



APPENDIX 10

*Mitigation & Monitoring
Measures*

1.

SCHEDULE OF MITIGATION & MONITORING PROPOSALS

All mitigation and monitoring measures relating to the pre-commencement, construction, operational and decommissioning phases of the Proposed Project are set out in the NIS and associated appendices.

All mitigation which will be implemented during the various phases of the Proposed Project to protect the Natura 2000 sites and their qualifying interests are presented in Table 1-1 below.

All monitoring measures which will be implemented during the pre-commencement, construction, operational and decommissioning phases of the Proposed Project are outlined in Table 1-2. All monitoring measures were set out in the NIS and associated appendices. 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 Project to ensure all the 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 mitigation and monitoring measures, planning 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 prior to the commencement of development. Similarly the decommissioning plan will be updated and agreed with the local authority prior to the commencement of any decommissioning works.

1.1

NIS Mitigation Measures

Table 18-1: Schedule of Mitigation Measures

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Audit Result	Action Required
Construction Phase					
MM1	Clear felling of Coniferous Plantation	Section 6.2.1.1 of the NIS	Mitigation measures will be implemented wherever clear-felling is planned. The objective will be to mitigate the risk of mobilising suspended solids and nutrients into drains and surface water courses, as follows in the design stage: ➤ Small felling areas (<25ha), sequencing of felling to avoid intense felling in one subcatchment. ➤ Limiting felling areas and sequencing the felling to avoid intense felling (>25ha) in one subcatchment. ➤ Machine combinations (i.e. handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance. ➤ Sediment/Silt traps will be strategically placed downslope within plantation drains near watercourses before ground preparation. The purpose is to slow water flow, increase residence time, and allow settling of silt. No direct discharge of such drains to water courses will occur. ➤ Crossing of watercourses away from bridges and culverts will not be permitted. Checking and maintenance of roads and culverts will be on-going throughout felling activity. No tracking of vehicles through watercourses will occur. Existing interceptor drains will also not be disturbed. ➤ Clay, soil and silts will be removed from roads during wet periods and dust will be suppressed during dry spells. ➤ Main drains that accommodate the discharge from collector drains will include rock armour, as required, where there are steep gradients. ➤ On steep slopes and where felling inside the 50-metre buffer is required, it will be necessary to install double or triple sediment traps. All drainage channels will taper out before entering the buffer zone. This ensures that discharged water fans out over the		

			buffer zone before entering the aquatic zone, with sediment filtered out by ground vegetation within the zone. ➤ Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the borrow pits. ➤ Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled. ➤ Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors. ➤ Extraction tracks near drains need to be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground. Culverts on drains exiting the Site will be unblocked. ➤ Brash mats will be used to support vehicles on soft ground, reducing soil erosion and avoiding the formation of rutted areas. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion, extraction will be suspended during periods of high rainfall. ➤ Timber will be stacked in dry areas and outside a 50-metre buffer. Check dams will be emplaced on the downgradient side of timber storage/processing sites. ➤ Works will not be conducted during significant rainfall events in order to minimise entrainment of exposed sediment in surface water runoff. ➤ Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when tree-felling operations have been completed. ➤ Refuelling or maintenance of machinery will not occur within 100 m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required. ➤ A permit to refuel system will be adopted. The following items will be conducted in relation to drain inspection and maintenance during pre-felling inspections and after:		
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			➤ Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines (i.e., hot spot areas). ➤ Inspections of plant and machinery will be conducted prior to any works to assure all are in good condition. ➤ Inspection of drainage ditches and outfalls. During pre-felling inspections, the main drainage ditches will be identified. The pre-felling inspection will be conducted during rainfall events. ➤ Following tree felling, all main drains will be inspected to ensure that they are functioning. ➤ All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall. ➤ Surface water monitoring will be conducted as outlined in Appendix 6 (SWMP).		
MM2	Earthworks – avoidance and rainfall	Section 6.2.1.1 of the NIS	Works areas will be kept at least 50 m from water courses to the extent possible. The proposed setback distance/buffer will serve to avoid direct physical damage to watercourses, entry of suspended sediments from earthworks and drainage systems by ending drain discharges outside the buffer and allowing water to filter via percolation. The key areas of the Proposed Project footprint are all located outside of this buffer zone with the exception of some short sections of existing road upgrades and new roads, proposed watercourse crossings and existing watercourse crossings requiring upgrading. There will be no stockpiling of excavated material within 50 m of any natural water courses or within 10 m of any drainage features on the Site. Due to the overland flow observed in the fields around T12 and the proximity of the area to the River Licky, there will be no local stockpiling of material around T12. This exclusion zone is outlined in Figure 6-1 below. Risks and effects of earthworks are made greater during storm events. Hence, earthworks will not be conducted during significant storm events. The works programme for the entire construction stage of the development will take account of weather forecasts, notably predicted rainfall. Large excavations and movements of soil/subsoil or vegetation stripping will be scaled back or suspended if heavy rain is forecast. Threshold rainfall values will serve to guide		

			decisions to suspend works, visually and/or judged from weather forecasting, by either of the following: ➤ High-intensity rainfall events, >10 mm/hr. ➤ Heavy frontal rainfall lasting most of the day, >25 mm in a 24-hour period. ➤ More than half the monthly average rainfall over 7 days. The ECoW is responsible for the checking and communication of weather forecasts. Prior to suspending works for climatic reasons, the following control measures will be completed: ➤ Open excavations will be secured. ➤ Temporary or emergency drainage will be provided to prevent back-up of surface runoff in work areas. ➤ Working for up to 12 hours after heavy rainfall events will be avoided to ensure drainage systems are not overloaded. Decisions are subject to visual inspection and judgement by ECoW. The intent and objective is to control erosion, avoid collapses of embankments, and limit the mobilisation and transport of sediments		
MM3	Earthworks – drainage and sediment controls	Section 6.2.1.1 of the NIS	Key mitigation by design measures that will be implemented comprise source controls, in-line controls and treatment systems, as follows: ➤ Source control measures cover working areas, staging areas and stockpiles. Methods that will be employed are diversion drains, flume pipes, sandbags, oyster bags filled with gravel, and filter fabrics. Flexibility to adapt methods will be required based on location-specific conditions, as judged by supervising engineers from visual inspection. ➤ In-line controls involve settling of suspended sediments and particulate organic matter with the use of silt fences, sand or oyster bags, weirs, baffles, and check dams. Flow limiters and sump pumping systems may be employed where needs arise in order to maintain the hydraulic functioning of the existing drain system. ➤ Treatment systems involve sediment traps and temporary sumps/attenuation ponds. ➤ Working areas, staging areas and stockpiles will be covered. Diversion drains, flume pipes, sandbags, silt fences, and filter fabrics will be employed. Flexibility to adapt methods will		

			be required based on location-specific conditions, as judged by the ECoW from visual inspection. ➤ In-line controls involve settling of suspended sediments and particulate organic matter with the use of silt fences and check dams. Flow limiters and sump pumping systems may be employed where needs arise in order to maintain the hydraulic functioning of the existing drain system. ➤ Treatment systems involve sediment traps and temporary sumps/attenuation ponds. ➤ If discharge water fails to be of a high quality during regular inspection, then a filtration treatment system will be used to filter discharge water before release to water courses. This applies for the entire construction phase. Particular care will be taken during any such application near receptor water bodies as certain chemical used for flocculation can affect the pH of watercourses. Manufacturers will be consulted prior to the potential use of filtration treatment systems, to ensure the application will not have negative effects on receptor water quality. ➤ For discharges near water courses, within the 50 m buffer, double silt fences will be employed. These will be inspected, maintained, and remain in place throughout the entire construction phase. ➤ Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, the majority of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats. Sediment entrapment mats, consisting of coir or jute matting, will be placed at the silt bag location to provide further treatment of the outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. Sedimats will extend the full width of the outfall to ensure all water passes through this additional treatment measure. Level spreaders will be designed for each outfall. Stockpiles will be progressively covered or sealed with the excavator bucket during stockpiling, and covers will be secured once a stockpile has reached capacity. It is proposed that excavated spoil will be used for landscaping where required. The excess material will be used for backfilling the borrow pits and roadside linear berms within the Proposed Wind Farm site. Excavated ‘clay pan’ material will only be used for the backfilling of borrow pits. Construction works will be sequenced to ensure borrow pit(s) will be available for backfilling before ‘clay pan’ material is excavated.		
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			The following recommendations and best practice guidelines for the placement of spoil within the proposed management areas will be adhered to during the construction of the Proposed Project: ➤ The landscaping areas will be developed in a phased approach, with the spoil being removed and temporarily stockpiled within a defined area while the borrow pits are being extracted. The stockpiled spoil will be deposited into the void borrow pit upon completion of extraction activities and the exercise will continue within the void until it cannot accommodate any further spoil. ➤ The placement of stockpiled spoil will be restricted to a maximum height of 1.0 m, subject to confirmation by the Geotechnical Engineer. ➤ Stockpiles will be compacted to reduce air voids and reduce the migration paths for infiltration by precipitation, and the surface of the placed spoil is shaped to allow efficient run-off of surface water where practical. This will ensure stability of the placed spoil and reduce the amount of potentially silt laden surface water runoff from these areas. ➤ Inspection of stockpiles, reinstated borrow pits, and landscaping areas will be made by the ECoW through regular monitoring of the works. The appointed contractor will review work practices at these areas when periods of heavy rainfall are expected so as to prevent excessive silt laden water runoff from being generated. ➤ An interceptor drain will be installed upslope of the filled borrow pit areas to divert any surface water away from these areas where necessary. ➤ Excavated material will be used to reinstate the proposed borrow pits once the required volume of stone has been extracted. Silt fences and double silt-fences will be emplaced down-gradient of the back-filled borrow pits and will remain in place throughout the entire construction phase, or until reseeded has been established to a sufficient level. ➤ The surface of the deposited spoil will be profiled to a gradient and vegetated or allowed to vegetate naturally as indicated by the Project Ecologist. ➤ Daily inspections of installed drainage systems will be undertaken, especially after heavy rainfall, to check for damage and blockages, and ensure there is no escape or build-up of standing water in parts of the systems where it is not intended.		
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			➤ Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. Checks will be conducted on a daily basis. ➤ Surface water quality monitoring: Monitoring will be performed as described in the Surface water management plan.		
MM4	Watercourse Crossing Installation and Upgrades	Section 6.2.1.1 of the NIS	➤ All new stream crossings within the Proposed Wind Farm site will be bottomless-box culverts or clear-span crossings. Existing banks will remain undisturbed. Abutments will be constructed from precast units combined with in-situ foundations. ➤ All guidance / mitigation measures required by the OPW and/or the Inland Fisheries Ireland (IFI) is incorporated into the design of the proposed crossings; ➤ All drainage measures will be installed in advance of the works; ➤ Plant and equipment will not be permitted to track across the watercourse; ➤ Once the foundations have been completed at both sides of the watercourse, the pre-cast concrete box culvert will be installed using a crane and there will be no contact with the watercourse; ➤ Where a box culvert is installed in sections, the joint will be sealed to prevent granular material entering the watercourse; ➤ During near-stream construction works, double-row silt fences will be emplaced immediately downgradient of work areas for the duration of activity. ➤ In accordance with IFI (2016), any near-stream works will be undertaken from July to September inclusive, i.e., the relatively drier summer period. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Any deviation that may be temporarily necessary will be done in discussion with the IFI. ➤ All new stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent. ➤ Underground cabling routes within the Site (e.g., from turbines) will follow new or existing access roads, and cables will pass within the structure of the road and associated culverts.		

MM5	Cable Works Installations	Section 6.2.1.1 of the NIS	Cable trenches will be constructed in short, controlled sections, minimising the amount of ground disturbed at any one time. This minimises the potential for drainage runoff and silt or suspended solids to enter water courses. Each short section of trench is excavated, ducting installed and bedded, and backfilled with the appropriate materials, before work on the next section commences. In-stream works will be avoided in all cases. Detailed method statements will be prepared and implemented by contractors, which will incorporate measures to protect watercourses from potential discharges of sediment, drilling fluids, fuel spills. ➤ Excavated material is stored on the up-gradient side of the trench and is temporarily sealed/smoothed over, using the back of the excavator. ➤ Material stockpiles should be stored at least 15 m back from drains and watercourses on level ground with a silt fence inserted at the base to prevent runoff. ➤ Silt fences will be installed temporarily downgradient of the cable trench works area. ➤ Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Project, will be transported to the borrow pits or used for landscaping and reinstatement elsewhere on-site or nearby, licenced waste facility. ➤ Trench supports will be installed, or the trench sides will be benched or battered back where appropriate, and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse. ➤ Ground water and surface water accumulating in the base of trenches will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids.		
MM6	Hydraulic Effects of Drainage	Section 6.2.1.1 of the NIS	The Proposed Project footprint has been reduced to a minimum and interceptor drains will be shallow which serves to reduce the relative risk of drainage effects.		
MM8	Dewatering and Pumping from Open Excavations	Section 6.2.1.1 of the NIS	Pumping of water from excavations will be necessary, so localised and temporary groundwater lowering cannot be avoided if or where it is implemented. Quantities will be small given the generally low-permeability characteristics of both the till and the bedrock groundwater flow system. Additionally, excavations will remain relatively shallow and most turbine bases and proposed borrow pits are located in elevated areas near hilltops. Pumping and water		

			management is a matter of routine for contractors familiar with this type of development and activity. No direct discharges to streams will be permitted, and this will be enforced by the ECoW. All pumped water must be led and pass through a suitably sized settling basin prior to diffuse discharge to ground or a drain away from the excavation location. The pumped water, which contains suspended solids, will be collected in sumps, pumped out, and led to associated settling basins or ponds which will be established in the first stage of construction. The purpose is to facilitate the settling out of fine sediments prior to subsequent discharge. The water will be pumped and discharged periodically, on as-needed basis. It is not a continuous process, and quantities pumped will vary from location to location, and seasons. Best practice methods will be applied to prevent accidental pollution of the water in open excavations as described in the next section. If or where required, additional specialist water treatment measures will be employed to ensure that no deterioration in downstream water quality occurs. Other relevant measures are: ➤ Interceptor drains will be established around the perimeter of borrow pits. These drains will divert any surface water away from the borrow pits and hence prevent water from ponding and lodging during construction (and also when reinstated). ➤ Settling basins have been designed at the lower side/outfall location of the borrow pits. No groundwater level impacts are predicted from the construction of the Proposed 110kV Underground Cabling Route due to the very shallow nature of the excavations (i.e. 0 – 1.3 m).		
MM9	Accidental Spills, Leaks or Other Releases	Section 6.2.1.1 of the NIS	The prevention of, and responses to, accidental spills and leaks of fuel and other chemicals will be implemented as follows; ➤ The highest standards of site management will be maintained, with the utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during construction;		

			➤ An Emergency Response Plan for accidental spillages will be implemented. All construction staff will be familiar with the emergency procedures and the use of the relevant equipment; ➤ The ECoW will oversee the pollution prevention measures agreed for the Site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures. ➤ Where possible, refuelling will occur at an off-site controlled fuelling station. ➤ On-site refuelling will be undertaken using an offsite fuel truck, with spill kits readily available for accidental leakages or spillages; ➤ Refuelling will be undertaken by designated, suitably trained personnel only; ➤ Refuelling of construction machinery will take place using drip trays at all times; ➤ All plant and machinery will be serviced before being mobilised on-site and will be regularly inspected and maintained to minimise the risk of leaks and spillages; ➤ Maintenance of construction vehicles or plant will, where practicable, be undertaken off-site; ➤ Spill response kits will be available at all active work areas, refuelling locations, concrete works and construction compounds, and personnel will be trained in their use; ➤ Fuels stored on-site will be minimised. Storage areas, where required, will be bunded appropriately for 110% of the fuel storage volume for the time period of construction and fitted with a storm drainage system and an appropriate oil interceptor; ➤ All waste tar material arising from the excavation of the Proposed 110kV Underground Cabling Route cabling trench and resurfacing of roads will be removed off-site and taken to a licenced waste facility; ➤ An emergency response plan for the construction phase to deal with accidental spillages will be in place. ➤ Hydrocarbon interceptors will be installed at the substations and construction compounds.		
MM10	Release of Cement-Based Products	Section 6.2.1.1 of the NIS	➤ No batching of wet-cement products will occur on-site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place; ➤ Where possible, pre-cast elements for culvert and watercourse crossings will be used; ➤ No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;		

			➤ Where concrete is delivered on-site, only the chute need 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 is to be directed to lined, cement washout ponds before being removed from the Site and discharged at a suitable licensed facility; ➤ The washout ponds will be covered when not in use to prevent rainwater collecting. ➤ Weather forecasting will be used to assist in planning large concrete pours, and large pours will be avoided where prolonged periods of heavy rain are forecast.; and, ➤ Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event; and ➤ At proposed turbine foundations, sand blinding, DPM, and lean-mix blinding are used to vertically contain the concrete. While the concrete is contained laterally by temporary/permanent shuttering. The concrete cures within 72hrs. ➤ Risks of pollution will be further reduced as follows: ➤ Concrete will not be transported around on-site in open trailers or dumpers to avoid spillage while in transport. ➤ Arrangements for concrete deliveries on-site will be discussed with suppliers before work starts, routes will be confirmed, and on-site washouts will be prohibited, and emergency procedures will be discussed. ➤ Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted on-site. ➤ Excavations will be sufficiently dewatered before concreting begins, and dewatering will continue while concrete sets. ➤ Covers will be used on freshly placed concrete to avoid the surface washing away in heavy rain. ➤ Any potential, small surplus of concrete will be disposed of after completion of a pour in suitable locations away from any watercourse or sensitive habitats.		
MM12	Wastewater Management	Section 6.2.1.1 of the NIS	Staff welfare facilities will be provided at the construction compounds within the Site. Sealed storage tanks will be used. These will be collected regularly and brought offsite for disposal by authorised means (permitted wastewater collector) to a wastewater treatment plant. It is not proposed to treat wastewater on-site.		

			➤ During the construction phase, a self-contained port-a-loo with an integrated waste holding tank will be used at each of the site construction compounds (and at the Proposed Grid Connection as required), maintained by the providing contractor, and removed off-site on completion of the construction works; ➤ Water supply for the site office and other sanitation will be brought to Site and removed after use from the Site to be discharged at a suitable off-site treatment location; and, ➤ No water or wastewater will be sourced on the Site, nor discharged to the Site.		
MM13	Otter	Section 6.2.1.2 of the NIS	The following mitigations will be in place with regard to construction works within the Site: ➤ A pre-commencement survey for otter will be undertaken within 150m upstream and downstream of the proposed new watercourse crossings and crossing upgrades that are required within the Site in advance of commencement of works. ➤ If a holt is found within 150m of construction areas, the works will be undertaken in line with TII (2006) and if a potential for disturbance is identified, these works will not be undertaken until a derogation licence is obtained. The requirement for a pre-construction survey does not represent a lacuna in the survey assessment but is fully in line with industry best practice. The function of the survey will be to assess any changes in baseline conditions since the time of undertaking the baseline surveys.		
Operational Phase					
MM14	Replacement of Natural Surfaces	Section 6.2.2.1 of the NIS	Risk of a significant increase in water quantity within watercourses and, therefore, flooding is minimised by using an attenuated surface water drainage network.		
MM15	Maintenance Works	Section 6.2.2.1 of the NIS	➤ Daily Visual Inspections ➤ Continuous Turbidity Monitoring ➤ Monthly Laboratory Analysis ➤ Field Monitoring		

MM16	Decommissioning	Section 6.2.3 of the NIS	The same mitigation to prevent adverse effects as a result of water quality deterioration resulting in impacts to associated aquatic fauna and disturbance effects to fauna during construction will be applicable to the decommissioning phase.		
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NIS Monitoring Measures

Table 18-2 Schedule of Monitoring

Ref. No.	Reference Heading	Reference Location	Mitigation Measure	Frequency	Reporting Period	Responsibility
Construction, Operational and Decommissioning Phase						
MX1	Operational phase water quality monitoring	Section 6.2.2.1 of the NIS	Maintenance works will be subject to monitoring measures which will include: > Daily Visual Inspections > Continuous Turbidity Monitoring > Monthly Laboratory Analysis > Field Monitoring	Daily - Monthly	Monthly	ECoW/Project Hydrologist

