



APPENDIX 6-6

FRESHWATER PEARL MUSSEL MANAGEMENT PLAN

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1. INTRODUCTION

1.1 Preamble

The purpose of this Freshwater Pearl Mussel Management Plan (FPMMP) is to set out the measures that will be implemented, during the construction, operation and decommissioning of the Proposed Project, to avoid, minimise and monitor any potentially significant effects on the Freshwater Pearl Mussel (hereafter referred to as 'FPM') and its supporting habitat, in this case the River Licky, which makes up part of the 'River Blackwater (Cork/Waterford) Special Area of Conservation (SAC)'. As discussed in Section 4.5 of Appendix 6-3: '*Aquatic Baseline Report*' (hereafter referred to as 'the ABR') of this EIAR, stage 1 & 2 FPM surveys were carried out in four sections of the River Licky, a known FPM watercourse, which were informed by National Parks and Wildlife Service (NPWS) historical FPM data and positive eDNA results for FPM as discussed in Section 4.2 of the ABR. A total of 127 live freshwater pearl mussel were recorded during the surveys, with an additional 2 dead shells recorded throughout the survey.

FPM is a highly threatened species and are critically endangered in Ireland. Being an extremely pollution sensitive species, sedimentation and enrichment of FPM supporting habitat has led to a marked decline in freshwater pearl mussel nationally, with the NPWS' most recent Article 17 Species Conservation Assessment published in 2025 estimating a population of 6,577,535–7,313,879 mature individuals, a dramatic decrease from the 2000-2006 Article 17 report which estimated a population of approximately 12 million mature mussels¹. Resultantly, the future prospects for the FPM in Ireland are poor, with the assessment of the population at the end of the most recent Article 17 reporting period stating the overall assessment of conservation status was 'Bad' and that the trend in conservation status was 'deteriorating'. Threats to FPM primarily include agricultural run-off, drainage of watercourse which alters natural flows, modern commercial forestry practices, urban and domestic wastewater leaks as well as development and infrastructure. As such, the Proposed Project has the potential to have significant effects on the SAC population of FPM in the River Licky in the absence of mitigation.

The protection of FPM and it's supporting habitat will largely rely on sound hydrological protection measures, such as best practice drainage design, pollution and sedimentation control measures, working methods, buffer zones and timing restrictions as has been set out within the EIAR. The aim of these measures is to prevent potential threats to the FPM at the source. This document does not intend to introduce any further mitigation measures which have not already been proposed within Chapter 4: '*Description of the Proposed Project*', Chapter 6: '*Biodiversity*', Chapter 8: '*Land Soils & Geology*' and Chapter 9: '*Hydrology & Hydrogeology*' of the EIAR, as well as their associated appendices, but instead compiles them into one convenient management plan for contractors to adhere to during the construction, operation and decommissioning phases of the Proposed Project. The prescription of the mitigation measures included throughout this FPMMP have been informed by Atkinson et al. (2023) and the Site Specific Conservation Objectives relating to FPM for the River Blackwater (Cork/Waterford) SAC. This FPMMP shall be read in conjunction with the EIAR, NIS and planning application drawings. The FPMMP may require updating and revision throughout the construction period.

Triggers for amendments to the FPMMP will include:

- Response to any specific requirements arising from conditions attached to a grant of planning permission;
- Where alternative, or more efficient mitigation measures become available;

¹ '*The Status of EU Protected Habitats and Species in Ireland – Species Assessment*', National Parks and Wildlife Services (2025); available at: <https://www.npws.ie/sites/default/files/publications/pdf/article-17-report-2025-volume-3.pdf>

- When there is a perceived need to improve performance in relation to protection of FPM and its associated habitat;
- As a result of changes in environmental legislation and/or guidance applicable and relevant to FPM and the Proposed Project;
- Where the outcomes from auditing establish a need for change;
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident occurring that necessitates an amendment.

Should amendments be required, these shall be agreed in writing with the local authority prior to the implementation of any measures.

1.2

Statement of Authority

This document was prepared by Eoin McCarthy with support from Michéal Cahill, both of MKO.

Eoin is a Project Director with McCarthy O'Sullivan Ltd. with over 15 years of environmental consultancy experience. Eoin holds B.Sc. (Hons) in Environmental Science from NUI, Galway. Since joining MKO in 2011, Eoin has been involved as a Graduate, Assistant and Project Environmental Scientist on a significant range of energy infrastructure, tourism, waste permit, flood relief scheme and quarrying projects. He has overseen some of the largest SID wind energy in Ireland in that time.

Michéal Cahill is an Environmental Scientist with MKO with over 2 years of experience in environmental consulting. Michéal holds a first-class honours degree in Environmental Science at University of Galway and was awarded the Professor Emer Colleran Medal for his academic achievements. Michéal has experience in the preparation and review of Environmental Impact Assessment Reports for both offshore and onshore wind farm projects, as well as aiding in the research and design phase of a pumped hydroelectric storage plant. Michéal's key strengths and areas of expertise are in environmental impact assessment, proficiency in geographic information systems and ecology. Michéal is involved in the preparation and revision of a variety of reports for a range of energy infrastructure projects.

This plan has also benefited from input and review by Niamh Rowan and Aran von der Geest Moroney (authors of the ABR), as well as Pascal Sweeney (reviewer of the ABR). Niamh and Aran are both of MKO, whereas Pascal is a consultant ecologist with Sweeney Consultancy.

This plan also benefits from input by Henning Moe, Colin Fitzgerald and Monika Kabza (authors of Chapter 9 and design of the proposed drainage plan for the Proposed Project), all of MKO.

Niamh Rowan and Aran von der Geest Moroney are both aquatic ecologists with extensive experience in undertaking ecological surveys and assessments for large-scale infrastructural projects such as wind farms, railways, roads and flood relief schemes.

Henning Moe is a trained hydrogeologist and registered professional geologist (P.Geo.). Firmly grounded in field-related aspects of geology and hydrogeology, Henning has more than 30 years of experience planning, implementing and managing a wide range of water resources projects involving groundwater exploration and management, environmental risk assessment and monitoring, and modelling.

Colin Fitzgerald is a Senior Environmental Geologist at MKO with over 12 years of experience in geological and environmental consulting. This experience can be categorised into the disciplines of contaminated land, hydrology, and mineral resources. Colin completed his undergraduate degree (B.Sc. Hons.) in geology from University College Cork and completed a P.G. (Dip.) in environmental engineering from Trinity College Dublin.



Monika Kabza is a Chartered Hydrogeologist (PGeo, EurGeol) with over 16 years of professional experience in groundwater resource assessment, environmental consultancy, and infrastructural development projects across Ireland. She holds an MSc (Hons) in Groundwater Engineering from the AGH University of Science and Technology in Krakow, Poland, and is a professional member of the Institute of Geologists of Ireland and the International Association of Hydrogeologists (Irish Group).

2. SITE AND PROPOSED PROJECT DETAILS

2.1 Proposed Site Location

The Proposed Project is made up of two distinct elements, the Proposed Wind Farm and the Proposed Grid Connection. The Site is located within a rural setting in southwest Waterford, approximately 5km southwest of Dungarvan, Co. Waterford. The village of Clashmore is located approximately 3.1km south of the Site.

The Proposed Grid Connection includes 110kV underground cabling from the Proposed 110kV Substation, in the townland of Clashbrack, Co. Waterford, to the Proposed 220kV Loop-in Substation in the townland of Ballycullane, Co. Waterford. The Proposed 110kV Underground Cabling Route measures approximately 9km in length and is located primarily within the curtilage of the public road corridor with two sections (approximately 262m and 788m) being located within private lands.

The Site measures approximately 1,450 hectares and comprises a mix of agri-pastoral land and commercial forestry. The N25 national primary road runs in a north to south direction to the east of the Site, passing within 200m of the Site at its closest extent. The L-2024 local road traverses the northern section of the Proposed Wind Farm in an east- west direction, with the L-6085 local road bisecting the eastern portion of the Site. The L-2023 also bisects the central section of the Site. The Site is also served by a number of existing agricultural roads and tracks. Existing site access is via forestry and agricultural entrances off the L-2023 and L-2024 local roads, as well as the L-6084 local road to the south of the Site and the L-6082 to the west of the Site.

Current land-use on the Proposed Wind Farm is predominantly comprised of a mix of commercial forestry and pastoral agriculture. Current land-use along the Proposed Grid Connection comprises of public road corridor and private land principally used by agriculture. The surrounding land use is predominantly pastoral agriculture, commercial forestry and low-density residential use along local and regional roads.

2.2 Description of the Proposed Project

A detailed description of the Proposed Project is provided in Chapter 4 (Description of the Proposed Project) of this EIAR. A brief description of the Proposed Project is provided below:

The full description of the Proposed Project, as per the public planning notices, is as follows:

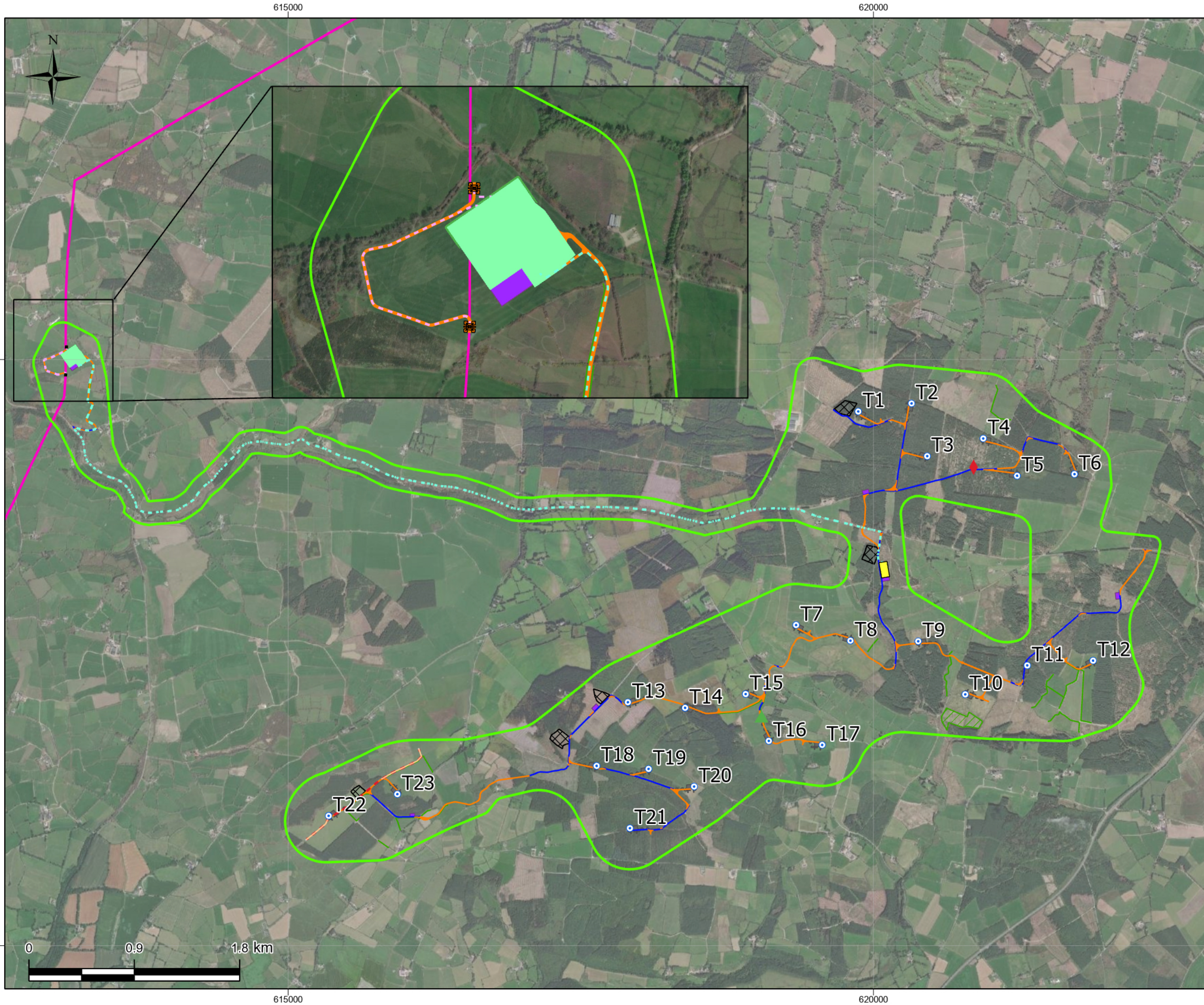
The proposed development will consist of the provision of the following:

- i. 23 no. wind turbines of varying dimensions, a meteorological mast and a telecommunications relay mast as follows:*
 - a. 6 no. wind turbines with an overall turbine tip height of 185 metres, a rotor blade diameter of 162 metres, and turbine hub height of 104 metres;*
 - b. 15 no. wind turbines with an overall turbine tip height of 175 metres, a rotor blade diameter of 150 metres, and turbine hub height of 100 metres;*
 - c. 2 no. wind turbines with an overall turbine tip height of 170 metres, a rotor blade diameter of 150 metres, and turbine hub height of 95 metres;*
 - d. A meteorological mast with a height of 80 metres and a telecommunications relay mast with a height of 30m;*
- ii. Associated wind turbines, meteorological mast and telecommunications relay mast foundations and hardstanding areas;*

- iii. *A 220kV loop-in substation compound (Including control buildings (with a combined floor area of 644Sq.m) with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, lightning protection poles and underground wastewater holding tank), with 220kV underground cabling connecting to 2 no. lattice-type end masts with a height of 21.5 metres to facilitate a 'Loop-in' connection to the existing 220kV Knockraha-Cullenagh overhead electricity transmission line, establishment of screening planting, all within the townland of Ballycullane;*
- iv. *A 110kV substation compound (Including control buildings (with a combined floor area of 644Sq.m) with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, lightning protection poles and underground wastewater holding tank) in the townland of Clashbrack;*
- v. *110kV underground cabling connection from the proposed 110kV substation in the townland of Clashbrack to the proposed 220kV loop-in substation in the townland of Ballycullane, primarily located within the public road corridor (including joint bays, communication chambers, earth sheath links, and ancillary works along the cabling route);*
- vi. *The re-routing underground of a section of the existing Dungarvan-Foxhole 38kV overhead line with 2 no. lattice-type end masts (15m height) and 38kV underground cabling (including joint bay) in the townlands of Cloghraun and Carronbeg;*
- vii. *Underground electrical (33kV) and communications cabling connecting the wind turbines and meteorological mast to the proposed 110kV substation;*
- viii. *6 no. construction compounds (including temporary site offices and welfare facilities (with a combined floor area of 607.5 Sq.m));*
- ix. *4 no. security compounds (including temporary security cabins with a combined floor area of 72 Sq.m);*
- x. *Junction accommodation works to facilitate access to the site, including the provision of new and upgrade of existing entrances and junctions off the L2024, L2021, L2023, L99997 and L6082 local roads, including new permanent gated site entrances;*
- xi. *Upgrade of existing site tracks/roads and provision of new site access roads, junctions and hardstand areas (including upgrade of a short section of the L99997 local road);*
- xii. *5 no. borrow pits;*
- xiii. *Spoil Management;*
- xiv. *Biodiversity Management and Enhancement Plan measures (including establishment of a riparian planting, broadleaf woodland planting and hedgerow planting/enhancement);*
- xv. *Tree felling and vegetation removal;*
- xvi. *Site Drainage;*
- xvii. *Operational stage site signage; and*
- xviii. *All ancillary site development works and apparatus.*

The application is seeking a 10-year planning permission. Current and future wind turbine generator technology will ensure that the wind turbine model, chosen for the Proposed Project, will have an operational lifespan greater than the 35-year operational life that is being sought as part of the planning application.

Figure 2-1 illustrates the overall layout of the Proposed Project (i.e. the Proposed Wind Farm and Proposed Grid Connection together). Detailed site layout drawings of the Proposed Project are included in Appendix 4-1 to the EIAR.



Legend

- EIAR Site Boundary
- Proposed Project**
 - Proposed Turbine Locations
 - ◆ Proposed Telecommunications Relay Mast
 - Proposed Hardstands
 - ▲ Proposed Met Mast
 - Proposed New Roads
 - Upgrades to Existing Roads
 - ▨ Proposed Borrow pits
 - Construction Compounds
 - Proposed 38kV Cable Track
 - Proposed 38kV OHL Interface End Masts
 - - - Proposed 38kV Underground Cable
 - Proposed 110kV Substation
 - - - Proposed 110kV Underground Cabling Route
 - Proposed 220kV End Masts
 - Proposed 220kV Loop-in Substation
 - - - Proposed 220kV Underground Grid Connection Route
 - Proposed Hedgerow Planting (5.5km)
 - ▨ Proposed Native Woodland Planting (3.6ha)
 - Proposed Screening Planting
- Overhead Line**
 - Existing Knockraha-Cullenagh 220kV Overhead Line

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator



EIAR Site Boundary - NOT TO SCALE

Drawing Title

Proposed Project		
Project Title		
Slievegrine Renewable Energy Development		
Project No.	Drawing No.	Scale
240740	2-1	1:30,000
Drawn By	Checked By	Date
SOR	NS	06/10/2026

MKO

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3. FRESHWATER PEARL MUSSEL

3.1 River Licky Population

As stated in Section 1.1 above, Stage 1 & 2 FPM surveys were carried out in four sections of the River Licky (see Figure 2-1 of the ABR for locations), a tributary of the Blackwater River and one of the two known freshwater pearl mussel populations to occur in tributaries of the Blackwater River. In 2005, the population of freshwater pearl mussel within the River Licky was estimated to be greater than 10,000 individuals². However, populations experienced a rapid and dramatic decrease within the coming years, and by 2009 the population had declined to approximately 4,700. No young or juvenile mussels were recorded in the Licky during monitoring in 2005 or 2009 and there was no evidence that recruitment had occurred in at least 12 years, with the smallest mussel in 2009 measuring 85.3 mm (DEHLG, 2010). A total of 127 live freshwater pearl mussel were recorded during the surveys undertaken by MKO in October 2025, with an additional 2 dead shells recorded throughout the survey.

3.2 River Blackwater (Cork/Waterford) SAC

The River Licky FPM population forms part of the larger River Blackwater SAC population, however, is considered a distinct population given its separation from the mainstream Blackwater by brackish water and a large distance of approximately 30km. A site-specific conservation objective (SSCO) for the River Blackwater (Cork/Waterford) SAC is to restore the population size to 35,000 adult mussels across the entire SAC, with the River Licky's target population being 10,000. Whilst the target populations for the River Blackwater mainstream and the Allow tributary were close to being maintained at the time of publication of the River Blackwater (Cork/Waterford) SAC SSCO document (2012), the Licky was experiencing dramatic decline as discussed in Section 3.1 above. In the absence of mitigation and a site drainage plan, the Proposed Project has the potential to significantly impact the River Lickys FPM population.

The SSCO's for the River Blackwater FPM population have been tabulated below (Table 3-1) in relation to the Proposed Projects potential to impact the conservation goals of the National Parks and Wildlife Services (NPWS) in the absence of the mitigation and control measures presented in this document.

² 'Conservation Objective Series - Blackwater River (Cork/Waterford) SAC 002170', National Parks and Wildlife Services (2012); Available at: <https://www.npws.ie/sites/default/files/publications/pdf/article-17-report-2025-volume-3.pdf>

Table 3-1: River Blackwater (Cork/Waterford) Site Specific Conservation Objectives Relating to Freshwater Pearl Mussel

Attribute	Target	Potential Impact of the Proposed Project
Distribution	Maintain at 161km.	In the absence of mitigation, there is potential that the Proposed Project will result in a decrease in the distribution of this species within the Licky River via a potential deterioration of water quality as a result of the construction phase of the Proposed Project
Population size	Restore to 35,000 adult mussels	In the absence of mitigation, the Proposed Project could potentially impact the FPM population of the SAC due to deterioration of water quality.
Population structure: recruitment	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	In the absence of mitigation, the Proposed Project could potentially impact the ability of the FPM population to recruit young or juvenile mussels due to siltation, sedimentation or eutrophication of supporting habitat.
Population structure: adult mortality	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	In the absence of mitigation, the Proposed Project could potentially impact the rate of adult mortality due to deterioration of water quality.
Habitat extent	Restore suitable habitat in more than 35km and any additional stretches necessary for salmonid spawning	In the absence of mitigation, the Proposed Project could potentially impact suitable FPM/salmonid habitat due to siltation, sedimentation or eutrophication.
Water quality: macroinvertebrate and phytobenthos (diatoms)	Restore water quality- macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	In the absence of mitigation, the Proposed Project could potentially impact the water quality of the River Licky and downstream receptors, which in turn could result in a decrease in macroinvertebrate and diatom diversity and abundance.

Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Restore substratum quality- filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%)	In the absence of mitigation, the Proposed Project could potentially increase sedimentation and eutrophication, which would encourage algal blooms due to nutrient run-off and provide a rooting medium for macrophytes, which would negatively affect FPM.
Substratum quality: sediment	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	In the absence of mitigation, the Proposed Project could result in elevated levels of fine sediment being deposited in the River Licky and its tributaries and reduce or prevent recruitment of juvenile mussels.
Substratum quality: oxygen availability	Restore to no more than 20% decline from water column to 5cm depth in substrate	Increased siltation in watercourses could lead to a temporary reduction in oxygen levels.
Hydrological regime: flow variability	Restore appropriate hydrological regimes	No instream works are proposed as part of the Proposed Project. No natural watercourses will be altered by the Proposed Project. The Proposed Project therefore will not alter the flow regime of the SAC.
Host fish	Maintain sufficient juvenile salmonids to host glochidia larvae	In the absence of mitigation, the Proposed Project could result in deterioration of salmonid host fish spawning grounds due to sedimentation and siltation.

As highlighted in Table 3-1 above, in the absence of mitigation, the Proposed Project has the potential to have significant impacts on the River Blackwater (Cork/Waterford) SAC and primarily the River Licky and its FPM population. The implementation of a bespoke surface water drainage design for the duration of the construction, operation and decommissioning phases of the Proposed Project, in conjunction with best in class hydrological mitigation and monitoring measures, will ensure that there will be no significant impacts on the River Lickys FPM population or the River Blackwater (Cork/Waterford) SAC. The proceeding sections will briefly discuss the surface water drainage design principles, features and monitoring/management measures in order to protect the hydrological resource within and downstream of the Site.

4.

SURFACE WATER DRAINAGE DESIGN

The drainage design for the Proposed Project has been prepared by MKO. The drainage design has been prepared based on experience of the project team on other similar projects and the best practice guidance documents referred to in the References sheet included in Volume 1 of the EIAR.

The protection of the watercourses within and surrounding the Site, and downstream catchments that they feed is important to establish the most appropriate drainage proposals for the Proposed Project. The drainage design for the Proposed Project has been planned with the intention of having no significant negative impact on the water quality of the Site and its associated rivers, and consequently no significant, negative impact on FPM.

No routes of any natural drainage features will be altered as part of the Proposed Project. Turbine locations and associated new roadways were designed to avoid natural watercourses where possible with existing roads to be used wherever possible. There will be no direct discharges to any natural watercourses or land drains, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses and drains. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Project.

4.1

Existing Drainage Features

The Proposed Project will require the crossing of 6 no. EPA mapped watercourses

There will be no direct discharges to natural watercourses or drains. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from watercourses. These locations are provided in Appendix 4-2 of the EIAR and will be subject to approval by the project hydrologist in conjunction with the ECoW prior to the commencement of any construction or felling operations. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings.

Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place.

Existing artificial drains in the vicinity of existing Site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas post treatment, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.

4.2

Drainage Design Principles

The key principles of drainage design that will be implemented and adhered to as part of the Proposed Project are as follows:

- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow or for rewetting of land.

- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line, treatment and outfall controls prior to controlled diffuse release as overland flow or for rewetting of land.
- No direct hydraulic connectivity from construction areas to watercourses or drains connecting to watercourses.
- No alteration of natural watercourses.
- Maintain the existing hydrology of the Site.
- Blocking of existing manmade drainage as appropriate.
- Daily inspection and recording of surface water management system by on-site Environmental Clerk of Works and immediate remedial measures to be carried out as required and works temporarily ceased if a retained stormwater/sediment load is identified to have the potential to migrate from the Site.

Drainage water from any works areas of the Site will not be directed to any natural watercourses within the Site. Two distinct methods will be employed to manage drainage water within the Site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the Site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release. The drainage design is intended to maximise erosion control, which is more effective than having to control sediment during high rainfall. Such a system also requires less maintenance. The area of exposed ground will be minimised. The drainage measures will prevent runoff from entering the works areas of the Site from adjacent ground, to minimise the volume of sediment-laden water that has to be managed. Discoloured run-off from any construction area will be isolated from natural clean run-off. A schematic of the proposed Site drainage management is presented in Figure 3-1 below.

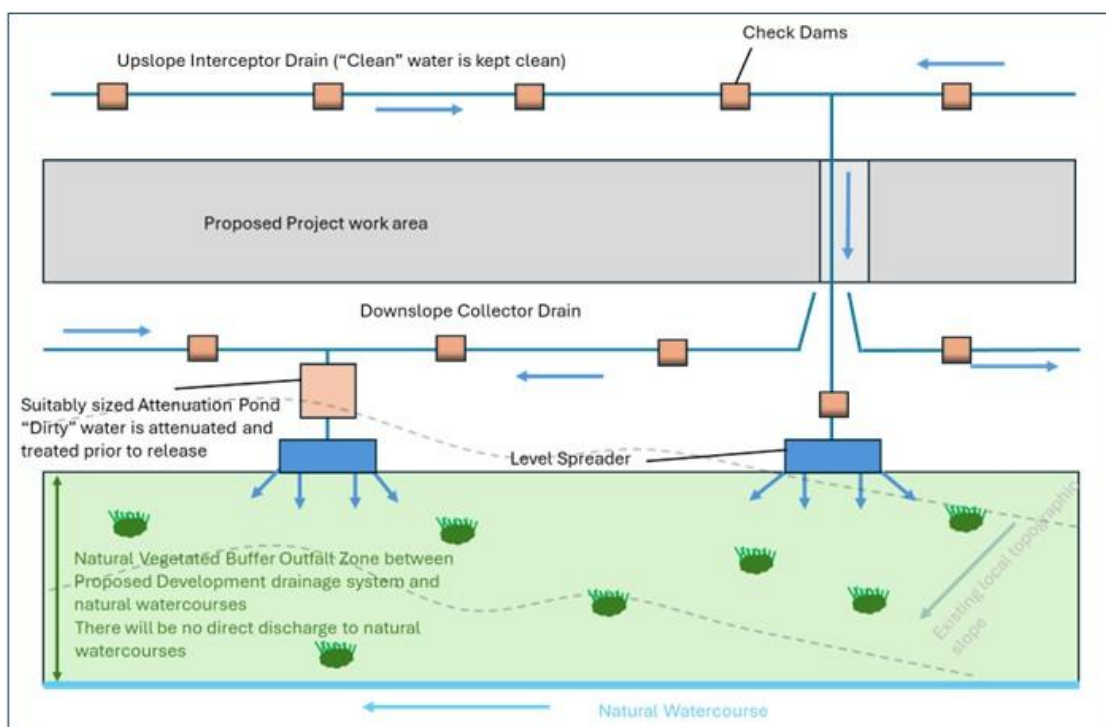


Figure 3-1 Proposed Project Drainage Process Flow

4.3

Drainage Design

A drainage design for the Proposed Project, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in Appendix 4-2 to the EIAR. The

drainage design employs the various measures further described below and is cognisant of the following guidance documents:

- Forestry Commission (2011): Forests and Water UK Forestry Standard Guidelines, Fifth Edition. Publ. Forestry Commission, Edinburgh;
- Standards for Felling & Reforestation (2019): Department of Agriculture Food and the Marine;
- Forest Service of the Department of Agriculture, Food & the Marine (2008): Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures.
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- Scottish Natural Heritage, 2019 Good Practice During Wind Farm Construction
- UK Guidance Note 2020 GPP1 - General Guide to Prevention of Pollution (UK Guidance Note);
- UK Guidance Note 2018 GPP5 – Works or Maintenance in or Near Watercourses
- Construction Industry Research and Information Association (CIRIA) 2006: Guidance on ‘Control of Water Pollution from Linear Construction Projects’ (CIRIA Report No. C648, 2006); and,
- Construction Industry Research and Information Association (CIRIA) 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

4.4

Drainage System Establishment

The early establishment of the drainage system will manage the risk of impacts on watercourses on and adjacent to the Site during construction. In addition, construction operations will adopt best working practices, and the development of the Site will be phased accordingly.

The construction of the drainage will start from the downstream sections and progress upstream, connecting conveyance systems with other drainage features as each development phase progresses. They have therefore been designed with sufficient capacity to respond to an early phase incoming flow during the construction phase.

The implementation of a Scheduling of Works Operating Record (SOWOR) prior to commencement will provide a series of pre-commencement triggers which set out specific conditions which will be met before the commencement of works in particularly sensitive areas. These pre-commencement triggers will apply to the installation of any drainage infrastructure. A SOWOR has been provided as Appendix A to this document.

The detailed drainage measures proposed to address surface water management based upon the design criteria and philosophy will be implemented. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction. Drains will be excavated, and settlement ponds constructed to eliminate any suspended solids within surface water running off the Site.

4.5

Surface Water Drainage Measures

A Surface Water Management Plan (SWMP) has been prepared as part of the ELAR and comprehensively discusses surface water drainage measures. In the interest of brevity, please refer to Section 2.5 of Appendix 4-4 of the ELAR to view these measures.

The proposed drainage measures discussed in Section 2.5 of the SWMP will be used to intercept silt, sediments, pollutants and other harmful runoff and are proposed throughout the Site (see Appendix 4-2) in order to prevent any pollutants from reaching natural watercourse and subsequently the River Licky and its FPM population. All proposed drainage measures will be installed prior to any construction or felling operations occurring.

5.

SURFACE WATER DRAINAGE MANAGEMENT

The following sections set out the drainage management arrangements to be followed during the construction, operational and decommissioning phases of the Proposed Project.

5.1

Good Environmental Management During Construction

Timing of works can strongly influence the potential for damaging the freshwater environment. Operations during wetter periods of the year pose a significantly greater risk of causing erosion and siltation, which can be particularly severe following major rainfall or snowmelt events. Traditionally, wind farm construction undertaken during the drier summer months would result in significantly less erosion and siltation. Construction activities within the hydrological buffer zones shall be avoided during or after prolonged rainfall or an intense rainfall event and work will cease entirely near watercourses when it is evident that water quality is being impacted. Given that this site has an established drainage network, the establishment of new watercourse crossings, and upgrade of existing watercourse crossings within the Site, will have a minimal impact on watercourses.

5.2

Drainage Measure Implementation and Management

5.2.1

Proposed Drainage Management

Runoff control and drainage management are key elements in terms of mitigation against impacts on FPM and its associated habitats. Two distinct methods will be employed to manage drainage water within the Site. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations, construction areas and temporary storage areas.

The second method involves collecting any drainage waters from works areas within the Site that might carry silt or sediment, and nutrients, to route them towards stilling ponds prior to controlled diffuse release over vegetated surfaces. There will be no direct discharges to surface waters.

During the construction phase all runoff from works areas (i.e. dirty water) will be attenuated and treated to a high quality prior to being released.

A detailed drainage plan showing the layout of the proposed drainage design elements is shown in Appendix 4-2 of the EIAR.

5.2.1.1

Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures detailed above, will be brought on-site in phases as they are required during the construction phase. The drainage measures detailed in Section 2.5 of the SWMP will be installed prior to, or at the same time as the works they are intended to drain.

5.2.1.2 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Project will also take account of weather forecasts, and predicted rainfall. Large excavations, large movements of overburden or large-scale overburden or soil 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.

5.2.1.3 Reactive Site Drainage Management

The final drainage design prepared for the Proposed Project prior to commencement of construction will provide for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the Environmental Clerk of Works (ECoW) or supervising hydrologist on-site. It should be noted that an ECoW with FPM experience will be contracted as part of the Proposed Project. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or supervising hydrologist will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

5.2.2 Drainage Maintenance

An inspection and maintenance plan for the drainage system on-site will be prepared in advance of commencement of any works on the Proposed Project. Regular inspections of all installed drainage features will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the ECoW or the Project Hydrologist. The drainage inspection and maintenance plan are included in the CEMP in Appendix 4-3 of the EIAR.

If necessary, any excess sediment build up behind check dams will be removed. For this reason, check dams will be inspected and maintained weekly during the construction phase of the Proposed Project to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

Check dams will also be inspected weekly during the construction phase of the Proposed Project and following rainfall events to ensure the structure of the dam is still effective in controlling flow. Any scouring around the edges of the check dams or overtopping of the dam in normal flow conditions will be rectified by reinforcement of the check dam.

Drainage swales will be regularly inspected for evidence of erosion along the length of the swale. If any evidence of erosion is detected, additional check dams will be installed to limit the velocity of flow in the channel and reduce the likelihood of erosion occurring in the future.

Silt traps will be inspected weekly during the construction phase of the Proposed Project and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

The frequency of drainage system inspections will be reduced following completion of the construction phase of the Proposed Project. The Project Hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system.

5.2.3 Construction Phase Drainage

The key principles of drainage design that will be implemented and adhered to as part of the Proposed Project are detailed in Section 4.2 above with the proposed drainage infrastructure within the Site being detailed in Section 2.5 of the SWMP (Appendix 4-4 of the EIAR). The drainage design for the Proposed Project, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in the drainage drawings included in Appendix 4-2 of the EIAR.

The Project Hydrologist will complete a detailed drainage design and maintenance plan before construction commences and will attend the Site to set out and assist with micro-siting of proposed drainage controls as outlined in Section 4.6 in Chapter 4: *'Description of the Proposed Project'* of the EIAR. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction.

It should be noted that a network of drains already exists at the Site, and these will be integrated and enhanced as required and used within the Proposed Project drainage system. The integration of the existing drainage network and wind farm networks has been undertaken on numerous wind farm sites in Ireland and is considered standard practice.

- All stream crossings 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;
- 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.

It should be noted that a network of drains already exists at the Proposed Project, and these will be integrated and enhanced as required and used within the Proposed Project drainage system. The integration of the existing drainage network and the Proposed Project network is relatively simple.

A 50 metre setback distance proposed from a majority of sensitive hydrological features (inclusive of the River Licky) means that adequate room will be maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operated effectively. The proposed buffer zone will:

- Avoid direct physical damage to watercourses;
- Avoid excavations within close proximity to surface water courses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

All of the Proposed Project works will be supervised by the ECoW supported by the Project Hydrologist.

The implementation of a SOWOR will continue through the construction phase of the Proposed Project. The SOWOR provides number of abandonment triggers which will ensure that site management are well informed as to the level of incident that will require the abandonment of works. The various triggers both pre-commencement and abandonment ensure best practice in terms of water quality management is maintained prior to commencement and during the various felling and construction phases.

The Appointed Contractor, with input from the Project Hydrologist, will complete a site drainage and maintenance plan before construction commences and will attend the Site to set out and assist with micro-siting of proposed drainage controls as outlined in Chapter 4: *'Description of the Proposed Project'*, Section 4.6 of the EIAR. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction.

Best practice and practical experience on other similar projects suggest that in addition to the drainage plans that are included in the EIAR, there are additional site-based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Geotechnical Engineers. The mechanisms for interaction between these roles are outlined within Section 4.1 of the CEMP (Appendix 4-3 of the EIAR).

In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures in the CEMP, SWMP and this FPMMP, to ensure protection of all watercourses and FPM.

5.2.4 Operational Phase Drainage Management

The project hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system. This operational phase drainage system will have been installed during the construction phase in conjunction with the road and hardstanding construction works.

In the operational phase of the Proposed Project, the reliance on the drainage system summarised above will become reduced as areas naturally revegetate. Once areas revegetate, this will result in a resumption of the natural drainage management that will have existed prior to any construction.

5.2.5 Decommissioning Phase Drainage

The drainage system will not be altered upon decommissioning. Measures which will be implemented to ensure no impacts upon the drainage system during decommissioning will be outlined within the Decommissioning Plan (Appendix 4-6 of the EIAR) and fully agreed with the local authority prior to any decommissioning works.

5.3 Activity Specific Drainage Control and Mitigation Measures

5.3.1

Refuelling, Fuel, Spills, Leaks and Hazardous Materials Storage

Wherever possible, vehicles will be refuelled off-site, particularly for regular road-going vehicles. On-site refuelling of machinery will be carried out at designated refuelling areas at various locations throughout the Site heavy plant and machinery will be refuelled on-site by a fuel truck that will come to the Site as required on a scheduled and organised basis. Other refuelling will be carried out using mobile double skinned fuel bowser. The fuel bowser will be parked on a level area in the construction compound when not in use.

All refuelling will be carried out outside designated watercourse buffer zones. 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 refuelling operations as required. All plant and machinery will be equipped with fuel absorbent material and pads to deal with any event of accidental spillage.

The following mitigation measures are proposed to avoid release of hydrocarbons at the Site:

- 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 as part of the CEMP. 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.
- The contracted ECoW will have previous demonstrable experience with freshwater pearl mussel;
- 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 to 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 110kV underground 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 contained within the Construction Environmental Management Plan (which is contained in Appendix 4-3).
- Hydrocarbon interceptors will be installed at the substations and construction compounds.

5.3.2 Concrete Deliveries

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in concrete delivery trucks. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching.

Before leaving the Site, washing of the delivery truck will be minimised and restricted to designated wash out areas. Wash out will be restricted to the concrete lorry's chute only. Concrete trucks will be washed out fully at the off-site batching plant, where facilities are already in place.

The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, concrete wash unit. This type of water treatment unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids will be removed off-site by an appropriately authorised waste collector for disposal at an authorised waste facility. Where temporary lined impermeable containment areas are used, such containment areas are typically built using straw bales and lined with an impermeable membrane. Two examples are shown in Plates 5-1 and Plate 5-2 below.



Plate 5-1 Concrete washout area



Plate 5-2 Concrete Wash Out Area

The areas are covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents will be tankered off-site to an appropriately authorised facility as necessary. Any residual solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste, as noted above, by an appropriately authorised waste collector for disposal at an authorised waste facility.

The risks of pollution arising from concrete deliveries will be further reduced by the following:

- Concrete truck bodies will not be washed out on the Site but will be directed back to their batching plant for washout.
- Site roads will initially be constructed with a subgrade and compacted with the use of a roller to allow concrete delivery trucks access all areas where the concrete will be needed. The final wearing course for the Site roads will not be provided until all bases have been poured. No concrete will be transported around the Site in open trailers or dumpers so as to avoid spillage while in transport. All concrete used in the construction of turbine foundations will be pumped directly into the shuttered formwork from the delivery truck. If this is not practical, the concrete will be pumped from the delivery truck into a hydraulic concrete pump or into the bucket of an excavator, which will transfer the concrete to the location where it is needed.
- The arrangements for concrete deliveries to the Site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout and discussing emergency procedures.
- Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted at the Site.

5.3.2.1 Concrete Pouring

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries may be carried out outside normal working hours to limit the traffic impact on other road users, particularly peak period school and work commuter traffic. Such activities are limited to the day of turbine foundation concrete pours, which are normally completed in a single day per turbine. The main concrete pours for turbine foundations will be planned approximately one week in advance.

Specific procedures will be adopted in advance of and during all concrete pours to minimise the risk of pollution. These will include:

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses (including drains and ditches) while placing concrete.
- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available, and used, when necessary, for freshly placed concrete to avoid the surface washing away in heavy rain.
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a concrete wash unit or equivalent.

5.3.3 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. It is not anticipated that vehicle or wheel washing facilities will be required as part of the construction phase of the Proposed Project as site roads will be formed before road-going trucks begin to make regular or frequent deliveries to the Site (e.g. with steel or concrete). The Proposed Project roads will be well finished with compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt.

A road sweeper will be available if any section of the public roads requires cleaning due to construction traffic associated with the Proposed Project.

5.3.4 Forestry Felling and Vegetation Removal Drainage Measures

As discussed in Sections 4.3.3.1 of Chapter 4: *'Description of the Proposed Project'* of the EIAR, vegetation removal, including forestry felling and hedgerow removal will be required within the Site to allow for the construction of the Proposed Project. The release of vegetation into watercourses, and in particular coniferous pine needles, have the potential to negatively effect freshwater pearl mussel through acidification of freshwater and eutrophication.

Mitigation measures will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses. These measures are derived from best practice guidance documents as outlined below and in Section 9.5.2 of Chapter 9: *'Hydrology and Hydrogeology'* of the EIAR.

During vegetation removal there is a potential to generate silts and sediments in surface water runoff due to tracking of machinery and disturbance of the ground surface etc, however mitigation is provided in Section 9.4.3.1 of Chapter 9: *'Hydrology and Hydrogeology'* with regard surface water quality protection for this activity which is summarised below.

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
- 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 existing forestry 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 void 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 (See 5.3.4.1 below). 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 the hydrological buffer zones.
- Works will not be conducted during significant rainfall events in order to minimise entrainment of exposed sediment in surface water run-off.
- 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 50m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required.
- A permit to refuel system will be adopted.

The following items will be conducted in relation to drain inspection and maintenance during pre-felling inspections and after:

- Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines (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.

Table 52 Minimum Buffer Zone Widths (Forest Service, 2000)

Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils
Moderate	(0 – 15%)	10 m	15 m
Steep	(15 – 30%)	15 m	20 m
Very steep	(>30%)	20 m	25 m

5.3.4.1 Brushing and Release of Nutrients

Felling of coniferous forestry within the Site has the potential to generate substantial quantities of brash comprising branches, foliage and needles. Where brushing is required, decomposition of the brash mats may result in the mobilisation of nutrients, particularly phosphorus, which could subsequently enter receiving drainage channels and watercourses. The management of brash will therefore seek to minimise nutrient mobilisation and prevent nutrient-rich runoff or leachate from reaching watercourses hydrologically connected to freshwater pearl mussel habitat. It should be noted that in some instances the removal of brash tracks may be counterproductive, and disturb the underlying soils, potentially leading to sediment mobilisation of soils and pine needles and foliage. In addition to the measures outlined in Section 5.3.4 above, the below measures to prevent eutrophication of downstream receptors include the below:

- Whole tree harvesting will be carried out within the 50m aquatic zones as displayed in the drainage design drawings included as Appendix 4-2 of the EIAR insofar as possible. This would reduce the potential for contamination of watercourses by excess nutrients (such as pine needles, branches etc..)
- Brash and other felling residues will not be deliberately stockpiled within the 50m aquatic zones, beside watercourses, within drains that discharge towards watercourses, or within other preferential surface-water flow paths;
- Should a shortwood harvesting system be required in proximity to any watercourses, brash generated close to watercourses and drains will be progressively removed or relocated from felling areas;
- Where brash is required to support harvesting machinery and prevent rutting/mobilisation of topsoil, sufficient brash material will remain in place for the duration of forestry operations;
- The ECoW, in consultation with the project ecologist/project hydrologist will determine whether removal of individual brash mats is environmentally preferable to retention;
- Where brash removal is considered necessary, removal should occur progressively as forestry operations retreat from the felling area;
- To prevent decomposition and nutrient runoff, brash will not be placed within existing forestry drains as a means of disposal;
- Brash extraction, disturbance of established brash mats and other activities likely to lead to sediment mobilisation will be avoided during or immediately preceding prolonged/heavy rainfall;
- Where contaminated runoff is observed originating from brash storage areas, the source should be isolated from the drainage network immediately.

5.3.5

Spoil Management Strategy and Placement of Spoil

It is proposed to manage overburden generated through construction activities for the Proposed Project locally within the Site through the backfilling of the proposed borrow pit voids. Linear berms will be placed along access roads where appropriate. It should be noted that there will be no stockpiling of excavated material within the stockpile exclusion areas as depicted in Figure 5-1 below:

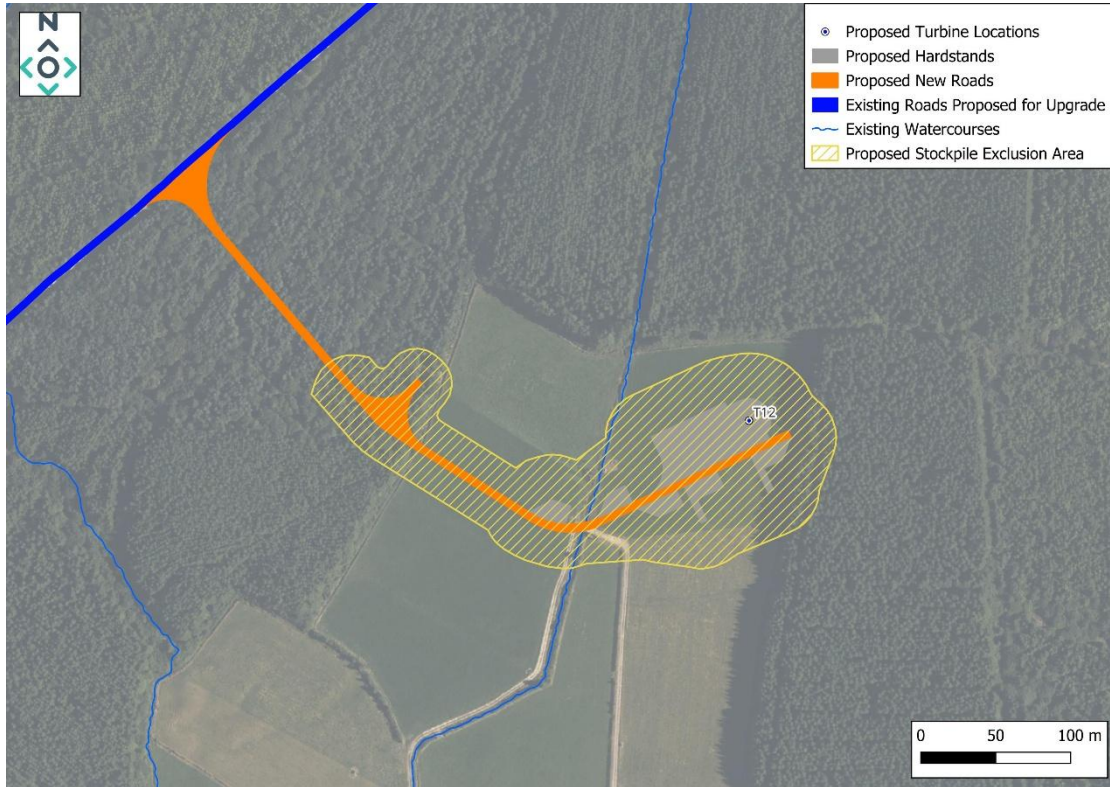


Figure 5-1: Stockpile Exclusion Area

The total estimated volume of spoil to be managed following excavations during the construction phase of the Proposed Project is approximately 425,882m³ (468,470m³ including a 10% contingency). Most material arising from the construction of the Proposed 110kV Underground Cabling Route will be temporarily stockpiled on Site and stored within the borrow pits within the Proposed Wind Farm, with the rest to be used in landscaping around the Site. The total capacity of the Borrow Pit void is at a minimum 396,000m³. The remaining 72,470 m³ of spoil, based on the contingency-inclusive estimate, will be accommodated through the proposed landscaping measures, including linear berms. Accordingly, sufficient capacity is available to manage the total volume of spoil arising from both the Proposed Wind Farm and the Proposed Grid Connection within the Site.

5.3.6

Borrow Pit Drainage

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 stilling pond 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 stilling 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 Section 9.4.3.8. 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).
- Stilling ponds have been designed at the lower side/outfall location of the borrow pits.

6.

BIODIVERSITY MANAGEMENT AND ENHANCEMENT PROPOSALS

MKO have prepared a Biodiversity Management and Enhancement Plan (BMEP) to support the EIAR for the Proposed Project, which is included as Appendix 6-4 to the EIAR. The proposals set out in the BMEP include measures that will help protect the River Licky and its FPM population from ongoing pressures at key locations within the Site, such as siltation and sedimentation from high levels of surface water run-off, poaching from livestock and the addition of vegetation associated with ongoing commercial conifer operations to watercourses throughout the Site. BMEP measures which will protect FPM once established include:

- To provide biodiversity enhancement within the Site by establishing an area of native woodland of 3.6ha and planting of 5.5km of new hedgerow (inclusive of 1.2km of riparian planting) within the Site in order to increase linear habitat and bolster wildlife corridors
- To protect the water quality of the River Licky from surface water run-off through targeted riparian planting and prevention of poaching of livestock along tributaries within the Site
- To provide additional foraging areas and nesting opportunities for pollinators
- To provide a management and monitoring plan to ensure the success of the proposed biodiversity enhancement measures.

6.1

New Hedgerow Establishment

The potential for translocation of existing hedgerows requiring removal was considered. However, hedgerow condition assessments were undertaken in line with the Hedgerow Appraisal System, as outlined in Appendix 6-1. Following analysis, it was deemed that the conservation value of the existing hedgerows requiring removal was relatively low, and therefore did not warrant translocation. Therefore, new hedgerow establishment is proposed. New hedgerow establishment is more likely to be successful than translocation in this instance, with the proposed establishment and monitoring protocol in place, and will result in a higher value hedgerow type, resulting in a net gain in hedgerow habitat within the Site.

It is proposed to plant 5.5km of new hedgerow within the Site. The proposed hedgerow replanting areas are depicted on Figure 3-1 of the BMEP and have been strategically chosen to link up areas where bat commuting activity has been recorded during the dedicated baseline surveys undertaken. The proposed new hedgerow includes approximately 1.2km of riparian hedgerow planting proposed alongside existing river corridors, in order to provide further benefits of excluding access to the watercourse by livestock, and by providing an additional vegetative buffer to slow down run-off from adjacent lands to the watercourses in these areas.

Species selected will be indigenous to the local area and will maximise flowering times throughout the year as well as berry availability later in the year. New hedgerows will be planted between November – March when the woody hedge plants are dormant. When planting new hedgerow, plants will be closely spaced (a maximum of 50cm apart) and planted in a staggered row. The new hedgerow will need to be protected from poaching by livestock, through the erection of new stockproof fencing where required, which will be at least 1m away from the hedge, and installed on each side if required.

The below listed species, which were identified as being locally present during the detailed habitat surveys undertaken or identified as being suitable native species found within the wider local area, will be used in the species composition. Planting will use larger seedlings, transplants or cuttings (sizing as

per the *BS 3936 -Nursery Stock - Part 1: Specification for trees and shrubs*³ to ensure connectivity gains are immediate and will be indigenous to the local area. Species to be used include hawthorn (*Crataegus monogyna*) which will make up approximately 75% of the hedgerow mix. The ideal native hedge is made up of 75% Hawthorn and 25% of at least 4 other species⁴, previously recorded on Site. This includes:

- Elder (*Sambucus nigra*)
- Blackthorn (*Prunus spinosa*)
- Grey willow (*Salix cinerea*)
- Rowan (*Sorbus aucuparia*)
- Privet (*Ligustrum vulgare*)

6.1.1 Maintenance of Newly Planted Hedgerows

In order to facilitate the successful establishment of new hedgerows to be planted, the following management measures are proposed (DAERA, 2022):

- New hedgerow shrub planting will be kept weed and litter free until the new plants are established, particularly from ruderal weeds. Healthy growth will be maintained by allowing the plant to occupy as much of the planting areas as possible to allow them to achieve as close their natural form as possible.
- When the plants are established, the ground flora will not be cut between March and October.
- During spring and autumn maintenance periods all trees and plants will be checked and adjusted/replaced as required, soil firmed, and any dead wood present removed back to healthy tissue and mulch added if required. Where tree guards are no longer required these will be removed to avoid damage to the tree.
- During the first growing season, all standard trees/ semi-mature trees will be watered regularly during any prolonged dry periods during the growing season (i.e. in April, May, June, July and August). During the second growing season the trees will be kept well-watered as often as required, particularly during June, July and August.
- Hedgerows will be trimmed every two – three years, with the cutting height raised 10-15cm each year, with trimming taking place in late winter (January / February), thus allowing flowers and fruit to develop.
- Hedgerows can be trimmed to produce an ‘A’ Shaped hedgerow which allows more light into the base.
- Any tree, hedge or shrub that is removed, uprooted, destroyed or that becomes seriously damaged, defective diseased or dead shall be replaced in the same location with another plant of the same species and size as that originally planted. All such replacements shall be carried out within the first planting season following the loss.

6.2 Native Woodland Establishment

The Proposed Wind Farm site borders the Licky River, part of the Blackwater River (Cork/Waterford) SAC, to the south. This SAC supports a range of aquatic QI species and habitats which are highly dependent on the water quality of the river, in particular freshwater pearl mussel (*Margaritifera margaritifera*). In order to enhance the biodiversity value on Site and create an additional riparian buffer to contribute to the protection of the water quality of the Licky River, it is proposed to establish a new native woodland measuring 3.6ha in area. This woodland will include a riparian boundary along a tributary of the Licky River, measuring approx. 100m in length. The proposed planting area is located at the southern boundary of the Proposed Wind Farm site, south of the Proposed Turbine T10 (see

³ British Standard. (1992). *BS 3936 - Nursery Stock - Part 1: Specification for trees and shrubs*.

⁴ NBDC. (2018). *All Ireland Pollinator Plan How-to-guide: Hedgerows for pollinators*. National Biodiversity Data Centre.

Figure 3-1 of BMEP). This location has been strategically sited in an area characterised by high surface water flows.

Woodland planting will follow the guidance laid out in “The Classification of Native Woodlands in Ireland and its Application to Native Woodland Management⁵” (Cross et al. 2010) and “Native Riparian Woodlands – A Guide to Identification, Design, Establishment and Management⁶” (Little et al. 2008).

6.2.1 Woodland Species

The existing habitat in the proposed woodland planting area is wet grassland (GS4). It is proposed that the woodland to be established will be of a species mix corresponding with a sub type of the *AF- Alder-meadowsweet* woodland type defined in (Cross et al. 2008, Plate 6-1 below). Tree species will include a primary species mix of pedunculate oak (*Quercus robur*), alder (*Alnus glutinosa*) and grey willow (*Salix cinerea*). It is likely that the woodland would conform most closely to the ‘wet pedunculate oak-ash woodland (WN4) category (Fossitt 2000), as outlined in Appendix 1 of Cross et al. (2010). However, there will be no planting of ash due to biosecurity concerns associated with the potential for infection of trees by ash dieback (*Hymenoscyphus fraxineus*). Trees will be of native origin and will be of advanced nursery stock where possible. Additionally, the following measures will be applied when planting trees:

- Mark out the area for planting so it is clear exactly where planting will be established.
- Trees will not be evenly spaced and instead will be spaced out randomly to mimic natural plant spacing. They will be planted at lower planting densities in order to allow natural recolonisation by other native species, particularly shrubs.
- Newly planted trees will need to be protected from poaching by livestock, through the installation of new stockproof fencing which will be at least 2m away from the treeline, and on each side if required.

	Sessile oak	Birch	Rowan	Holly	Scots Pine	Ash	Hazel	Hawthorn	Pedunculate oak	Wild cherry	Crab apple	Alder	Grey willow	Spindle	Elm	Yew	White-beam	Purging buck-thorn	Goulden rose	Silver birch	Salix species
AF Alder-meadowsweet (<i>Alnus glutinosa</i> – <i>Filipendula ulmaria</i>) woodland type																					
AF1 Ash – remote sedge (<i>Fraxinus excelsior</i> – <i>Carex remota</i>) sub-type				(x)		x	(x)	x	(x)			x	x								
AF2 Alder – bramble (<i>Alnus glutinosa</i> – <i>Rubus fruticosus</i>) sub-type						(x)		x				x	x								
AF4 Hawthorn-herb-Robert (<i>Crataegus monogyna</i> – <i>Geranium robertianum</i>) sub-type						x		x				x									
AF5 Birch – water mint (<i>Betula pubescens</i> – <i>Mentha aquatica</i>) sub-type		x				x		(x)				x	x						(x)		
SU Almond willow-nettle (<i>Salix triandra</i> – <i>Urtica dioica</i>) sub-type												x	x								x

Plate 6-1 A list of the appropriate tree and shrub species to plant in each riparian woodland sub-type. (Adapted from Cross et al. 2010). Please note however, that no planting of Ash is proposed.

⁵ <https://www.woodlandsofireland.ie/wp-content/uploads/No.-6-Woodland-Classification.pdf>

⁶ <https://www.woodlandsofireland.ie/wp-content/uploads/No.-4-Riparian-Woodlands.pdf>

6.3

Maintenance of Established Hedgerows and Woodland

In order to facilitate the successful establishment of the new trees to be planted within the Site, the following measures are proposed:

- During spring and autumn maintenance periods all trees and plants will be checked and adjusted/replaced as required, soil firmed and any dead wood present removed back to healthy tissue and mulch added if required. Where tree stakes and ties are no longer required these will be removed to avoid damage to the tree;
- During the first growing season, all standard trees/ semi-mature trees will be watered regularly during any prolonged dry periods during the growing season (i.e. in April, May, June, July and August), if required. During the second growing season the trees will be kept well-watered as often as required, particularly during June, July and August.
- Any tree, hedge or shrub that is removed, uprooted, destroyed or that becomes seriously damaged, defective diseased or dead shall be replaced in the same location with another plant of the same species and size as that which was originally planted. All such replacements shall be carried out within the first planting season following the loss.
- Replanted trees will be inspected following the main growing season (i.e. in September) for the first three years of growth, where the requirement for replacement planting will be assessed. If any trees are dead or damaged these will be replaced using the same species within the next planting season. Recommendations for ongoing or remedial management required will be specified within a periodic Monitoring Report.

6.4

Water Quality Protection

Watercourses and tributaries to the River Licky within the Site where poaching was recorded will be fenced off for livestock. Where linear riparian planting is proposed along a watercourse this will also be fenced off for livestock and access to the watercourse will thereby be restricted also. Fencing will be erected 1.5m from the top bank of the watercourse following the guidance detailed by Farming for Water⁷. The proposed fencing and riparian planting will act as an additional buffer against sediment and nutrient run-off from fields. These measures align with the objectives of the Water Framework Directive, and it is anticipated that these measures will result in added benefits to riparian habitats and fauna within and downstream of the Site.

7.

SURFACE WATER QUALITY MONITORING

This section of the FPMMP sets out the programme for water quality monitoring during the pre-construction, construction, commissioning and operational phases of the Proposed Project.

The surface water quality monitoring programme combines the use of laboratory analysis, water quality monitoring instrumentation and visual inspection to develop a comprehensive schedule of monitoring of all watercourses that exist both at the Site and the surrounding area. The information collected by this schedule of water monitoring, particularly the continuous turbidity monitoring will inform the pre-commencement triggers in the SOWOR before works commence in an area. The turbidity monitors both upstream and downstream of the Site will provide instant data on the quality of water in which they are deployed and will be equipped with an alarm system to alert site management if a peak in turbidity occurs as set out in the SOWOR.

⁷ <https://farmingforwater.ie/app/uploads/2025/02/Bovine-Exclusion-for-Water-Bodies.pdf>

The water monitoring programme was prepared in accordance with the following legislation:

- Planning and Development Acts 2000 (as amended);
- Planning and Development Regulations, 2001 (as amended);
- S.I. No. 477 of 2011: European Communities (Birds and Natural Habitats) Regulations 2011, resulting from EU Directives 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);
- S.I. No. 293 of 1988: Quality of Salmon Water Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended) and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC). Since 2000 water management in the EU has been directed by the Water Framework Directive (WFD).
 - The key objectives of the WFD are that all water bodies in member states achieve (or retain) at least 'good' status by 2015. Water bodies comprise both surface and groundwater bodies, and the achievement of 'Good' status for these depends also on the achievement of 'good' status by dependent ecosystems. Phases of characterisation, risk assessment, monitoring and the design of programmes of measures to achieve the objectives of the WFD have either been completed or are ongoing. In 2015 it replaced a number of existing water related directives, which were successively being repealed, while implementation of other Directives (such as the Habitats Directive 92/43/EEC) form part of the achievement of implementation of the objectives of the WFD;
 - Ireland's WFD commitments are further aided by the River Basin Management Plan 2022-2027 and the Water Action Plan 2024⁸. In Ireland, the WFD requires the preparation of River Basin Management Plans (RBMPs), which set out the environmental objectives and programme of measures required to protect and restore water bodies during each six-year planning cycle.
 - The Water Action Plan 2024: Ireland's River Basin Management Plan 2022–2027 is Ireland's third RBMP and represents the State's current plan for implementing the objectives of the WFD. It identifies the principal pressures affecting Ireland's waters and establishes the actions and measures to be undertaken to protect water bodies, prevent deterioration and support the achievement of the environmental objectives established under the WFD.
- S.I. No. 51 of 2025: European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2025, resulting from EU Directive 2006/118/EC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);
- S.I. No. 99 of 2023: European Union (Drinking Water) Regulations 2023, as amended by S.I. No. 673 of 2025: European Union (Drinking Water) (Amendment) Regulations 2025, which give effect to the requirements of Directive (EU) 2020/2184 on the quality of water intended for human consumption (recast); and
- S.I. No. 355 of 2018: European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2018.

⁸ Water Action Plan 2024, DHLGH (2024). Available at: <https://assets.gov.ie/static/documents/water-action-plan-2024.pdf>

This water monitoring programme will be the subject of independent review by the Project Hydrologist who will provide the necessary guidance on the monitoring requirements. The water monitoring programme is outlined in the following sections.

7.1 Pre-Construction Baseline Monitoring

Water quality field testing and laboratory analysis will be undertaken prior to commencement of felling and construction at the Site. The monitoring programme will be subject to agreement with Waterford City & County Council but will be based on the planning stage programme already outlined in the EIAR and CEMP and presented in this document.

Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs).

Baseline sampling will be completed on at least two occasions, and these should ideally coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell.

A network of existing drains already exist, and these will be integrated and enhanced as required and used within the Proposed Project drainage system. These existing drains will continue to function as it is during the pre-construction phase.

However, prior to commencement of works in sub-catchments across the Site, drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage. These inspections will be done on a catchment-by-catchment basis as the construction works develop across the Site, as works in all areas will not commence simultaneously.

7.2 Construction Phase Monitoring

7.2.1 Daily Visual Inspections

An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works. Daily visual inspections of drains and outfalls will also be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime. Should the suspended solids levels measured during construction be higher than the existing levels, the source will be identified, and additional mitigation measures implemented. 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.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each primary watercourse along the Proposed Grid Connection Site underground cable route and specifically following heavy rainfall events (i.e. weekly, monthly and event based).

Inspection sheets and photographic records will be kept on site. Inspection points will include the in-situ field monitoring point locations and the laboratory analysis sampling points. Inspection points will depend on works being completed within the catchment upstream of the identified monitoring locations. Visual inspections will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period and data including photographs will be collected by visual inspections and independently assessed by the Project Hydrologist who will monitor and advise on the records being received.

Daily Visual Inspection locations will be confirmed by the Project Hydrologist and ECoW, prior to the commencement of the construction phase. A Daily Visual Check Sheet Template has been provided as Appendix B of this FPMMP.

The following periodic inspection regime will be implemented:

- Daily general visual inspections of site operations and inspections of all drainage infrastructure within the Site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW;
- Inspections to include all elements of drainage infrastructure to ensure the system is operating correctly and to identify and maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter will be noted and corrective action will be implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as straw bales or oil absorbent materials need replacement;
- Event based inspections by the ECoW as follows:
 - >10 mm/hr (i.e. high intensity localised rainfall event);
 - >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
 - Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
- Monthly site inspections by the Project Hydrologist/ ECoW during construction phase;
- Quarterly site inspections by the Project Hydrologist/ ECoW after construction for a period of one year following the construction phase; and,
- A written record will be maintained or available on-site within the CEMP which will be maintained on-site during the construction phase.

7.2.2 Continuous Turbidity Monitoring

Turbidity monitors or sondes can be installed where required at locations surrounding the Site. The sondes will provide continuous readings for turbidity levels in the watercourse. This equipment will be supplemented by daily visual monitoring at their locations as outlined in the sections below.

The proposed locations for continuous, in-situ monitoring will be confirmed by the Project Hydrologist prior to the commencement of the construction phase.

7.2.3 Monthly Laboratory Analysis

Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the Proposed Project. This will not be restricted to just these locations around the Site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager.

7.2.4 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) will be taken at the surface water monitoring locations, as per water monitoring programme for the Proposed Project. These analyses will be carried out by either the ECoW or the Project Hydrologist. In-situ field monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

7.2.5 Monitoring Parameters

The analytical determinants of the monitoring programme (including limits of detection and frequency of analysis) will be as per S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2018. The likely suite of determinants will include:

- pH (field measured);
- Electrical Conductivity (field measured);
- Temperature (field measured);
- Dissolved Oxygen (field measured);
- Alkalinity (pH measured);
- Total Phosphorus;
- Chloride;
- Nitrate;
- Nitrite;
- Total Nitrogen;
- Ortho-Phosphate;
- Total Ammonia as N;
- Biochemical Oxygen Demand;
- Total Suspended Solids;
- True colour; and
- Dissolved Organic Carbon.

7.3 Construction Phase Drainage Inspections and Maintenance

The developer will appoint a Project Contractor who will be responsible for the construction of the Proposed Project in accordance with the SWMP and this FPMMP which will be updated by the contractor as required during the construction phase of the Proposed Project. Drainage performance will form part of the civil works contract requirements. During the construction phase, the Project Contractor will be responsible for the effectiveness of drainage measures. This responsibility extends to drainage maintenance, to ensure that the installed drainage measures continue to perform as intended by the detailed drainage design. Silt fences, check dams, level spreaders and other drainage measures likely to form part of the detailed drainage design, require regular maintenance to ensure they continue to function effectively, and the Project Contractor is entirely responsible for this maintenance.

Regular inspections of all existing and installed drainage measures should be undertaken by the Project Contractor, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system. The contractor will devise a system of recording the findings of these inspections. Any excess build-up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. For this reason, the drainage measures installed on-site should be inspected at least weekly by the contractor and maintained as required during the construction phase of the Proposed Project to ensure good performance.

The ECoW will monitor the effectiveness of the on-site drainage during changing weather, ground or drainage conditions encountered on site, through their regular visual inspections of on-site watercourses and water monitoring programme. Where it appears that additional drainage measures will be required to ensure the drainage system remains effective, the ECoW will notify the contractor, the developer and project design team including the Project Hydrologist. The ECoW's role in this regard does not replace the need for the weekly (at least) inspections of the drainage system's measures by the Project Contractor.

7.3.1 **Surface Water Monitoring Reporting**

Visual inspection and laboratory analysis results of water quality monitoring shall assist in determining requirements for any necessary improvements in drainage controls and pollution prevention measures implemented on site.

It will be the responsibility of the ECoW to present the ongoing results of water quality and weather monitoring at or in advance of regular site meetings.

Reports on water quality will consider all field monitoring and visual inspections, and results of laboratory analysis completed for that period. Reports will describe how the results compare with baseline data as well as previous reports on water quality. The reports will also describe whether any deterioration or improvement in water quality has been observed, whether any effects are attributable to construction activities and what remedial measures, or corrective actions have been implemented. Any proposed alteration to sampling frequency will be agreed with the Planning Authority in advance.

7.3.2 **Post Construction Monitoring**

7.3.2.1 **Monthly Laboratory Analysis Sampling**

Monthly sampling for laboratory analysis for the range of parameters adopted during pre-commencement and construction phases will continue quarterly after construction is complete. The Project Hydrologist will monitor and advise on the readings received from the testing laboratory and monitoring will only cease once the hydrologist is satisfied that the chemical and biological monitoring results show that there is no adverse impact on the quality of surface water within the natural watercourses draining the Site.

8. COMPLIANCE AND REVIEW

8.1 Site Inspections and Auditing

Routine inspections of construction activities will be carried out on a daily and weekly basis by the ECoW and the Site Supervisor/Construction Manager to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place. The Project Hydrologist will also assist in compliance of testing and monitoring as required.

The FPMMP will be reviewed in line with the SWMP and CEMP and updated as required prior to commencement of construction to address any relevant planning conditions and mitigation measures.

References

Atkinson et al. (2023), 'SUPPLEMENTARY GUIDANCE ON ASSESSMENT AND CONSTRUCTION MANAGEMENT IN MARGARITIFERA CATCHMENTS IN IRELAND: BLACKWATER RIVER (CORK/WATERFORD) SAC.

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DoE/NIEA (2015): Wind farms and groundwater impacts - A guide to EIA and Planning considerations"; Eastern Regional Fisheries Board: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;

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Forest Service (Draft): Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;

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Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works Adjacent to Waters;

Institute of Geologists Ireland (2013) Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;

Murnaine, E., Heap, A., Swain, A., 2006. Control of water pollution from linear construction projects. Site guide (C649). CIRIA.

National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;

National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;

PPG1 - Understanding your environmental responsibilities – good environmental practices (UK Guidance Note) (2021)

PPG5 – Works or Maintenance in or Near Water Courses (UK Guidance Note) (2018);
Scottish Natural Heritage, 2010: Good Practice During Wind Farm Construction;
Wind Energy Development Guidelines for Planning Authorities, 2006 (the DoEHLG 2006 Guidelines)
and the Draft Revised Wind Energy Development Guidelines (Draft DoHLGH 2019 Guidelines);



APPENDIX A

**SCHEDULE OF WORKS
OPERATING RECORD (SOWOR)**

Work Item No.	Description	Estimated Duration of Works	Risk Schedule 1: very high risk Schedule 2: high risk Schedule 3: intermediate risk	Pre-commencement Triggers all four triggers should be met				Works Abandonment Triggers If <u>any</u> four triggers are met			
				Trigger 1 Drainage treatment infrastructure installed prior to works commencing. All in good working order	Trigger 2 River/ watercourse turbidity	Trigger 3 Daily Visual Inspection procedure in place by ECoW	Trigger 4 Weather forecast: (a) during planned works period (b) observed on site	Trigger 1 Damage to silt fence/other drainage measure or drainage point close to capacity	Trigger 2 River/ Watercourse turbidity	Trigger 3 Deterioration of SW quality as reported by ECoW	Trigger 4: Weather forecast (a) during the planned works period and (b) observed on site
1	Enabling works including felling, site compound establishment welfare facilities, site office and fencing	2 months	Schedule 2	Drainage measures to be installed as per EIAR & drainage management plan	Turbidity at baseline levels	Procedure for inspection must be in place with ECoW reporting satisfactory SW quality before works commence	Schedule 2 rainfall figures (see below) utilising reliable forecasting source	Works cease and emergency response procedure activated including the use and installation of additional pumping equipment, sedimats, siltbags and silt fencing	Turbidity 20% above baseline conditions or >15ntu – subject to baseline data analysis	Works cease and investigation conducted.	Schedule 2 rainfall figures (see below)
2	Preliminary enabling works and excavation operations	6 months	Schedule 1	Drainage measures to be installed as per EIAR & drainage management plan	Turbidity at baseline levels	Procedure for inspection must be in place with ECoW reporting satisfactory SW quality before works commence	Schedule 1 rainfall figures (see below) utilising reliable forecasting source	Works cease and emergency response procedure activated including the use and installation of additional	Turbidity 20% above baseline conditions or >15ntu – subject to baseline data analysis	Works cease and investigation conducted.	Schedule 1 rainfall figures (see below)

								pumping equipment, sedimats, siltbags and silt fencing			
3	Roads Excavation Excavate new road alignment, upgrade/widen existing carriageway	3-4 months	Schedule 1	Drainage measures to be installed as per EIAR & drainage management plan	Turbidity at baseline levels	Procedure for inspection must be in place with ECoW reporting satisfactory SW quality before works commence	Schedule 1 rainfall figures (see below) utilising reliable forecasting source	Works cease and emergency response procedure activated including the use and installation of additional pumping equipment, sedimats, siltbags and silt fencing	Turbidity 20% above baseline conditions or >15ntu – subject to baseline data analysis	Works cease and investigation conducted.	Schedule 1 rainfall figures (see below)
4	Culvert Upgrade or replacement works	4 months	Schedule 1	Drainage measures to be installed as per EIAR & drainage management plan	Turbidity at baseline levels	Procedure for inspection must be in place with ECoW reporting satisfactory SW quality before works commence	Schedule 1 rainfall figures (see below) utilising reliable forecasting source	Works cease and emergency response procedure activated including the use and installation of additional pumping equipment, sedimats, siltbags and silt fencing	Turbidity 20% above baseline conditions or >15ntu – subject to baseline data analysis	Works cease and investigation conducted.	Schedule 1 rainfall figures (see below)
5	Carriage way resurfacing	1 month	Schedule 3	Activity not dependent on drainage treatment infrastructure	Activity not anticipated to effect turbidity	Activity not dependent on visual inspection of SW quality	Activity not weather dependent	Activity not dependent on drainage treatment infrastructure	Activity not anticipated to effect turbidity	Activity not dependent on visual inspection of SW quality	Activity not weather dependent

11	Commissioning and snagging	2 months	Schedule 3	Activity not dependent on drainage treatment infrastructure	Activity not anticipated to effect turbidity	Activity not dependent on visual inspection of SW quality	Activity not weather dependent	Activity not dependent on drainage treatment infrastructure	Activity not anticipated to effect turbidity	Activity not dependent on visual inspection of SW quality	Activity not weather dependent
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Schedule 1 – Very high-risk activities	>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.	
	No overland flow or pathway for water movement	
	Conditions on the ground match the forecast	
Schedule 2 – High risk activities	>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.	
	Conditions on the ground match the forecast	
Schedule 3 – Intermediate risk	>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.	
	Conditions on the ground match the forecast	



APPENDIX B

**DAILY VISUAL CHECK SHEET
TEMPLATE**

	Daily Visual Inspections	Project	240740 - Slievegrine	Draft Date	29/09/2026
		Client	Slievegrine Ltd.	Version	1
		File Name	240740 - Daily Visual Inspection - 2026.09.29		

Date:	
Weather:	
Rainfall previous 24hr (mm):	
Completed by:	

Surface Water Sampling Locations			
SW Ref	Visual Inspection Result	Action Required	Photographs
SW1			
SW2			
SW3			
SW4			
SW5			
SW6			
SW7			
SW8			
SW9			
SW10			

Visual Inspection Locations			
VC Ref	Visual Inspection Result	Action Required	Photographs
VI1			
VI2			
VI3			
VI4			
VI5			
VI6			
VI7			
VI8			
VI9			
VI10			

Visual Inspection Results:

1. Water clear – no issues.
2. Water turbid with a peaty tinge.
3. Water silty as a result of works NOT associated with the Slievegrine Renewable Energy Development.
4. Water silty as a result of works associated with the Slievegrine Renewable Energy Development. ACTION REQUIRED.

	Daily Visual Inspections	Project	24040 - Slievegrine	Draft Date	29/09/2026
		Client	Slievegrine Ltd.	Version	1
		File Name	240740 – Daily Visual Inspection – 2026.09.29		

Action Items / Notes / Comments:

Visual Inspection Results:

1. Water clear – no issues.
2. Water turbid with a peaty tinge.
3. Water silty as a result of works NOT associated with the Slievegrine Renewable Energy Development.
4. Water silty as a result of works associated with the Slievegrine Renewable Energy Development.
ACTION REQUIRED.



APPENDIX C

*Sweeney Consultancy Review
Statement*

Sweeney Consultancy
ECOLOGICAL & ENVIRONMENTAL SERVICES
Rahan, Mallow, Co. Cork.
Tel. 086 2263383
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05 October, 2026

Re: Slievegrine Freshwater Pearl Mussel Review

I wish to confirm that I have reviewed the documentation relation to Freshwater Pearl Mussels in the planning application for a proposed windfarm at Slievegrine. The survey methodology and population assessment, as presented for this protected species is correct. Potential threats to the species from the proposed development have been fully assessed and adequate mitigation measures proposed. I am therefore fully satisfied that the development, as proposed in the planning application, will not negatively impact the Freshwater Pearl Mussel population of the River Licky.



Pascal Sweeney, B.Sc., M.Sc.(Res.)
Freshwater Ecologist

