April 2017 and in agreement with the local authority roads department.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM61	Chapter 15: Material Assets (to include Traffic and Transportation, Aviation and Telecommunications)	15.5.7.1.3: Turbine Component Delivery Mitigation	Mitigation measures proposed for the turbine delivery route also include: Programme of Deliveries: A programme of deliveries will be submitted to the Local Authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company. Unloaded Trial Run: Vehicles with similar dimensions of the abnormal load vehicles will complete an unloaded run of the route to ensure all temporary accommodation works are suitable for the loaded convoy. Garda Escort: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised. Reinstatement: Any area affected by the works on the public road to facilitate turbine delivery will be fully reinstated to its original condition. Consultation: Consultation with the local residents and Tipperary County Council will be carried out in advance to manage turbine component deliveries.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM62	Chapter 15: Material Assets (to include Traffic and Transportation, Aviation and Telecommunications)	15.6.6: Mitigation Measures	In line with standard practice for wind farm developments, the coordinates and elevations for turbines will be supplied to the IAA at the end of the construction phase. An aeronautical obstacle lighting scheme will be agreed with IAA in line with IAA's consultation response and applied to the proposed turbines. Should the Proposed Development get Planning consent, the turbine locations would be added to aviation flight charts and clearly marked as en-route obstacles.		
Operational Phase					
MM63	Chapter 5: Population and Human Health	5.8.5.2: Mitigation Measures - Operational	To ensure health and safety of both the public and staff throughout the operational phase of the Proposed Development, access to the Site shall be restricted during the Operational Phase. For operation and maintenance staff working at the Proposed Development Site, site safety procedures will be established, and all employees will be obliged to comply with these. All personnel undertaking works in or around the turbines will be fully trained and will use appropriate Personal Protective Equipment (PPE) to prevent injury, and this is further detailed in the Safety & Health Management Plan detailing the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the Littleton Wind Farm and shall be read in conjunction with the Safety & Health Plan prepared for the Proposed Development by the Project Supervisor for the Design Process (PSDP). Some key mitigation measures that shall be implemented during the operation phase include: All personnel undertaking works in or around the turbines will be fully trained and will use appropriate Personal Protective Equipment (PPE) to prevent injury;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- Equipment within high voltage substations presents a potential hazard to health and safety. The proposed substation will be enclosed by palisade fencing and equipped with intruder and fire alarms in line with ESB and EirGrid standards; - All electrical elements of the Proposed Development are designed to ensure compliance with EMF standards for human safety; - All on-site electrical connections are carried by underground cable and will be marked out above ground where they extend beyond the track or hardstanding surface. Details of cables installed in the public road will be available from ESNB; - Turbine design includes a glass fibre reinforced polyester hood covers the nacelle. The turbines will be equipped with a Lightning Protection System (LPS) earthing and isolation to help protect the wind turbine against the physical damage caused by lightning strikes. Additionally, the turbines will be equipped with a Fire Suppression System. Furthermore, the proposed wind farm will be remotely monitored, and potential accidents will be quickly identified and reported; - Furthermore, a nominated competent person will carry out checks and routine maintenance work to ensure the reliability and safe operation of fire-fighting equipment and installed systems such as fire alarms and emergency lighting. A record of the work carried out on such equipment and systems will be kept on site at all times; - In line with WEI Health and Safety Guidelines for the Onshore Wind Industry (2011), Emergency Response Plans will include emergency response procedures for initial actions in the event of a fire. Records will be kept for testing of fire alarms and drills and maintenance/inspection of fixed and portable firefighting equipment;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- Information will be provided to employees on fire safety and fire prevention, including risks of and control measures to prevent fire outbreak, evacuation procedures and those responsible for their implementation, and the use of firefighting equipment, in line with HSA guidance (Fire Prevention - Health and Safety Authority (hsa.ie). The wind farm system will include a kill switch that can be operated at any time with an overriding manual shutdown system in case of an emergency; - During the construction phase of the Proposed Development, an emergency response plan will be in place as set out in the CEMP, included in Appendix 2.1 of Volume 3 of this EIAR; - Turbines will be fitted with a Fire Suppression System. Additionally, each turbine will have a number shown in large print on the top of the nacelle which is intended to aid in any aerial fire support to control wildfires in the unlikely event once should occur in the area; - Lightning conductors will be installed on each turbine as all structures standing tall in the sky require this protection. Turbines specifically require this to prevent power surges to electrical components; - Turbines will be fitted with ice detection systems which will stop the turbine from rotating if ice is forming on a turbine blade. This prevents ice throw which can cause injury; 24-hour remote monitoring and fault notifications are included as standard in the Turbine Operations and Maintenance Contracts; - Aviation lighting will be installed on the turbines which will be routinely maintained, with the precise location and detail such as height of turbines being sent to the Irish Aviation Authority;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- In addition to scheduled maintenance, the maintenance contracts will allow for call out of local engineers to resolve any issues as soon as they are noticed the remote monitoring system; - Access to the turbines inner structure will be locked at all times and only accessed by licensed employees for maintenance; - Risk avoidance by design will be achieved through the preparation of a detailed design risk assessment at detailed design stage, a detailed method statement for all elements of the work, supervision by geotechnical personnel during excavation and avoidance of earthworks during severe weather conditions. In line with the Health Service Executive's Emergency Planning recommendations, any incident which may occur at the site which requires emergency services, incident information will be provided in the 'ETHANE' format. - Exact location; - Type of incident; - Hazards; - Access and egress; - Number of casualties (if any) and condition; - Emergency services present and require. The design of the Proposed Development has considered the susceptibility to natural disasters. The proposed site drainage will mitigate against any		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			potential flooding risk, as described in EIAR Chapter 8 – Land, Soils and Geology and EIAR Chapter 9 – Hydrology, Hydrogeology and Water Quality. A nominated competent person shall carry out checks and routine maintenance work to ensure the reliability and safe operation of fire-fighting equipment and installed systems such as fire alarms and emergency lighting. A record of the work carried out on such equipment and systems will be kept on site at all times. The wind farm system shall include a kill switch that can be operated at any time with an overriding manual shutdown system in case of an emergency. During the Operational Phase of the Proposed Development, public access will be restricted to recreational amenity routes only. Fencing shall be used to prevent public access to critical wind farm infrastructure as well as other restricted areas of the Site such as biodiversity enhancement areas.		
MM64	Chapter 6: Biodiversity	6.10.3.3.1: Badger	In the event that a new badger sett is discovered during maintenance of bat felling buffers (vegetation trimming), NPWS will be informed and the relevant guidance <i>Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes</i> (NRA, 2008c) and will be followed. The bat buffer pre-clearance badger survey shall extend 50m beyond the bat felling buffers.		
MM65	Chapter 6: Biodiversity	6.10.3.3.2: Otter	There is potential for an indirect effect on fish species, which otter forages, due to water quality changes from erosion and sediment. Periodic inspections of sediment and erosion control measures will be undertaken until the risk of erosion or siltation has declined following the successful establishment of vegetation during the operational phase.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM66	Chapter 6: Biodiversity	6.10.3.4.1: Feathering of Blades	As per NatureScot 2021 guidelines the turbine blades will be feathered during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or 'idle' when not generating power. Turbine blades spinning in low wind can kill bats, however bats cannot be killed by feathered blades which are not spinning (Horn et al., 2008). The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50% (NatureScot 2021). As such, the feathering of blades to prevent 'idling' during low wind speeds will be implemented for all turbines.		
MM67	Chapter 6: Biodiversity	6.10.3.4.2: Cut-in Speeds / Curtailment	While bat activity varied by species, no detector/turbine locations had activity for any species higher than low/moderate levels (based on Ecobat median percentile scores). Therefore, increased cut-in speeds are not required from commencement of operation, but will rather be reserved for implementation where required based on operational monitoring (see Section 17.1.1.1.1). Modern, remotely-operated wind turbines as proposed here allow cut-in speeds to be controlled centrally/automatically, facilitating an operation regime designed to minimise harmful effects to bats.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM68	Chapter 6: Biodiversity	6.10.3.4.4: Lighting	The lighting installed at the proposed substation will utilise directional lighting (i.e. lighting which only shines on work areas and not nearby countryside) to prevent overspill. This will be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only. Lights will be sensor activated to minimise operation time; trigger sensitivity for the sensors will be specified to ensure the lights are not triggered by bat activity during periods when lighting is not required.		
MM69	Chapter 6: Biodiversity	6.10.3.5: Marsh Fritillary	The pre-clearance bat buffer ecological survey shall include a marsh fritillary habitat appraisal, followed if necessary by a larval web survey. This will ensure that suitable mitigation and avoidance measures can be implemented in the event that marsh fritillary establish in the bat felling buffers during the operational phase.		
MM70	Chapter 6: Biodiversity	6.10.3.6: Herpetofauna	The following mitigation for habitats supporting herpetofauna is proposed (see Appendix 6.1 for further details): • In the post-construction phase, the settlement ponds within the BEMP area will be adapted to provide permanent and suitable breeding habitat for amphibians. • Existing scrub around ponds will be retained where possible, in order to provide suitable supporting habitat and connectivity for smooth newt and common lizard foraging and commuting. • Following construction, one side of each settlement pond will be excavated to form a shallow-angled slope providing variable water depth. The settlement ponds will be fenced to prevent disturbance. Access will be provided via gates.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Ongoing management plan will be carried out along with the monitoring if required, including supplementary planting to achieve vegetative cover around ponds.		
MM71	Chapter 6: Biodiversity	6.10.3.7: Aquatic Ecology	To avoid accidental leakages or spillages and release of sediments and pollutant into watercourses at the operational works, it will be required to implement the same mitigation measures with the construction phase mentioned in Section 6.10.2.3. In addition, the drainage design to control runoff from the Proposed Development is proposed in Chapter 9. The design will be set to attenuate runoff by collecting in new proposed silt traps, settlement ponds and vegetated buffer areas prior to release into the existing drains within the Site. The details for the mitigation measures are proposed within Chapter 9 as follows; - 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 into downstream field drains; - Collector drains will be used to gather runoff from internal site access tracks and turbine hardstanding areas of the Site likely to have entrained suspended sediment, and channel it to new local settlement ponds for sediment settling; - On sections of internal site access tracks transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/roadside drains;		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- Check dams will be used along sections of internal site access tracks drains to intercept silt at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; - Settlement ponds, emplaced downstream of internal site access tracks 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 existing drains; - Settlement ponds will be designed in consideration of the greenfield runoff rate, existing bog settlement ponds will also buffer discharges from the bogs; and, - Finally, all surface water runoff from the development will pass through the existing settlement ponds at the existing bog outfall locations.		
MM72	Chapter 7: Ornithology	7.9.3.3 and 7.9.3.3.1: Predator Exclusion and Control	In order to mitigate potential population level effects on curlew arising from potential collisions, a number of measures to reduce predator pressure are proposed to offset potential effects and improve the conservation status and breeding success of the local breeding curlew population. These measures will also benefit other breeding wader and waterbird species. The primary measure proposed to reduce predator pressure on breeding curlew (and other breeding waders and waterbirds) is the installation of permanent predator fencing around Derryhogan Lakes. The fencing will be incorporated into the alignment of the barrier to prevent recreational user and dog access along proposed tracks and trails, and will also extend around the northern and western margins, fully encircling the wetland mosaic at Derryhogan Lakes (See Figure 7-7).		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			In addition, mink and crow trapping will be regularly undertaken in this area. Management of scrub and other long vegetation will be undertaken in the areas within and adjoining Derryhogan Lakes. This will reduce perching opportunities and cover for predators, and prevent scrub from encroaching the predator fencing. Collectively, these measures will contribute to reduced predator pressure and are likely to result in stabilisation, and over the longer term, growth of the local breeding population. If realised, improvements in the conservation status of the local population would lead to increased resilience, and would contribute to offsetting any potential population level effects associated with collision mortality during the operational phase.		
MM73	Chapter 8: Land, Soils and Geology	8.7.3: Mitigation Measures During Operation	It is not envisaged that the operation of the proposed project will result in significant impacts on the geological regimes within the study area, as there will be no further disturbance of overburden post-construction. The main potential impact during the operation phase would be the risk to groundwater from contamination from spills. Storage tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. Refuelling of maintenance vehicles will be conducted from these tanks or from delivery vehicles at designated refuelling areas. Specific mitigation measures relating to the management of hydrocarbons are as follows: Fuels, lubricants, and hydraulic fluids for equipment used on the site will be carefully handled to avoid spillage.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of; - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling; and - Appropriate spill control equipment, such as oil soakage pads, will be kept within the refuelling areas and in each item of plant to deal with any accidental spillage. Due to the reduced magnitude of the impacts, no additional mitigation measures are required for the maintenance and operation of the site, over and above those incorporated into the design of the substation transformer, which will be bunded to protect soils against accidental leakages of oils and battery fluids.		
MM74	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.2.1.1: Potential Effects from the Replacement of Natural Surfaces with Lower Permeability Surfaces	it is proposed that runoff from the proposed infrastructure will be collected locally in new proposed silt traps, settlement ponds and vegetated buffer areas prior to release into the existing bog drainage network. The new proposed drainage measures will then create significant additional attenuation to what is already present. The operational phase drainage system will be installed and constructed in conjunction with the existing bog drainage network and will include the following mitigation measures:		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
			• 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 into downstream field drains; • Collector drains will be used to gather runoff from internal site access tracks and turbine hardstanding areas of the Site likely to have entrained suspended sediment, and channel it to new local settlement ponds for sediment settling; • On sections of internal site access tracks transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/roadside drains; • Check dams will be used along sections of internal site access tracks drains to intercept silt at source. Check dams will be constructed from a 4/40mm non-friable crushed rock; • Settlement ponds, emplaced downstream of internal site access tracks 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 existing drains; • Settlement ponds will be designed in consideration of the greenfield runoff rate, existing bog settlement ponds will also buffer discharges from the bogs; and, • Finally, all surface water runoff from the development will pass through the existing settlement ponds at the existing bog outfall locations.		



Monitoring Measures (MM) Ref. No.	EIA Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM75	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.2.1.5: Potential Effects from the Release Wastewater	It is proposed to install a sealed underground holding tank for effluent (wastewater) from the onsite 110kV electrical substation building. The tank shall be routinely emptied by a licensed contractor. A level sensor will be installed in the tank which shall be linked to the on-site SCADA system. If the level of the tank contents rise to a predetermined 'high' level a warning shall appear on the overall SCADA system for the site and automatic notification shall be sent to the facility manager. A formal service agreement will be entered into with a suitably permitted waste contractor, in relation to the servicing and de-sludging of the wastewater holding tank on site. There will be no discharge of wastewater to ground at the Site, and therefore there is no potential to impact groundwater or surface water quality.		
MM76	Chapter 12: Shadow Flicker	12.5: Mitigation Measures	Shadow flicker control modules, consisting of light sensors and specialised software, will be installed on the turbines to ensure that mitigation is implemented to reduce shadow flicker occurrence at any receptor. The locations and dimensions of the turbines and shadow flicker receptors can be input into the turbine control software, and when the theoretically optimal on-site conditions for shadow flicker are met (i.e. the light intensity is sufficient and shadow flicker might occur) during operation, then individual turbines would cease operation until the on-site conditions change, or the theoretical period has passed. Shadow flicker prediction modelling is inherently conservative and results in an unrealistically worst-case estimation of shadow flicker effects. As such, implementing mitigation based on prediction modelling can result in unnecessary turbine shutdowns, resulting in reduced renewable energy generation.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Littleton Wind Farm DAC will provide protection from shadow flicker by committing to curtailing turbines for all instances where shadow flicker effects are reported to occur at residential dwellings within 10 rotor diameters of the turbines. Shadow flicker occurrence will be identified following reports or complaints of shadow flicker from receptors within 10 rotor diameters of the turbines. A Complaints Investigation Procedure will be agreed with the Local Authority prior to the Proposed Development becoming operational, which will set out the steps to be followed in the event that shadow flicker related complaints are received. Once reports of shadow flicker have been validated (confirmed via software model that shadow flicker can occur at the receptor at the reported time), mitigation will be implemented for all instances of shadow flicker occurrence at that receptor. However, it should be noted that when the conditions for shut down due to shadow flicker are met, there is a short period of time before complete shutdown occurs, as the turbines gradually slow down and stop turning. This will depend on the reaction time of the shadow flicker control modules and the particular turbine type, as well as the rotational speed at which the turbine is stopping from, and is likely to be within the scale of several seconds to around a minute. Appendix 12-2 contains a list of times when each turbine could theoretically cause shadow flicker. These are given as an example of potential mitigation system inputs, and before any implementation a detailed review would be required for the key parameters such as final turbine locations and dimensions and detailed review of receptor rooms and windows.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM77	Chapter 15: Material Assets (to include Traffic and Transportation, Aviation and Telecommunications)	15.5.7.2: Operation	For each site access location, hedgerow trimming shall be carried out to the right and left of the proposed entrance in compliance with the Wildlife Act 1976 as amended, to achieve required minimum visibility in both directions. Hedgerows shall be maintained by the Proposed Development owner to ensure required visibility throughout the operational phase of the Proposed Development as part of the scheme's operation and maintenance arrangements.		
Decommissioning Phase					
MM78	Chapter 5: Population and Human Health	5.8.5.1: Mitigation Measures – Construction & Decommissioning	A Construction and Environmental Management Plan (CEMP) is included in Appendix 4.1, which details construction protocols and methodologies. This CEMP will be adopted and further developed in consultation with the local authority and other competent bodies prior to implementation. Furthermore, site investigation has been completed, and mitigation has been proposed as detailed in Chapter 8 – Land, Soils and Geology. Public safety is addressed by restricting access to the public in the vicinity of the site works during the construction and decommissioning stage. The construction site will be closed to the public for the 24-month construction period as well as the decommissioning period. This measure aims to avoid potential injury to members of the public as a result of construction activities. Specific mitigation measures for the borrow pit are outlined in Chapter 11, Noise and Vibration. Appropriate warning signage will be posted at the construction site entrance during both the construction and decommissioning phases, directing all visitors to the site manager. Appropriate warning signage shall be provided on public roads approaching site entrances and along haul		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			routes including clear signage relating to the development, both temporary and permanent will be provided for accessing the site. In relation to the TDR, extra safety measures will be employed when large loads are being transported, for instance, Garda escort will be requested for turbine delivery, and a comprehensive turbine delivery plan will be utilised to avoid potential effects on human safety for road users and pedestrians. A Construction Traffic Management Plan is included in the CEMP in Appendix 4.1 of this EIAR.		
MM79	Chapter 6: Biodiversity	6.10.4: Mitigation Measures During Decommissioning	Mitigation measures for the Proposed Wind Farm that will apply for the decommissioning phase relate to the protection of water quality (as outlined in Chapter 9 - Hydrology and Water Quality). Turbine foundations, access tracks and hardstand will be left in place and covered with peat/topsoil to revegetate at the decommissioning stage. It is considered that leaving the turbine foundations, access tracks and hardstand areas in-situ will cause less environmental damage than removing them. Grid connection infrastructure including the on-site substation and ancillary electrical equipment shall form part of the national grid and will be left in situ (as outlined in Chapter 4 – Project Description).		
MM80	Chapter 7: Ornithology	7.9.4: Mitigation Measure during the Decommissioning Phase of the Project	The same mitigation measures will apply for the decommissioning phase as for the construction phase. Turbine foundations and hardstands will be left in place and covered with local soil/topsoil to revegetate at decommissioning stage. It is considered that leaving the turbine foundations, access tracks and hardstand areas in-situ will cause less environmental damage than removing them. Grid connection infrastructure including the on-site substation and ancillary electrical equipment shall form part of the national grid and will be left in situ (as outlined in Chapter 4 – Project Description).		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Decommissioning operations will take place during the hours of daylight to minimise disturbances to roosting birds, or active nocturnal bird species. This in line with best practice recommendations for mitigation measures in regard to birds and wind farms as recommended by statutory bodies such as English Nature and the Royal Society for the Protection of Birds (Drewitt, A. L. & Langston, R. H., 2006). Turbines components will be broken up onsite prior to removal, and as such vegetation trimming requirements to facilitate turbine removal will be minimal (reduced in comparison to construction stage) or not required. Toolbox talks shall be held with construction staff on disturbance to key species during decommissioning. This will help minimise disturbance. Any re-instated habitats will include native species where possible to enhance diversity of birds. Turbine T08 and the section of internal access track between T06 and T08 will not be decommissioned during the non-breeding season (September 1st to February 28th). This will avoid effects during the non-breeding season on roosting hen harrier.		
MM81	Chapter 8: Land, Soils and Geology	8.7.4: Mitigation Measures during Decommissioning	Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some impacts associated with site reinstatement will be reduced by retaining infrastructure in-situ where feasible. Turbine foundations will remain below ground level and will be covered with overburden material to facilitate re-vegetation. Internal access tracks and hardstanding areas will also remain in-situ to minimise ground disturbance and associated environmental effects. The grid connection infrastructure, including substations and ancillary electrical equipment, will remain in place as part of the national grid infrastructure.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Retaining this infrastructure will avoid additional excavation and associated impacts such as sedimentation, erosion, dust, noise, traffic generation, and potential impacts on groundwater and surface water quality. Where removal of infrastructure is required by the relevant local authority, mitigation measures similar to those implemented during the construction phase will be employed to minimise environmental effects.. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures outlined above.		
MM82	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.5.3.1: Proposed Wind Farm	Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures will be implemented during the Decommissioning Phase.		
MM83	Chapter 10: Air Quality and Climate	10.5.1.3: Decommissioning Phase	While no likely significant effects have been identified in respect of air quality from the Proposed Development during the decommissioning phase, the same mitigation measures with respect to dust control and minimisation will be implemented. The proposed access tracks across the Site will be left in-situ and no mitigation measures are proposed. In terms of the underground cable and substation, these will also be left in situ and so no additional mitigation measures are proposed.		
MM84	Chapter 11: Noise and Vibration	11.5.3.1: Wind Farm Site	The noise impact for construction works traffic will be mitigated by restricting movements along access routes to the standard working hours and exclude working on Sundays, unless specifically agreed otherwise with the local authority. The decommissioning works, which will be of a lower impact than construction works, will be carried out in accordance with the mitigation policies and guidance required at the time of the works, and restricted to normal working hours, 07:00 - 19:00 hours Monday to Friday		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			and 07:00 - 13:00 on Saturdays in accordance with best practice at the time of the works.		
MM85	Chapter 11: Noise and Vibration	11.5.3.2: Grid Connection	For the decommissioning works associated with the grid connection, the pulling locations will be selected so they are at least 100m from adjacent properties. If the pulling location cannot be located sufficiently distant from housing, the pulling activity will be screened from the noise sensitive locations.		
MM86	Chapter 15: Material Assets (to include Traffic and Transportation, Aviation and Telecommunications)	15.5.7.3: Decommissioning	Mitigation measures adopted for project decommissioning will be in line with those identified for the construction phase of the Proposed Development. All decommissioning works will be carried out in accordance with a decommissioning plan to be agreed with the planning authority in advance of the decommissioning works. Traffic management measures identified will be included in the decommissioning plan for the wind farm.		
Monitoring					
MM87	Chapter 6: Biodiversity	6.10.2.2.1: Mitigation or Compensation of Habitat Loss	Dry Calcareous Grassland Translocation and Enhancement Monitoring and vegetation management such as removal of scrub and trees to maintain open calcareous grassland will be carried out by a qualified ecologist in years 1, 2, 3, 5, 10, 15, 20 and 30 of operation.		
MM88	Chapter 6: Biodiversity	6.10.2.2: Marsh Fritillary	Monitoring will be carried out by a qualified ecologist in years 1, 2, 3, 5, 10, 15, 20, 30, 35 of operation.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM89	Chapter 6: Biodiversity	6.10.3.2.1: Monitoring of Habitat Restoration and Recreation	Monitoring is required where translocation of the calcareous grassland, re-wetting and restoration of the cutover bogs, recreation of the hedgerows, re-planting of the woodlands will be conducted as mitigation/enhancement measures during the construction phase. As indicators to monitor good status and successional progress of these habitats, it is recommended to refer to the criteria, positive indicators and/or favourable conditions shown in the following guidelines. • 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. • Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013). Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report [pdf]. • Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. Irish Wildlife Manuals, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. • Miyawaki method for creating forests The monitoring years for each habitat are directed in the Biodiversity Enhancement Management Plan.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM90	Chapter 6: Biodiversity	6.10.3.2.2: Monitoring of Invasive Species	Invasive species will continue to be monitored by a qualified ecologist to ensure the eradication, generally, up to five years from the first-time treatment, and where required, the follow-up control will be implemented by a licenced specialist. The ISMP will be prepared to describe the further specific control plan.		
MM91	Chapter 6: Biodiversity	6.10.3.4.3: Operational Curtailment	Collision monitoring will be carried out for the first three years of operation, and an annual review at the end of each of these years will determine whether increased cut-in speeds should be implemented. If, following any of the initial three years of post-construction surveys, bat carcass searches indicate fatalities are occurring (refer below), increased cut-in speeds will be implemented. Alternatively, if it is found that the results of fatality searches reconfirm the level of bat activity at turbine locations remains low or low/moderate then curtailment will not be required. Collision monitoring will subsequently be undertaken in years 5, 10, 15, 20, 25 and 30 with further review after each monitoring period. If the requirement for curtailment is identified following the initial 3-year monitoring period, the following measures will be implemented: Increasing the cut-in speed above that set by the manufacturer can reduce the potential for bat/turbine collisions. A study by Arnett et al. (2011) showed a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s. Species with elevated risk of collision (Leisler's bat, soprano and common pipistrelle) in particular could benefit from increasing the cut-in speed of turbines, as dictated on a case-by case basis depending on the activity levels recorded at each turbine.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			If required based on operational monitoring results, cut-in speeds should be increased to 5.5 m/s during the bat activity season (April-October) or where temperatures are optimal for bat activity, from 30 minutes prior to sunset and to 30 minutes after sunrise at turbines where surveillance shows high bat activity levels for High and Medium-Risk species and/or if bat carcasses are recorded. The duration required depends on the level of mitigation required for each individual turbine i.e. a full bat activity season or only spring and autumn (duration will be determined by the first year of surveillance). Cut-in speed restrictions will be operated according to specific weather conditions: When the air temperature is above approximately 10°C at nacelle height (as bat activity is reduced below this temperature) and; Where the wind speed is above 5 - 6.5m/s at nacelle height. It has been shown that curtailing the operations of wind turbines at low wind speeds can reduce bat mortality dramatically, particularly during late summer and the early autumn months. Due to the considerable unnecessary down time resulting from the “blanket curtailment” and the advances in smart curtailment a focused curtailment regime is further proposed as an optional means of achieving the level of curtailment indicated as required by operational monitoring. This will focus on times and dates, corresponding with periods when the highest level of bat activity occur within the Site. This includes the use of the SCADA (Supervisory Control and Data Acquisitions) operating system (or equivalent) to only pause/feather the blades below a specified wind speed and above a specified temperature within specified time periods. Post-construction collision monitoring surveys will be undertaken for the first three years of operation to confirm if curtailment is required in line		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			with post-construction activity levels. The post construction surveys will be used to update the curtailment regime (blanket curtailment) designed around the values for the key weather parameters and other factors that are known to influence collision risk. This will include all of the following: Wind speed in m/s (measured at nacelle height) Time after sunset Month of the year Temperature (°C) Precipitation (mm/hr)		
MM92	Chapter 6: Biodiversity	6.10.3.4.6: Monitoring of Mitigation Measures	The success of the implemented mitigation measures for bats on the project will be monitored for a period of no less than three years post construction and appropriate measures taken to enhance these if and where required.		
MM93	Chapter 6: Biodiversity	6.10.3.4.7: Bat Fatality Monitoring	Whilst no significant residual impacts on bats are predicted, the proposed development could provide an opportunity to gain baseline data on bat/turbine interaction and the scheme will be monitored for bat fatalities for the first three years of operation (post construction surveys) and subsequently in years 5, 7, 10, 15, 20, 25 and 30 as part of the additional monitoring schedule.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			The primary components of the bat mortality study will be as follows (whether curtailment is in place or not): a) Carcass removal trials to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance of published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results. No turbines which are used for carcass removal trials will be used for subsequent fatality monitoring. b) Turbine searches for fatalities will be undertaken following best practice in terms of search area (focusing on the hard standing) (NatureScot, 2021) and at intervals selected to effectively sample fatality rates as determined by carcass removal trials in (a) above. c) A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any). d) Recorded fatalities will be calibrated against known predator removal rates to provide an estimate of overall fatality rates.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM94	Chapter 6: Biodiversity	6.10.3.5: Marsh Fritillary	Monitoring surveys and maintenance works for the translocated habitats for marsh fritillary will be implemented by a qualified ecologist to ensure that the mitigation measures during the construction phase are successful.		
MM95	Chapter 6: Biodiversity	6.10.3.6: Herpetofauna	Monitoring surveys will be conducted in years 1, 2, 3, 5, 10, 15, 20, 30 and 35 post construction. In the early operational phase, the establishment of suitable vegetation, such as swamps of sedges, bulrush, common reed within and around ponds will be monitored.		
MM96	Chapter 7: Ornithology	7.9.3.1: Standard Post Construction Avian Monitoring	A post construction monitoring programme will be implemented at Littleton in order to confirm the efficacy of the mitigation measures; the results of this will be submitted annually to the competent authority and NPWS. Published guidance on assessing the impacts of wind farms on birds recommends the implementation of an agreed post-development monitoring programme as a key mitigation measure (Drewitt and Langston, 2006). In addition, published recommendations on swans and wind farms (Rees, 2012) suggests that systematic post construction monitoring; adapted to quantify collision, barrier, and displacement, be conducted over a period of sufficient duration to allow for annual variation or in combination effects. The following individual components will be carried out: 1. Fatality Monitoring (to be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction)- A comprehensive fatality monitoring programme will be undertaken following published best practice (Smallwood et al., 2010; Fijn et al., 2012 and Grunkorn, 2011); the primary components are as follows:		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			e) Initial carcass removal trials to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance to published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results (Smallwood et al., 2010). No turbines which are used for carcass removal trials will be used for subsequent fatality monitoring. Carcass removal trials will be continued for the duration of fatality searches. f) Turbine searches for fatalities will be undertaken following best practice (Fijn et al., 2012 and Grunkorn, 2011) in terms of search area (minimum radius hub height of 81m) and at intervals selected to effectively sample fatality rates based on carcass removal rates (1 per month). To be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring to be agreed with NPWS. g) A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any). h) Recorded fatalities will be calibrated against known predator removal rates to provide an estimate of overall fatality rates. Reports will be submitted to the competent authority and NPWS following each round of surveys.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			2. Flight Activity Survey (to be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction) - A flight activity survey will be undertaken during the summer and winter months to include both vantage point and hinterland surveys as Per SNH (2017)/NatureScot (2025a) guidance: i) Record any barrier effect i.e. the degree of avoidance exhibited by species approaching or within the Site (Drewitt and Langston, 2006). Target species to be all raptors and owls, all wild goose and duck species, all swan species, and all wader species. j) Record changes in flight heights of key receptors post construction. Reports will be submitted to the competent authority and NPWS following each round of surveys. This survey is to be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS. 3. Monthly Wildfowl Census (to be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction). A monthly wildfowl census, following the methods utilised for the baseline survey, is to be repeated on a monthly basis during the winter period. This aims to: k) Assess displacement levels (if any) of wildfowl such as swans post construction l) Assess overall habitat usage changes within the vicinity of the Proposed Development post construction.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			This survey will be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS. Reports will be submitted to the competent authority and NPWS following each round of surveys. 4. Breeding Bird Survey (to be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction). A breeding bird survey (moorland breeding bird and Common Bird Census), following methods used in the baseline survey to be repeated yearly between early April to early July. This aims to: m) Assess any displacement effects such as those recorded on breeding birds. Overall density of breeding birds to be annually recorded. 5. Breeding Wader Survey (to be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction). A breeding bird survey, following methods used in the baseline survey to be repeated yearly April-May-June. Both of the above surveys are to be conducted during years 1, 2, 3, 5, 10, 15, 20 and 30 post construction to allow for annual variation and cumulative effects. Dependant on results further monitoring requirements will be agreed with NPWS.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
MM97	Chapter 7: Ornithology	7.9.3.2: Monitoring of Potential Recreational Effects and Adaptive Mitigation	Monitoring of potential recreational effects on breeding and wintering waders and waterbirds will be undertaken in each monitoring year (years 1, 2, 3, 5, 10, 15, 20 and 30 post construction) to monitor the effectiveness of mitigation measures and to identify any emerging patterns of disturbance and recreational user behaviour in order to inform adaptive mitigation. Adaptive mitigation will include temporary/seasonal closure of trails to recreational users where evidence of significant disturbance to breeding waders/waterbirds is observed. It will also include identification of areas and points where recreational users habitually stray towards breeding or wintering wader/waterbird habitats, which will trigger measures such as additional fencing and signage. In parallel with the monitoring detailed above, annual breeding season surveys of breeding curlew using the site will be undertaken in all years during the operational phase, and will similarly feed back into the adaptive mitigation regime as required.		
MM98	Chapter 9: Hydrology, Hydrogeology and Water Quality	9.6.1.1: Proposed Wind Farm	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of the commencement of any works and will be included in the CEMP. Regular inspections of all installed drainage systems will be undertaken, especially before and 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 sediment levels at dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			During the construction phase field testing (visual, supplemented with pH, electrical conductivity, temperature, dissolved oxygen and turbidity monitoring), sampling and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events (i.e. weekly, monthly and event-based). The data will be processed and analysed and works will cease if elevated turbidity concentrations are recorded. In this event, all upstream silt traps and drainage routes will be inspected to identify the cause of the elevated turbidity levels. Works will not recommence until any issues have been resolved and the turbidity concentrations have returned to background concentrations.		
MM99	Chapter 11: Noise and Vibration	11.6.1.1: Wind Farm Site	During the construction phase noise monitoring will be undertaken at the closest properties south (R303) and east (R302) of the borrow pit, as shown in Figure 11.3, to confirm that the noise criteria are met at the closest properties.		
MM100	Chapter 11: Noise and Vibration	11.6.2.1: Wind Farm Site	During the operational phase of the wind farm, should any complaints arise following commissioning, the wind farm operator will undertake noise monitoring at the wind farm. The noise monitoring methodology will be agreed with the Local Authority and based on best practice. In addition, the operator will adhere to any other obligations in relation to operational noise detailed in the wind farm planning conditions. Should any non compliance be identified, a mitigation strategy will be developed and implemented followed by an additional monitoring campaign to verify its effectiveness.		
MM101	Chapter 11: Noise and Vibration	11.6.2.1.1: Operational Amplitude Modulation and Tonal Noise	Should complaints be received relating to amplitude modulation and/or tonal noise, a survey would be carried out. Criteria for the assessment of the significance of these effects will be based on best practice and agreed with the Local Authority.		



Monitoring Measures (MM) Ref. No.	EIAR Chapter	Section	Mitigation Measure	Audit Result	Action Required
			Should the survey indicate a significant level of amplitude modulation and/or tonal noise, mitigation measures will be implemented. At the EIAR stage, it is not possible to specify what those mitigation measures will be, as it will depend on the sources of the amplitude modulation and/or tonal noise as well as its magnitude. However, steps which will be considered will include: - Working with the turbine manufacturer to install physical mitigation systems - Developing and implementing control system changes which apply specific operational modes as required.		
MM102	Chapter 14: Archaeological, Architectural and Cultural Heritage	14.6: Monitoring	Archaeological monitoring and any required site investigations undertaken during the construction phase will be carried out under the appropriate archaeological licences and in accordance with the requirements of the National Monuments Service (NMS). All works will comply with approved method statements and reporting requirements associated with the relevant licences.		



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