APPENDIX 6

SURFACE WATER MANAGEMENT PLAN

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1. INTRODUCTION

This Surface Water Management Plan (SWMP) is intended, as an accompanying document to the Construction and Environmental Management Plan (CEMP), to compile the proposed surface water drainage control and treatment measures, set out in the Chapter 4 and Chapter 9 of the Environmental Impact Assessment Report (EIAR), and the proposed surface water monitoring programme, in a single document. This SWMP will require updating by the selected contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. The SWMP due to its structure and nature will also require constant updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further prior to and during the construction phase of the Proposed Project.

This SWMP draws and expands on information already provided in Chapter 4 and Chapter 9 of the EIAR and Section 3.2 of the CEMP (Appendix 4-4 of the EIAR). This SWMP has been divided into three sections, as listed below:

- Surface Water Drainage Design;
- Surface Water Drainage Management;
- Surface Water Monitoring Programme.

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project, 'Proposed Wind Farm', 'Proposed Grid Connection', 'Proposed Project site', and 'site'. A detailed description of the Proposed Project is provided in Chapter 4 of this EIAR.

1.1 Statement of Authority

This document was prepared by Catherine Johnson, with input from Aisling Thompson, and reviewed by Ellen Costello, all of MKO.

Catherine is a Project Environmental Scientist at MKO with over 3 years of consultancy experience in sustainability and renewable energy. Prior to joining MKO, Catherine worked as an Environmental Social Governance (ESG) analyst for Acasta in Edinburgh. Catherine has expertise in international climate law and policy, renewable energy, earth science, and sustainability/ESG processes. Catherine has a BSc in Earth and Ocean Science and an LLM in Global Environment and Climate Change Law.

Aisling is an Environmental Scientist with MKO with over 1 year of experience in both private practice and local authorities. Aisling holds a BSc in Applied Freshwater and Marine Biology and LLM in Marine and Maritime Law. Prior to taking up her position with MKO in June 2025, Aisling worked as an Aquaculture technician with Mount Cook Alpine Salmon in New Zealand. Aisling has specialist knowledge in Environmental and Marine law and policy, Marine and freshwater laboratory skills, and Appropriate Assessments.

Ellen is a Senior Environmental Scientist with over 6 years of consultancy experience with MKO and has been involved in a number of wind energy EIAR applications involving the compilation of numerous chapters including chapters on Population and Human Health. Ellen holds a BSc. in Earth Science and a MSc. in Climate Change: Integrated Environmental and Social Science Aspects.

This document has also benefited from input by Michael Gill and Conor McGettigan, both of Hydro-Environmental Services (HES). Michael and Conor are the authors of Chapter 9: Water of this EIAR. Michael and Conor also designed the proposed drainage plan for the Proposed Project that was submitted as part of the planning application.

Michael Gill (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 22 years' environmental consultancy experience in Ireland. Michael has completed numerous geological, hydrological and hydrogeological impact assessments of wind farms and renewable projects on peatlands in Ireland. He has substantial experience in surface water drainage design and SUDs design, flood modelling, and surface water/groundwater interactions. For example, Michael has worked on the EIS for Carrownagowan WF, Oweninny WF, Cloncreen WF, and Yellow River WF, and over 100 other wind farm-related projects.

Conor McGettigan (BSc, MSc) is an Environmental Scientist with over 3 years' experience in environmental consultancy in Ireland. Conor holds an M.Sc. in Applied Environmental Science (2020) and a B.Sc. in Geology (2016) from University College Dublin. Conor has prepared the Land, Soils and Geology and Hydrology and Hydrogeology Chapters for numerous wind farm EIAR projects. Conor routinely completes Flood Risk Assessments for a wide variety of projects including wind farms, quarries and proposed residential developments.

2. SURFACE WATER DRAINAGE DESIGN

The drainage design for the Proposed Project has been prepared by Conor McGettigan of HES and by the firm's principal, Michael Gill. HES are the authors of the Water chapter of the EIAR (EIAR Chapter 9) and have designed the drainage plan for the Proposed Project based on experience of HES on other wind farm sites on BnM bogs and elsewhere, and a number of best practice guidance documents referred to in the References section of EIAR Chapter 9: Water.

The protection of the watercourses within and surrounding the site of the Proposed Project, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Project. The Proposed Project's drainage design has therefore been proposed specifically with the intention of having no negative impact on the water quality of the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems. No routes of any natural drainage features will be altered as part of the Proposed Project and turbine locations and associated new roadways were originally selected to avoid natural watercourses, and existing roads are to be used wherever possible. There will be no direct discharge of runoff into local watercourses or into the existing bog drainage network. All discharges will be made over open ground or into existing field drains with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated. A copy of the drainage design drawings for the Proposed Project site, is included in Appendix A of this document.

2.1 Existing Drainage Features

Due to the historic peat extraction activities at the Proposed Project site, the site has been artificially drained in order to lower the peat water table. Drainage was first installed in 1950 prior to the commencement of peat extraction in 1960.

The surface of the cutover bog is drained by a network of parallel field drains that are typically spaced at 15 - 20m intervals, piped drains, main drains, headland drains, and silt ponds. The field drains are approximately 0.5 - 1.5m deep and in most areas, they intercept the mineral subsoil underlying the peat. Much of the site is drained by gravity however there are 2 no. pumps located in the centre of the site. Following peat extraction activities, drainage by gravity in this area of the site was no longer feasible as the water level in the surrounding streams were higher than the water level within the site. The field drains discharge to main drains which flow via gravity towards the perimeter of the site where they discharge to larger headland drains. These headland drains eventually discharge to large silt (settlement) ponds. The silt ponds are used to trap sediment and prevent elevated levels of suspended sediment arising in effluent from the drained peatland. Treated surface water is then discharged at outfall points where the effluent flows into off-site drainage channels which in turn discharge into the local stream and river network.

Drainage of the Proposed Project site is currently operating under licence from the EPA (P0500-01). The drainage system has been operating in accordance with this existing Integrated Pollution Control (IPC) licence, with all drainage water from the bogs being discharged via an appropriately designed silt pond treatment arrangement.

Drainage from the Proposed Project site discharges through 8 no. gravity surface water outfalls (SW19, SW19A, SW19B, SW22, SW22A, SW22B, SW22C and SW22D). The locations of these outfalls and the receiving surface waterbodies are detailed below:

- In the east of the Proposed Project site, within the Brosna_100 WFD river sub-basin, there are a total of 4 no. discharge points (SW22, SW22A, SW22B and SW22C) to the EPA named Fortified House Castlearmstong Stream;
- Within the Boor_020 WFD river sub-basin, there is 1 no. outfall (SW22D) to the EPA named Ballynahown Stream (referred to locally as the Brooks Stream);

- Within the Lemanaghan Stream_010 WFD river sub-basin, there are a total of 2 no. outfalls (SW19 and SW19A) to the EPA named Lemanaghan Stream; and,
- To the west, within the Brosna_110 WFD river sub-basin, there is 1 no. outfall (SW19B) to the EPA named Kilcolgan Beg Stream, a tributary of the Brosna River.

Note that despite a section of the Proposed Project site being mapped by the EPA[1] in the catchment of the Blackwater River, there are no surface water discharge points (outfalls) within this sub-catchment. Drainage in this area of the Proposed Project site is directed, via field and main drains, into the Brosna sub-catchment and discharges to the tributaries of the Brosna River.

The respective settlement ponds and their outfall pipe elevations are presented in Table 9-9 in Chapter 9: Water. Outfall pipe elevations range from 44.59 – 52.23mOD (metres above Ordnance Datum) with the greatest outfall elevations recorded in the north of the Proposed Project site at SW22D. Outfalls generally discharge to nearby surface water bodies as mapped by the EPA or into smaller drains that flow towards these mapped watercourses.

The routes of any natural drainage features will not be altered as part of the Proposed Project. Turbine locations have been selected to avoid natural watercourses where possible; however, 1 no. watercourse (the Lemanaghan Stream) is present within the Proposed Wind Farm that will be crossed by proposed new roads at 2 no. locations. During the site walkover of the Proposed Project site, it was noted that the Lemanaghan Stream has been integrated into the existing bog drainage regime.

Furthermore, a proposed temporary culvert will be constructed along the temporary construction access road to the Proposed Grid Connection infrastructure under the existing Overhead Line (OHL); this culvert will be temporary and will be decommissioned as part of the removal of the temporary road during the construction phase.

There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings (See Appendix A).

2.2 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/recharge to ground;
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line treatment and discharge to ground via infiltration drains and infiltration areas;
- There is no direct hydraulic connectivity from proposed construction areas to natural watercourses or drains connecting to downstream watercourses;
- Maintain the existing hydrology/hydrogeology of the site;
- Re-routing existing local drainage pathways as required; and
- Daily inspection and recording of surface water management system by on-site Environmental Clerk of Works (EnvCoW) 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.

[1] *Environmental Protection Agency – "Hydrotool" Map Viewer (www.epa.ie);*

Drainage water from any works areas of the site will not be directed to any natural watercourses within the Proposed Project site. Two distinct methods will be employed to manage drainage water within the Proposed Project 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 via recharge.

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 must be managed. Discoloured run-off from any construction area will be isolated from natural clean run-off.

A schematic line drawing of the proposed drainage design is presented Figure 2-1.

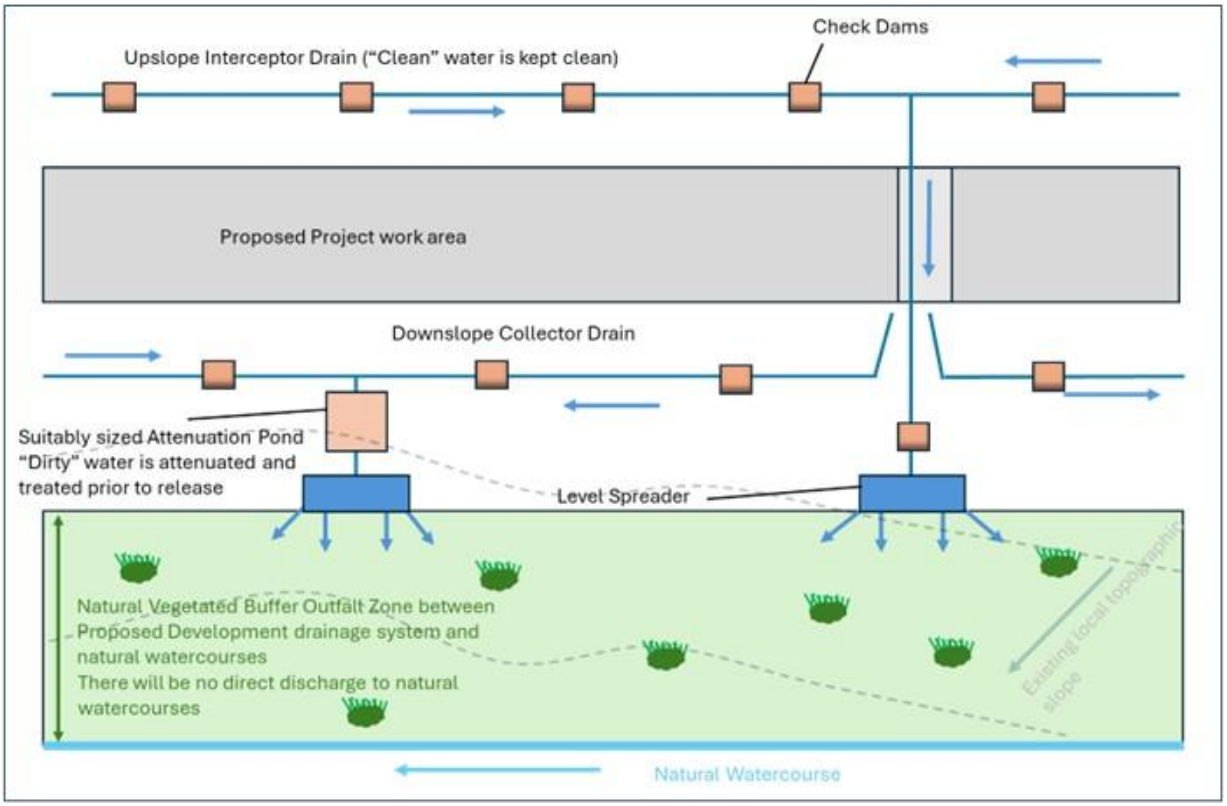


Figure 2-1 Proposed Project Drainage Process Flow

During the construction phase, all runoff from works areas (i.e., dirty water) will be attenuated and treated prior to being released within the Proposed Project site. All drainage outfall from the Proposed Project site is routed through existing settlement ponds that remain in situ from the previous site use.

Comprehensive surface water mitigation and controls are outlined below to ensure protection of all downstream receiving waters. Mitigation measures will ensure that surface runoff from the developed areas of the site will be of a high quality and will therefore not impact on the quality of downstream surface water bodies.

2.3 Best Practice Guidance

The drainage design presented in the EIAR and planning application documents has been prepared based on experience of the project team of other renewable energy sites in similar environments, and a number of best practice guidance documents.

There is no one guidance document that deals with drainage management and water quality controls for wind farms and other renewable energy developments. However, a selection of good practice approaches has been adopted in preparation of this drainage design, and these are taken from the various best practice guidance documents listed below. These relate to infrastructure and operational works on sites, road design, water quality controls for linear projects, road drainage and management of geotechnical risks. To achieve best practice in terms of water protection through construction management, the detailed drainage design and all drainage management proposals shall be prepared in accordance with guidance contained in the following:

- Institute of Geologists Ireland (2013) Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- DoE/NIEA (2015): Wind farms and groundwater impacts - A guide to EIA and Planning considerations";
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Wind Energy Development Guidelines for Planning Authorities, 2006 (the DoEHLG 2006 Guidelines) and the Draft Revised Wind Energy Development Guidelines (Draft DoHPLG 2019 Guidelines);
- Forestry Commission (2011): Forests and Water UK Forestry Standard Guidelines, Fifth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Service (Draft): Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- Forest Service, (2000): Code of Best Forest Practice – Ireland. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the design, construction and management of forest roads;
- MacCulloch (2006): Guidelines for risk management of peat slips on the construction of low volume low cost roads over peat (Frank MacCulloch Forestry Civil Engineering Forestry Commission, Scotland);
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Eastern Regional Fisheries Board(2003): Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works Adjacent to Waters;
- Scottish Natural Heritage, 2010: Good Practice During Wind Farm Construction;
- 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);
- CIRIA Report No. C648 (2006): CIRIA (Construction Industry Research and Information Association) guidance on 'Control of Water Pollution from Linear Construction Projects'; and
- CIRIA Report Number C532 (2001): Control of water pollution from construction sites - Guidance for consultants and contractors.

2.4 Drainage System

The early establishment of the drainage system outlined in Section 2.5 below 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. An example of a SOWOR that will be developed by the EnvCoW and is included in Appendix B.

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.

2.5 Surface Water Drainage Measures

2.5.1.1 Interceptor Drains

Interceptor drains will be installed upgradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert upslope runoff around the works area to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area.

The interceptor drains will be installed in advance of any main construction works commencing. The material excavated to make the drain will be compacted on the downslope edge of the drain to form a diversion dike. On completion of the construction phase works, it is envisaged that the majority of the interceptor drains will be removed. At that stage, there will be no open excavations or large areas of exposed ground that are likely to give rise to large volumes of potentially silt-laden run off. Any areas in which works were carried out to construct roads, turbine bases or hardstands, will have been built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water to infiltrate the subsurface of these constructed areas. It is not anticipated that roadways or other installed site infrastructure will intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. Where the drains are to be removed, they will be backfilled with the material from the diversion dike. Interceptor drains may have to be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting of conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains would be maintained in localised areas along the roadway with culverts under the roadway, which would allow the intercepted water to be discharged to vegetation filters downgradient of the roadway. Similarly, in localised hollows where water is likely to be funnelled at greater concentrations than on broader slopes, interceptor drains and culverts may be left in situ following construction. Figure 2-3 below shows an illustrative drawing of an interceptor drain.

The velocity of flow in the interceptor will be controlled by check dams (see Section 2.5.1.4 below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel.

Interceptor drains will be installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water will travel along the interceptor drains to areas downgradient of works areas, where the drain will terminate at a settlement pond/field drain. Across the entire length of the interceptor drains, the design elevation of the water surface along the route of the drains will not be lower than the design elevation of the water surface in the outlet at the level spreader.

2.5.1.2 Collector Drains

Collector drains (or swales) are shallow drains that will be used to intercept and collect runoff from the main construction areas of the site during the construction phase (i.e., from turbine base/hardstand areas, construction compounds, and the substation). Drainage swales will remain in place to collect runoff from roads and hardstanding areas of the Proposed Project during the operational phase. A swale is an excavated drainage channel located along the downgradient perimeter of construction areas, used to collect and carry any sediment-laden runoff to a sediment-trapping facility and stabilised outlet. Swales are proven to be most effective when a dike is installed on the downhill side. They are similar in design to interceptor drains and collector drains described above.

Collector drains will be installed downgradient of the main works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales will intercept the potentially silt-laden water from the excavations and construction areas of the site and prevent it reaching natural watercourses. Collected water will travel along the collector drains to areas downgradient of the main works areas, where the drain will terminate at a settlement pond and outfall to a field drain (see Section 2.5.2.4).

Collector drains will be installed in advance of any main construction works commencing. The material excavated to make the swale will be compacted on the downslope edge of the drain to form a diversion dike.

2.5.1.3 Over-The-Edge Drainage

As stated above, drainage management with the Proposed Project site will be based on risk. Within the Proposed Project site layout there are sections of proposed floating road between turbine infrastructure. In these sections, and depending on intermediate topography, a collector drain (dirty water system as described above) may be used during construction stage, otherwise over-the-edge (OTE) drainage will occur. OTE drainage allows runoff from access tracks to flow into local field drains and be managed via the existing site drainage system. OTE drainage will only occur where topography allows, and it is only proposed in areas of low risk and remote from outfall locations (at least 150m from bog outfall locations). Silt traps and check dams will be installed in field drains downstream of OTE drainage areas, and these measures will provide attenuation and treatment of any arising dirty water. In addition, all drainage water from the bogs will travel along field drains, and main drains, and then into existing settlement ponds prior to outfall from the proposed site into surrounding receiving waters.

2.5.1.4 Check Dams

Drainage gradients within the site are generally low, and as such the use of and spacing between check dams is less frequent than on hillside sites.

The velocity of flow in the interceptor drains and collector drains will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the drain is non-erosive.

Check dams will also be installed in some existing artificial drainage channels that will receive waters from works areas of the site.

Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. Check dams may also be installed in some of the existing field drains on the proposed site, downstream of where drainage swales connect in.

Check dams will be made up of straw bales or stone, or a combination of both depending on the size of the drainage swale it is being installed in. Where straw bales are to be used, they will be secured to the bottom of the drainage swale with stakes. Clean, 4- to 6-inch stone layers (102-152 mm) will be built up on either side and over the straw bale to a maximum height of 600 mm over the bottom of the interceptor drain. In smaller channels, a stone check dam will be installed and pressed down into place in the bottom of the drainage swale with the bucket of an excavator.

The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150 mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams. Check dams will not be used in any natural watercourses, only artificial drainage channels (field drains) and interceptor/collector drains. The check dams will be left in place at the end of the construction phase to limit erosive linear flow in the drainage swales during extreme rainfall events.

Check dams are designed to reduce velocity and control erosion and are not specifically designed or intended to trap sediment, although sediment is likely to build up. If necessary, any excess sediment build up behind the dams will be removed. For this reason, check dams will be inspected and maintained regularly to insure adequate performance during construction. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

2.5.1.5 Silt Bags

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.

Dewatering silt bags are also used where water is pumped temporarily from excavations (e.g., turbine bases). Water is pumped into the silt bags, and then arising discharge is filtered through the silt bag fabric and flows into local collector drains.

Dewatering silt bags can also be used as an additional filtration measure downgradient of stilling ponds, wherever it is deemed appropriate, throughout the site. The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures. The dewatering silt bags will ensure that there will be no loss of peaty silt into any field drain/main drain.

The dewatering silt bag that will be used will be approximately 3m in width by 4.5m (see Plate 2-1 and Plate 2-2 below) in length and will be capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, will be removed from site by a waste contractor with the necessary waste collection permit/license, who will then transport the silt bag to an appropriately licensed waste facility.

Plate 2-1 Silt Bay with water being pumped through

Plate 2-2 Silt Bay under inspection

2.5.1.6 Siltbuster

A "siltbuster" or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas, if necessary, prior to its discharge to stilling ponds or swales.

Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction sites.

The unit stills the incoming water/solids mix and routes it upwards between a set of inclined plates for separation. Fine particles settle onto the plates and slide down to the base for collection, whilst treated water flows to an outlet weir after passing below a scum board to retain any floating material. The inclined plates dramatically increase the effective settling area of the unit giving it a very small footprint on site and making it highly mobile. Figure 2-2 below shows an illustrative diagram of the Siltbuster.

The Siltbuster units are now considered best practice for the management of dirty water pumped from construction sites. The UK Environment Agency and the Scottish Environmental Protection Agency have all recommended/specified the use of Siltbuster units on construction projects.

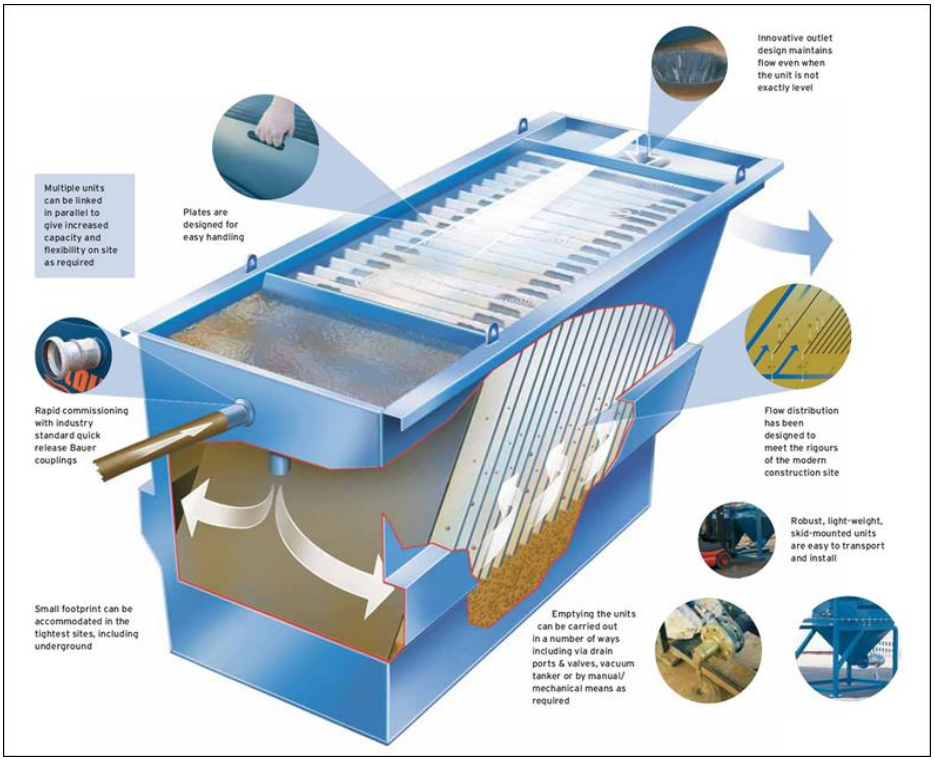


Figure 2-2 Siltbuster (Source: https://www.siltbuster.co.uk/sb_prod/siltbuster-fb50-settlement-unit/)

2.5.1.7 Sedimats

Sediment entrapment mats, consisting of coir or jute matting, will be placed at the outlet of the silt bag to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

2.5.1.8 Culverts

All new proposed culverts will be suitably sized for the expected peak flows in the watercourse.

Some culverts may be installed to manage drainage waters from works areas of the Proposed Project, particularly where the waters must be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In some cases, 2 no. or more smaller diameter culverts may be used where this depth is limited, though this will be avoided as they will have a higher associated risk of blockage than a single, larger pipe. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

2.5.1.9 Silt Fences

Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where works are proposed within the 50m buffer zone of a stream.

Silt fences will be installed as single, double or a series of triple-silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document *'Control of Water Pollution from Linear Construction Projects'* published by CIRIA (No. C648, 2006).

Silt fence material will comprise Terrastop™ Premium material, and silt fences will be installed per the manufacturer's guidelines. Silt fences will be inspected on a regular basis to ensure that they are operating effectively.

2.5.1.10 Peat Ditch Silt Traps

Silt traps will be installed in field drains downstream of drainage outfalls from works areas. The purpose of the silt traps is to capture silt by means of slowing water flow within the field drains. The existing field drains have a low gradient already, and with the installation of local silt traps drainage water from the wind farm works will be filtered and treated on its onward journey towards the existing settlement ponds.

The peat ditch silt traps will be constructed using stacked timber logs, or marine plywood. These can also be covered in geotextile to enhance filtration. The majority of peat ditch silt traps will be left in situ following the construction phase.

2.5.1.11 Settlement Ponds

Settlement ponds will be used to attenuate runoff from main works areas (i.e., from turbine base/hardstand areas, construction compounds, and the substation) of the site during the construction phase. The purpose of the settlement ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff velocity will allow larger particles to settle out in the stilling ponds, before the run-off water is discharged to field drains/main drain within the Proposed Project site.

Settlement ponds will be located towards the end of collector drains, close to where the treated water will be discharged to field drains/main drains.

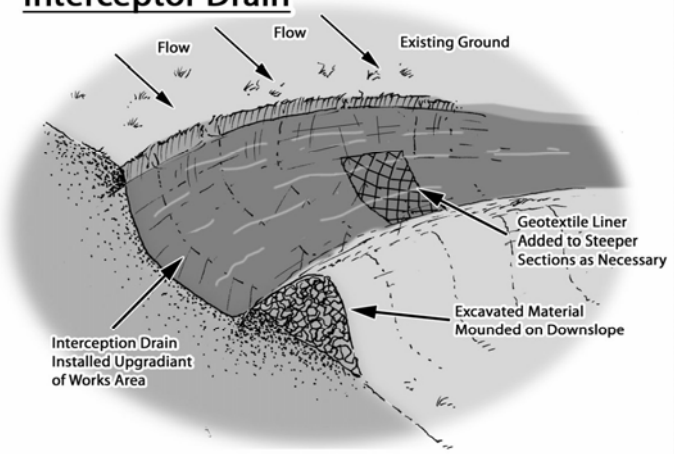
During the construction phase, a water level indicator such as a staff gauge will be installed in each settlement ponds with marks to identify when sediment is at 10% of the settlement ponds capacity. Sediment will be cleaned out of the still pond if it exceeds 10% of pond capacity. Settlement ponds will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and other issues that might interfere with flows.

Settlement ponds (at main works areas) will be removed at the end of the construction phase. They will not be needed beyond that point, as there is an existing drainage system, and boundary settlement ponds already located within Lemanaghan Bog.

During the operational phase all drainage water leaving the proposed site will drain via field drains, main drains, and be treated in the existing settlement ponds prior to outfall.

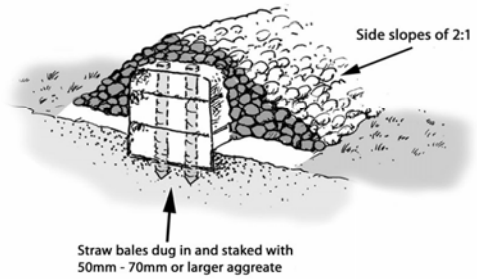
Drainage Design Measures

Interceptor Drain

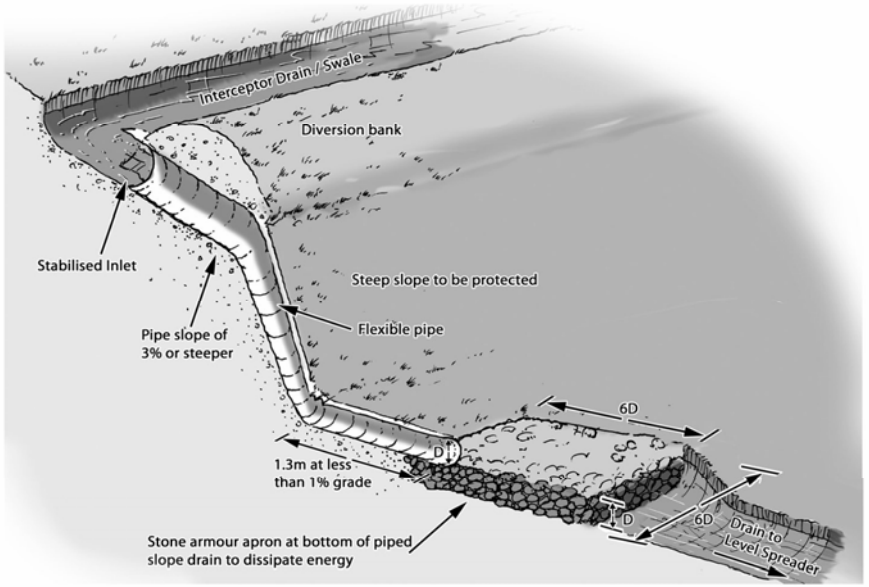


Check Dam (Stone Dam in Drain)

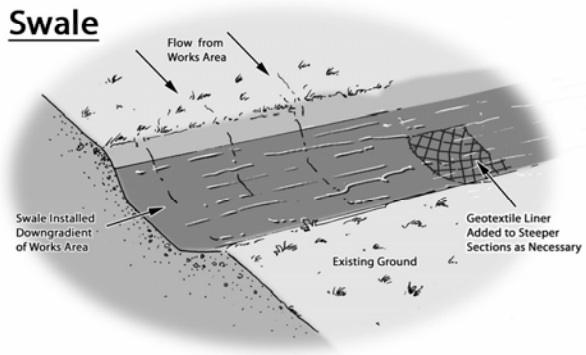
Check Dam
(Straw Bale & Stone Dam - Cross Section)



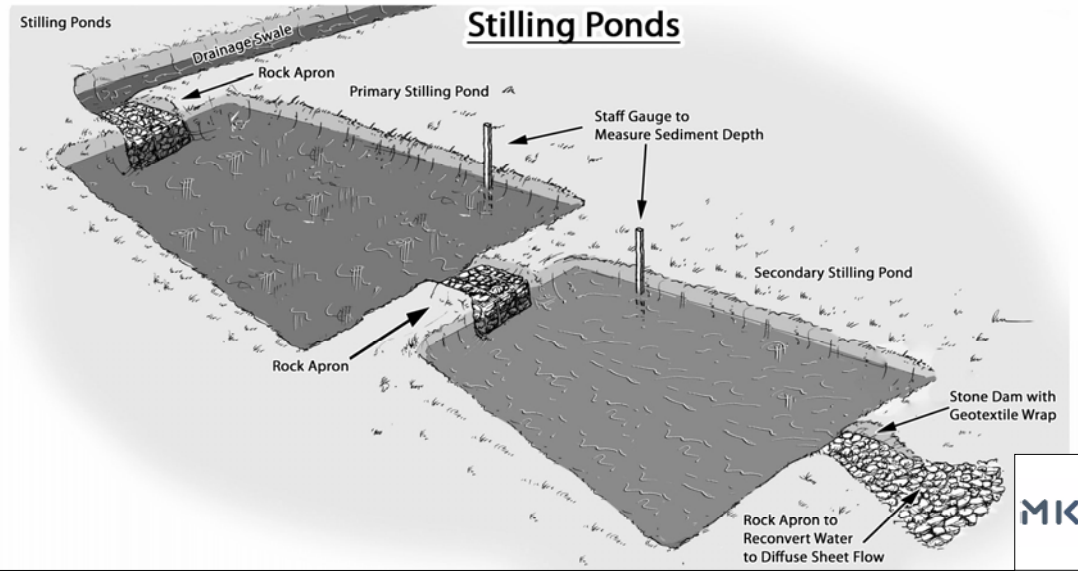
Slope Pipe Drain



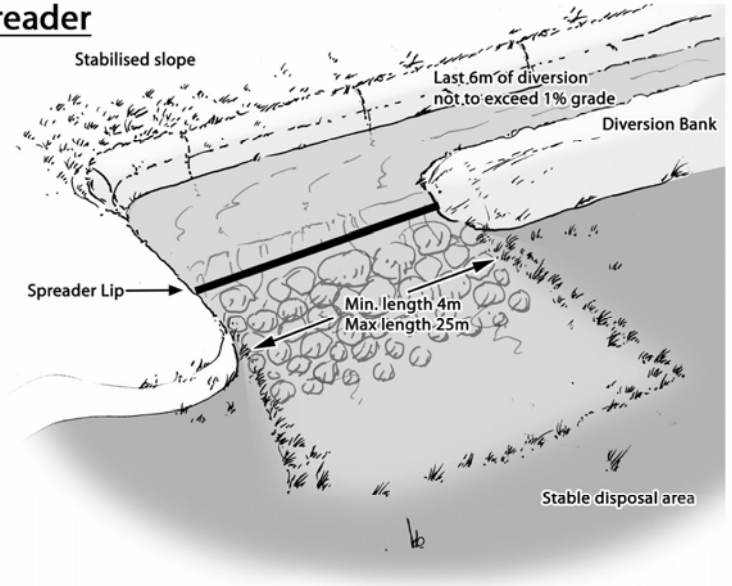
Swale



Stilling Ponds



Level Spreader



MAP TITLE: **Drainage Design Illustrations**		MAP NO.: **Figure 2-2**	SCALE: **NTS**
PROJECT TITLE: **Lemanaghan Wind Farm, Co. Offaly**			DATE: **19.03.2026**
DRAWING BY: **Catherine Johnson**	CHECKED BY: **Ellen Costello**	ISSUE NO.: **200804 - 2026.03.19 - F**	

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2.5.2 Cable Trench Drainage

Cable trenches are typically constructed in short, controlled sections, thereby minimising the amount of ground disturbed at any one time and minimising the potential for drainage runoff to pick up silt or suspended solids. Each short section of trench is excavated, ducting installed and bedded, and backfilled with the appropriate materials, before work on the next section commences. This operation normally occurs over a period of 2-4 hours.

To efficiently control drainage runoff from cable trench works areas, excavated material is stored on the up-gradient side of the trench and is temporarily sealed/smoothed over, using the back of the excavator bucket. Should any rainfall cause runoff from the excavated material, the material is therefore collected and contained in the downgradient cable trench. Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Project, would be transported to one of the on-site borrow pit storage areas or used for landscaping and reinstatements of other areas elsewhere onsite.

On steeper slopes, silt fences, as detailed in Section 2.5.1.8, above, will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

3. SURFACE WATER DRAINAGE MANAGEMENT

The following sections set out the drainage management arrangements in terms of pre-construction, construction, operational and decommissioning phases of the Proposed Project.

3.1.1 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 in the hydrological buffer zones at the 2 no. proposed watercourse crossings within the site 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 likely to be impacted. Given that this site has an established drainage network, the 1 no. new watercourse crossing point, and 1 no. upgraded watercourse crossing point, will have a minimal impact on watercourses.

3.2 Drainage Measure Implementation and Management

3.2.1 Proposed Drainage Management

Runoff control and drainage management are key elements in terms of mitigation against effects on surface water bodies. 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 via recharge.

It should be noted that for the Proposed Project, a network of existing bog drains already exist, 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 drainage network is relatively simple. The key elements being the upgrading and improvements to existing water treatment elements, such as in line controls and treatment systems, including silt traps, settlement ponds and buffered outfalls.

During the construction phase, all runoff from works areas (i.e., dirty water) will be attenuated and treated prior to being released within the Proposed Project site. All drainage outfall from the Proposed Project site is routed through existing settlement ponds that remain in situ from the previous site use.

A detailed drainage plan showing the layout of the proposed drainage design elements is shown in provided as Appendix A to this report.

3.2.2 Pre-Construction Drainage

Drainage from the Proposed Project site discharges through 8 no. gravity surface water outfalls (SW19, SW19A, SW19B, SW22, SW22A, SW22B, SW22C and SW22D). The locations of these outfalls and the receiving surface waterbodies are detailed above in Section 2.1.

Prior to commencement of works in sub-catchments across the site, main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage. It is proposed to complete these inspections on a catchment-by-catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously.

Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.

The routes of any natural drainage features will not be altered as part of the Proposed Project. Turbine locations have been selected to avoid natural watercourses. It is proposed that 2 no. watercourse crossings (2 no. watercourse crossings including the removal of 1 no. existing crossing) are required at the Proposed Wind Farm, while an additional temporary culvert is required along the temporary construction access road to the Proposed Grid Connection infrastructure under the OHL.

There will be no direct discharges to natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetated filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Project and are indicated on the drainage design drawings.

Within the site, there are numerous manmade drains that are in place from the previous land use of industrial peat extraction. The current drainage pattern is via a network of field drains typically spaced at 15 to 20m intervals, piped drains, main drains, headland drains, and silt ponds. The drainage within Lemanaghan Bog is controlled under IPC License (P0500-01) and will be subject to '*Condition 10 Cutaway Bog Rehabilitation'* of the IPC Licence that following the decommissioning of use of all or part of their bogs, BnM, prepares (to the satisfaction of the EPA) and implements a Cutaway Bog Rehabilitation Plan. BnM has produced a Draft Rehabilitation Plan for Lemanaghan Bog, and it is the intention of BnM to rehabilitate the bog in a phased approach under IPC Licence. The Draft Rehabilitation Plan is included as Appendix 2-4 to the EIAR. Irrespective of the consenting or construction of the Proposed Project, the measures outlined in the Draft Rehabilitation Plan will be implemented by BnM in agreement with the EPA, per BnM's IPC Licence Obligations.

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, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains.

3.2.3 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 2.2 above with the proposed drainage infrastructure within the Proposed Wind Farm being detailed in Section 2.5 above. A preliminary 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 figures included in Appendix A.

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 4.9 in Chapter 4 of the EIAR. The drainage system will be excavated and constructed in conjunction with the road and hard standing construction.

Proposed Mitigation Measures for watercourse crossings are detailed below as detailed in Section 9.5.2.1 of the EIAR and are briefly summarised as follows:

- A constraint/buffer zone will be maintained for all crossing locations where possible. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse.

It should be noted that within Lemanaghan Bog, a network of existing bog drains already exist, and these will be integrated and enhanced as required and used within the Proposed Project drainage system as appropriate (note, this is not inclusive of the areas encompassing the turbine accommodation works and the Proposed Grid Connection infrastructure under the existing OHL). The integration of the existing drainage network and the Proposed Project drainage network is relatively simple. The key elements being the upgrading and improvements to existing water treatment elements, such as in line controls and treatment systems, including silt traps, settlement ponds and buffered outfalls. A schematic line drawing of the proposed drainage design is presented in Figure 2-1 above.

Setbacks from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage (river/stream banks and river/stream beds) to watercourses and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses;
- 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 EnvCoW supported by the Project Hydrologist.

The implementation of a SOWOR will continue through the construction phase of the 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, Section 4.9 of the EIAR and Section 3.2.4 of the CEMP (Appendix 4-4 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 Appointed Contractor, the Project Hydrologist and the Project Geotechnical Engineers. The mechanisms for interaction between these roles are outlined within Section 4.1 of the CEMP.

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 outlined in Sections 2.5 above and 3.3 below, and to ensure protection of all watercourses.

3.2.4 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures detailed above, will be brought onsite in phases as they are required during the construction phase in advance of any work commencing. A sufficient number of straw bales, clean drainage stone, terram, stakes, etc., will be kept on site at all times to implement the drainage design measures as necessary. The drainage measures detailed in the above will be installed prior to, or at the same time as the works they are intended to drain.

3.2.4.1 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 in particular, working under a SOWOR system as proposed in the planning application. 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.

The following forecasting systems are available and will be used on a daily/weekly basis, as required, to allow site staff to direct proposed and planned construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Éireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Éireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and,
- Consultancy Service: Met Éireann provide a 24-hour telephone consultancy service. The forecaster will provide an interpretation of weather data and give the best available forecast for the area of interest.

Using the safe threshold rainfall values will allow planned works to be safely executed (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works will be suspended if forecasting suggests any of the following is likely to occur:

- >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures shall be completed:

- Secure all open excavations;
- Provide temporary or emergency drainage to prevent back-up of surface runoff; and,
- Avoid working during heavy rainfall (listed above) and for up to 24 hours after heavy events to ensure drainage systems are not overloaded

3.2.4.2 Reactive Site Drainage Management

The detailed drainage plan prepared for the site (see Appendix A of this document) has provided for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat potentially silt-laden water from the works areas, will be monitored continuously by the EnvCoW) on-site. The EnvCoW or project 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.

The EnvCoW or Project Hydrologist will respond to changing weather, ground or drainage conditions on the ground as the Proposed 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.

3.2.4.3 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 work as described above and in Section 4.8 in Chapter 4 of the EIAR.

The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored. Please note that irrespective of the consenting or construction of the Proposed Project, the measures outlined in the Draft Cutaway Bog Decommissioning and Rehabilitation Plan (Appendix 2-4) will be implemented by BnM in agreement with the EPA, per BnM's IPC Licence Obligations.

3.2.4.4 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 4-8 of the EIAR) and fully agreed with the local authority prior to any decommissioning works.

3.3 Activity Specific Drainage Control and Mitigation Measures

3.3.1 Refuelling, Fuel and Hazardous Materials Storage

Wherever possible, vehicles will be refuelled off-site. This will be the case for regular, road-going vehicles. However, for construction machinery that will be based on-site continuously during construction, a limited amount of fuel will have to be stored on site in appropriately bunded containers within dedicated fuel storage areas.

On-site refuelling of machinery will be carried out at dedicated refuelling locations using a mobile double skinned fuel bowser. The fuel bowser, a double-axle, custom-built refuelling trailer, will be re-filled off site and will be towed around the Proposed Project site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the Proposed Project. The 4x4 jeep

will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use.

Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be available if necessary, during all refuelling operations.

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

- All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site;
- On-site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer or truck will be re-filled off site and will be towed/driven around the site to where machinery are located. The 4x4 jeep/fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume during the construction phase;
- The electrical control building will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used will be regularly inspected for leaks and fitness for purpose;
- An emergency plan for the construction phase to deal with accidental spillages will be developed (refer to Section 6 of this CEMP). Spill kits will be available to deal with accidental spillages.

3.3.2 Cement Based Products Control Measures

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills.

Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water possible. The small volume of water that will be generated from washing of the concrete truck's chute will be directed into a temporary, lined, impermeable containment area for concrete washout. 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 Plate 3-1 and Plate 3-2 below.

Plate 3-1 Concrete washout area

Plate 3-2 Concrete washout area

The areas are generally 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. Any 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.

Alternatively, a Siltbuster-type concrete wash unit or equivalent[2] may be used. This type of Siltbuster unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids can be disposed of off-site at an appropriate waste facility.

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

- Concrete trucks will not be washed out on the site, only the chute will be cleaned as outlined above. The trucks will be directed back to their batching plant for washout.
    - Please note, where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water possible
- Site roads will be constructed to the required standard to allow transport of the turbine components around the site, and hence, concrete delivery trucks will be able to access all areas where the concrete will be needed. No concrete will be transported around the site in open trailers or dumpers to avoid spillage while in transport. All concrete used in the construction of turbine bases 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 agreed with suppliers before work starts, agreeing routes, prohibiting on-site washout and to agree emergency procedures.
- Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating that the washout of concrete trucks is not permitted on the site.

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries may be required 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.

[2] https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/

Given the scale of the turbine base concrete pours which form part of the Proposed Wind Farm, the pours will be planned approximately 1 week in advance. Special 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 truck's chute will be directed into a temporary, lined, impermeable containment area, or a Siltbuster-type concrete wash unit or equivalent.
- Surplus concrete after completion of a pour will be taken off-site and disposed of at an appropriately authorised facility.

3.3.3 Vegetation Removal Drainage Measures

As discussed in Section 4.4.1.8 of Chapter 4 of the EIAR vegetation removal will be required within the site to allow for the the site entrances, access roads, underground cabling, and other ancillary infrastructure. No forestry felling requiring the provision of a Limited Felling License (LFL) from the Department of Agriculture, Food and the Marine (DAFM) Forest Service is required as part of the Proposed Project.

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 Water 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 9.5.2.1 of Chapter 9 Water with regard surface water quality protection for this activity which is summarised below. Also, prior to the commencement of subsequent road construction the following key temporary drainage measures will be installed:

- Interceptor drains will convey clean runoff water around works areas to the existing downstream drainage system (field drains and main drains).
- Silt traps and check dams will be installed in field drains downstream of over the edge (OTE) drainage areas, and these will provide attenuation and treatment of dirty water.
- Silt fences will be emplaced within drains down-gradient of all construction areas.

Before the commencement of any vegetation removal works, an EnvCoW shall be appointed to oversee the works. The EnvCoW shall be experienced and competent, and shall have the following functions as proposed in the planning application:

- Attend the site for the setup period when drainage protection works are being installed and be present on site during the remainder of the works;
- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below);

- Be responsible for preparing and delivering the Environmental Toolbox Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with the proposals outlined in Section 4 below;
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures;
    - Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
    - Sampling shall be taken from the stream/riverbank, with no in-stream access permitted;
    - The following minimum analytical suite shall be used: potential of Hydrogen (pH), Emulsifiable Concentrate (EC), Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD), Total Phosphorus (Total P), Orthophosphate (Ortho-P), Total Nitrogen (Total N), and Ammonia;
    - Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions;
    - Prepare and maintain a contingency plan;
    - Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed; and
    - Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the EnvCoW.

Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses as a result of vegetation removal are as follows:

- The felling will be completed primarily by hand in order to limit disturbance;
- If machinery is required, works will be undertaken using machinery which are most suitable for the ground conditions and which will minimise soil disturbance;
- Where possible, trees will be felled away from drains to prevent the unnecessary deposition of peat or brash into the bog drains;
- Where machinery is required, brash/bog mats will be used to protect the peat surface and reduce erosion;
- Silt fences will be installed downgradient of the works to intercept potentially silt laden runoff; and,
- Works will be completed during periods of low rainfall.

Table 3-1 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

3.3.4 Peat Deposition Areas

It is proposed to manage any excess overburden generated through construction activities within the Proposed Project site, in 2 no. peat deposition areas, as shown in Figure 4-1 in Chapter 4 of the EIAR,

in linear berms along access roads where appropriate, and landscaping. Further details are provided in the Peat and Spoil Management Plan (Appendix 4-3 of the EIAR).

During the initial placement of peat and spoil, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from the storage areas as required. Interceptor and collector drains will be used at storage areas. 'Siltbuster' treatment trains will be employed if previous treatment is not to a high quality.

3.3.5 Borrow Pit Drainage

It is intended to obtain crushed stone that will be required for the construction of the Proposed Project from 4 no. proposed onsite borrow pits. As the borrow pit excavation progress and become deeper, surface water and groundwater ingress will be removed via pumping to settlement ponds, and re-distribution locally across natural vegetated areas. Where required, additional specialist water treatment measures will be employed to ensure no deterioration in downstream water quality occurs.

Temporary control of groundwater within the borrow pits may be required and measures will be determined as part of the ground investigation programme. A temporary pump and suitable outfall locations will be required during construction.

Settlement ponds have been designed at the lower side/outfall location of the borrow pits.

4. SURFACE WATER QUALITY MONITORING

This section of the SWMP 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. The SOWOR is provided as Appendix B to this SWMP.

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;
- 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. 673 of 2025: European Union (Drinking Water) Regulations 2025, which give effect to the requirements off the EU Drinking Water Directive; and
- S.I. No. 355 of 2018: European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2018.

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.

4.1.1 Pre-Construction Baseline Monitoring

Water quality field testing and laboratory analysis will be undertaken prior to commencement of vegetation removal and construction at the site. The monitoring programme will be subject to agreement with Offaly 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) and sampling will be undertaken at designated locations as outlined in Figure 4-1 below.

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 bog 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.

4.2 Construction Phase Monitoring

4.2.1 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 (i.e., Lemanaghan Stream) that interacts with the Proposed Project, 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 are shown in Figure 4-1 of this SWMP and will be confirmed by the Project Hydrologist and EnvCoW, prior to the commencement of the construction phase, and a Daily Visual Check Sheet Template is included in Appendix C. Daily Visual Inspections are subject to change upon commencement of construction activity and works in progress within the catchment areas.

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 EnvCoW or a suitably qualified and competent person as delegated by the EnvCoW;
- 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 EnvCoW 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/ EnvCoW during construction phase;
- Quarterly site inspections by the Project Hydrologist/ EnvCoW 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.

4.2.2 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 Proposed Project site with further sampling points added as deemed necessary by the EnvCoW in consultation with the Project Hydrologist and Site Manager.

4.2.3 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 EnvCoW 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.

4.2.4 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.

4.3 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 this SWMP 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 EnvCoW 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 EnvCoW will notify the contractor, the developer and project design team including the Project Hydrologist. The EnvCoW'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.

4.3.1 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 EnvCoW 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.

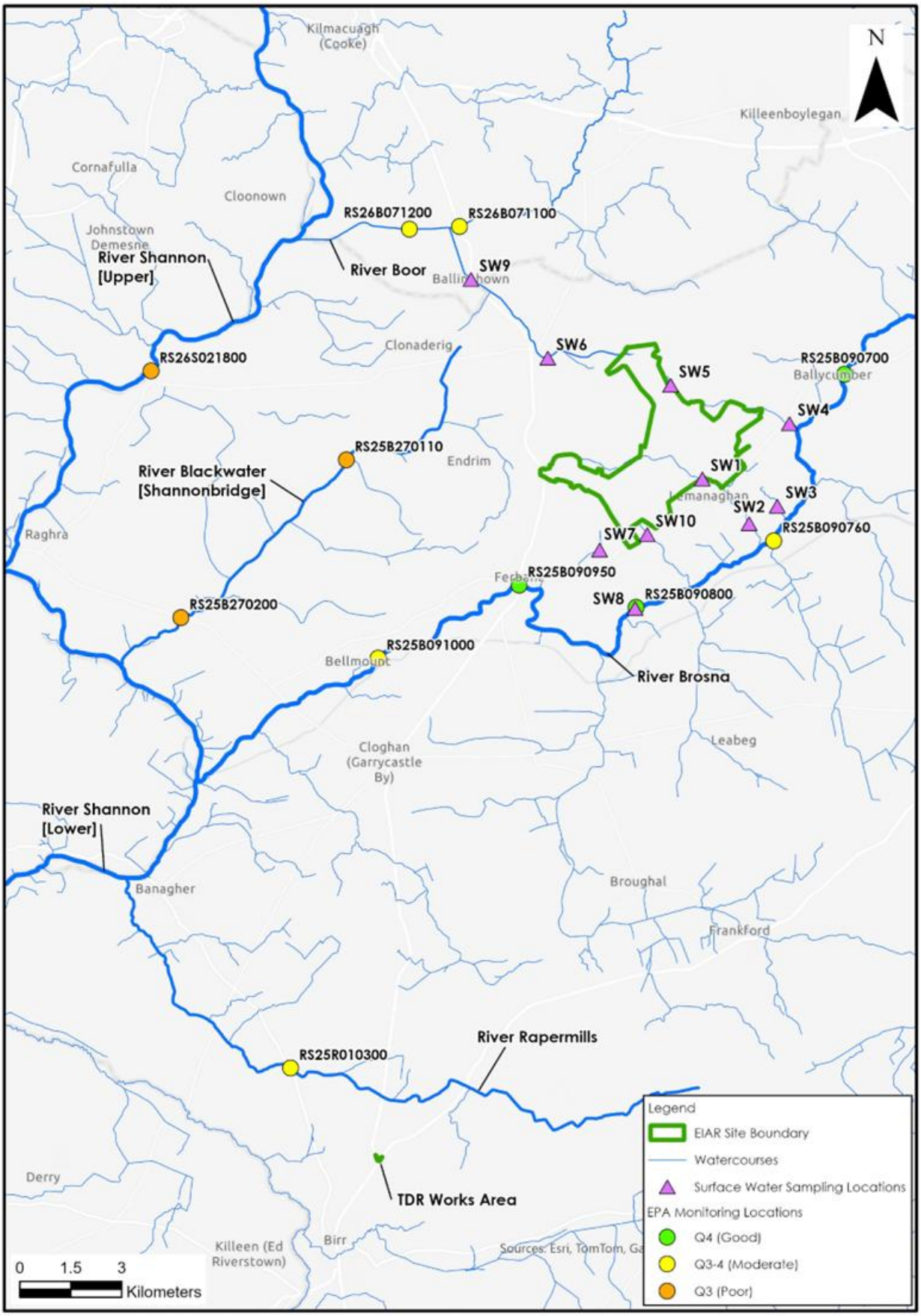
4.3.2 Post Construction Monitoring

4.3.2.1 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.

Surface water sampling and visual inspection locations are presented in Figure 4-1 below.

Figure 4-1 Surface Water Sampling and Visual Inspection Locations



5. COMPLIANCE AND REVIEW

5.1 Site Inspections and Auditing

Routine inspections of construction activities will be carried out on a daily and weekly basis by the EnvCoW 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 SWMP will be reviewed in line with the CEMP and updated as required prior to commencement of construction to address any relevant planning conditions and mitigation measures, and also every six months thereafter during the construction phase of the Proposed Project.

References

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

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

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PPG5 – Works or Maintenance in or Near Water Courses (UK Guidance Note)

Scottish Natural Heritage, 2010: Good Practice During Wind Farm Construction

Wind Energy Development Guidelines for Planning Authorities, 2006 (the DoEHLG 2006 Guidelines)

APPENDIX A

DRAINAGE DESIGN DRAWINGS

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be discharged or pumped directly to any natural watercourse. All discharges will be made over open ground or into existing field drains with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material will be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that will not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of suitable splash plates, and/or other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where (temporary) deep excavations are proposed, cut-off drains or existing field drains will be used to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of temporary exposed ground and temporary stockpiles open/exposed at any time will be minimised.

Site Tracks

11. Use of existing field drains or track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, on an impermeable surface and away from field drains / ditches and watercourses/waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Concrete pours will be managed and supervised to ensure there will be no leakage/seepage/discharge of concrete or concrete water during the construction phase.
16. Concrete wash water, and waste concrete will be managed appropriately on site at a lined concrete wash out pit(s).

If water pollution is identified the following steps would be adhered to:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around any source of pollution.

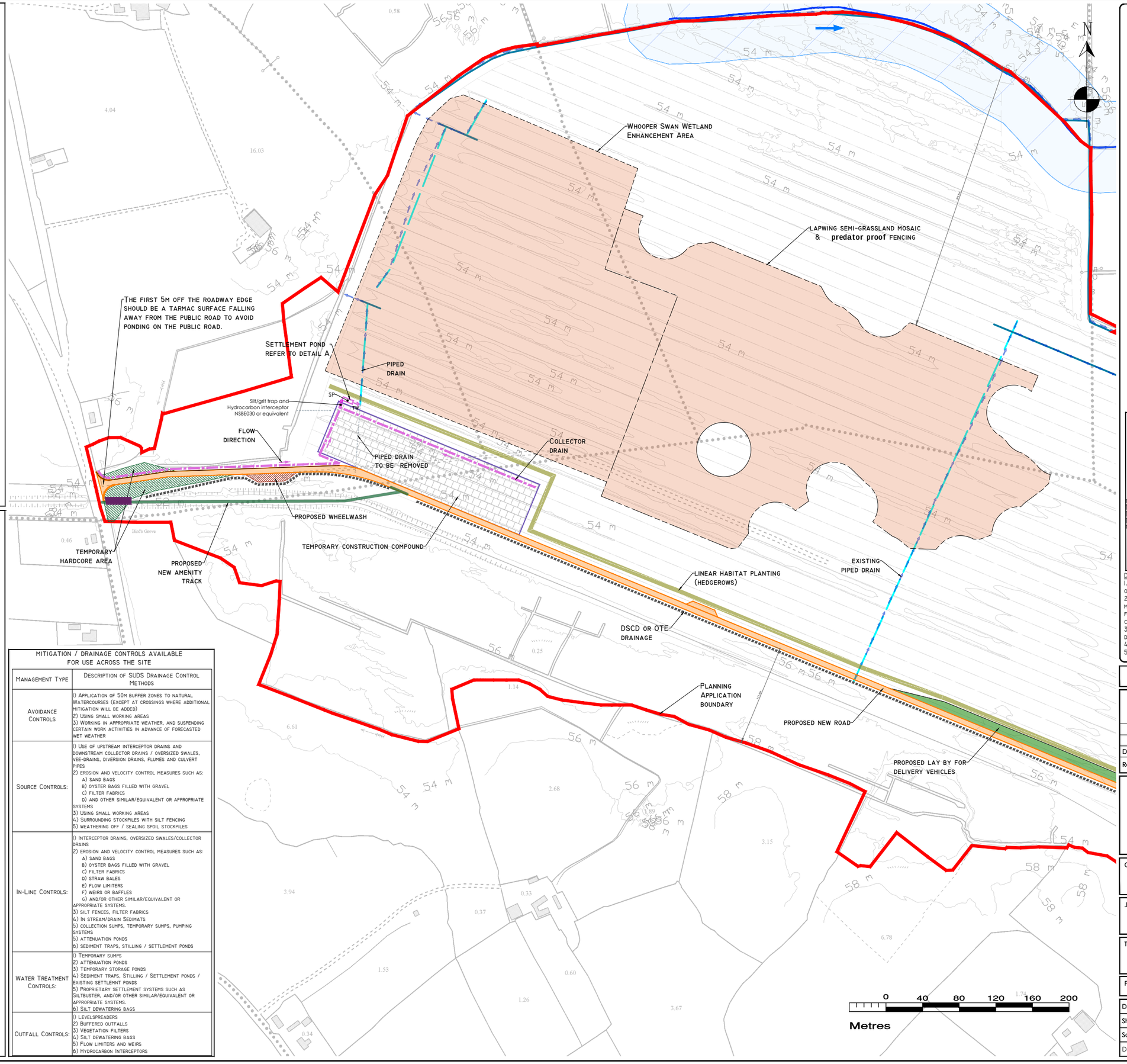
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive receptors.

DRAINAGE NOTES:

1. Site Tracks and Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, will be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS drainage system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/silt traps or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / existinf field drains will be used to collect upstream surface water flows. Regular cross drains / discharge to field ditches/drains will be installed to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Optimum locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into any existing watercourses.
7. A buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches. This buffer will not be possible at river/stream crossings, but other suitable controls are proposed in those areas (i.e. additional silt fencing).
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / field drains to be shallow with moderate gradients to prevent scouring. In steep areas check dams will be installed to reduce flow velocities and provide source control of silt containment. These have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depend on the catchment area being served. Sample pond sizes for various catchment areas shown on Drawing D501.
11. Straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. Silt fences may be removed when suitable vegetation cover is established.
12. Silt fences to be provided along the edge of existing watercourses where works comes within <15m of edge of any ditch / drain / ephemeral channel.
13. Slopes of the swales / ditches to be vegetated or protected from erosion until vegetation has been established. Stripped vegetative layer ('peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation will be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams / silt traps will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams /silt traps to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will only be stored within bunded containment structures.
20. Temporary use of silt bags will be used on site where pumping from excavations is required.

MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

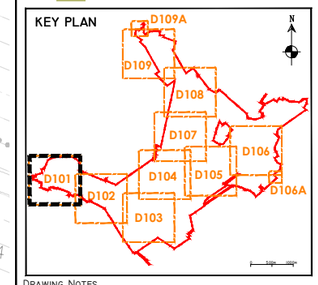
Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses (except at crossings where additional mitigation will be added) 2) Using small working areas 3) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) Weathering off / sealing spoil stockpiles
In-Line Controls:	1) Interceptor drains, oversized swales/collector drains 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) Straw bales E) Flow limiters F) Weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) Silt fences, filter fabrics 4) In stream/drain Sedimats 5) Collection sumps, temporary sumps, pumping systems 5) Attenuation ponds 6) Sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) Attenuation ponds 3) Temporary storage ponds 4) Sediment traps, Stilling / Settlement ponds / existing settlemnt ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs 6) Hydrocarbon interceptors



Drawing Legend :

- Existing Drainage
  - Watercourses
  - Watercourses 50m buffer
  - Watercourses 20m buffer
  - Stream flow direction
  - Existing main drains
  - Redirected main drains
  - Existing piped drains
  - Field drain
  - Existing settlement ponds
- Proposed Drainage
  - Upstream Interceptor Drain
  - Downstream Collector Drain (DSCD)
  - DSCD or Over The Edge (OTE)
  - Indicative Direction of Flow
  - Silt Fences
  - WF Settlement Pond
  - Level Spreader
  - Proposed Culverts/Bridges
  - Interceptor Drain Culvert
  - Collector Drain Culvert
  - O Overland Flow Discharge
  - TW Treated Water Discharge
  - SP WF Settlement Pond
  - BP-SP Borrow Pit Settlement Pond
- Planning Application Boundary
- Existing Ground Surface Minor Contour (2 m Interval)
- Turbine and Swept Area
- Turbine Foundation
- Crane Platform/Hardstand
- Existing Roads To Be Upgraded
- Proposed New Roads
- Existing Roads To Be Upgraded For Amenity
- New Amenity Tracks
- Borrow Pit
- Substation
- Temporary Construction Compound
- Substation Temporary Construction Compound
- Met Mast
- Peat Deposition Areas
- Cable Trench And Works Area
- Lay By For Delivery Vehicles
- Existing Pump Stations
- Crane Pads
- Tower Hardstand
- Temporary Access Track
- Existing Overhead Line
- Proposed Grid Connection
- Habitat Enhancement Areas
- Lapwing Semi-Grassland Mosaic
- Linear Habitat Planting

KEY PLAN



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Date	Description	Chkd	Signed
Revisions			

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Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: **Proposed Drainage Layout**

Figure No: D101

Drawing No: P1540-0-0326-A1-D101-00A	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

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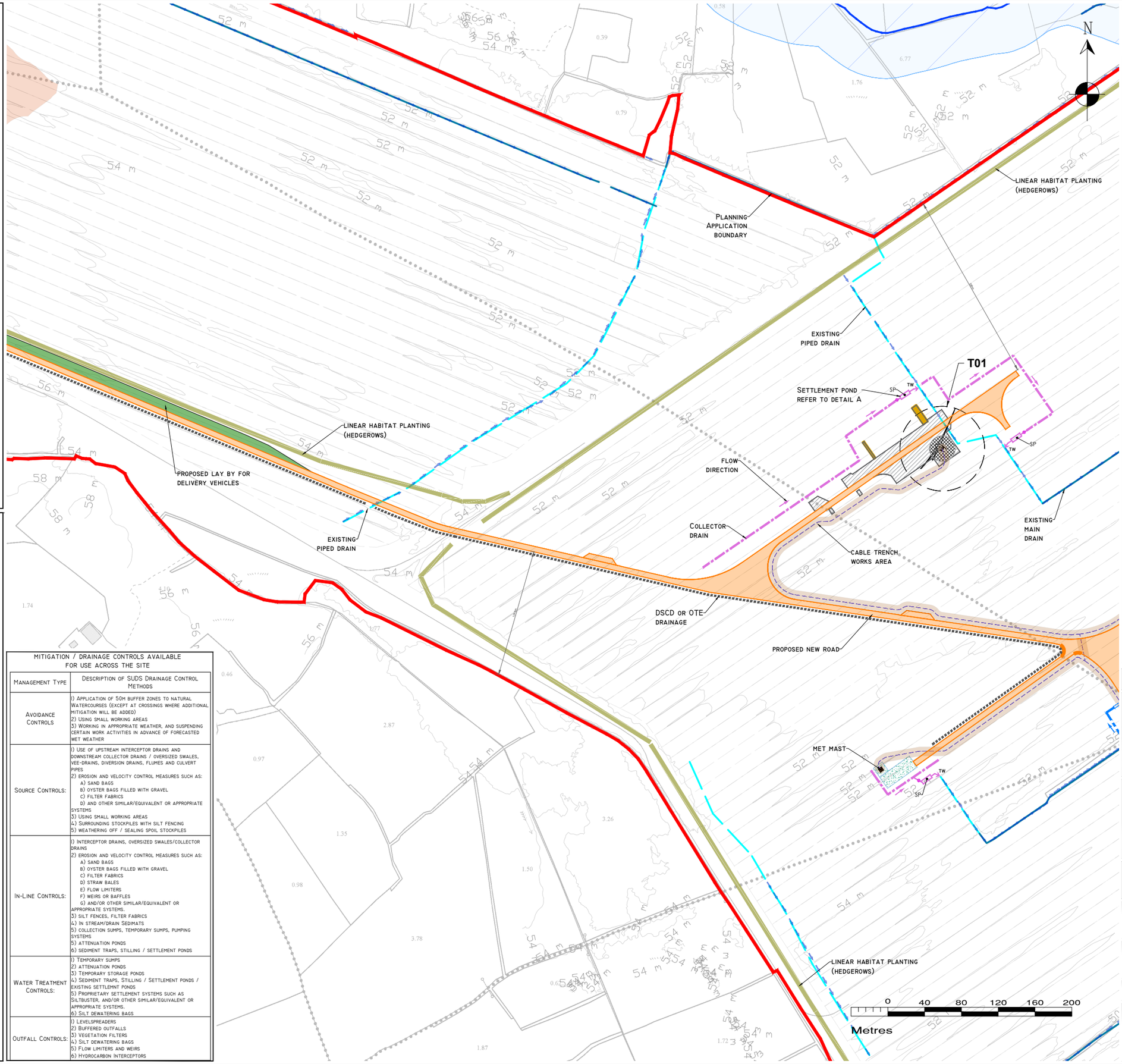
7. A buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches. This buffer will not be possible at river/stream crossings, but other suitable controls are proposed in those areas (i.e. additional silt fencing).
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / field drains to be shallow with moderate gradients to prevent scouring. In steep areas check dams will be installed to reduce flow velocities and provide source control of silt containment. These have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depend on the catchment area being served. Sample pond sizes for various catchment areas shown on Drawing D501.
11. Straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. Silt fences may be removed when suitable vegetation cover is established.
12. Silt fences to be provided along the edge of existing watercourses where works comes within <15m of edge of any ditch / drain / ephemeral channel.
13. Slopes of the swales / ditches to be vegetated or protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation will be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams / silt traps will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams /silt traps to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will only be stored within bunded containment structures.
20. Temporary use of silt bags will be used on site where pumping from excavations is required.

MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural watercourses (except at crossings where additional mitigation will be added) 2) Using small working areas 3) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) And other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) Weathering off / sealing spoil stockpiles
In-Line Controls:	1) Interceptor drains, oversized swales/collector drains 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) Straw bales E) Flow limiters F) Weirs or baffles G) And/or other similar/equivalent or appropriate systems. 3) Silt fences, filter fabrics 4) In stream/drain Sedimats 5) Collection sumps, temporary sumps, pumping systems 5) Attenuation ponds 6) Sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) Attenuation ponds 3) Temporary storage ponds 4) Sediment traps, Stilling / Settlement ponds / existing settlemnt ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs 6) Hydrocarbon interceptors



Drawing Legend :

Existing Drainage
- Watercourses
- Watercourses 50m buffer
- Watercourses 20m buffer
- Stream flow direction
- Existing main drains
- Redirected main drains
- Existing piped drains
- Field drain
- Existing settlement ponds

Proposed Drainage
- Upstream Interceptor Drain
- Downstream Collector Drain (DSCD)
- DSCD or Over The Edge (OTE)
- Indicative Direction of Flow
- Silt Fences
- WF Settlement Pond
- Level Spreader
- Proposed culverts/bridges
- Interceptor Drain Culvert
- Collector Drain Culvert
- O Overland Flow Discharge
- TW Treated Water Discharge
- SP WF Settlement Pond
- BP-SP Borrow Pit Settlement Pond

- Planning Application Boundary
- Existing ground surface minor contour (2 m interval)
- Turbine and swept area
- Turbine foundation
- Crane platform/hardstand
- Existing roads to be upgraded
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- Existing roads to be upgraded for amenity
- New amenity tracks
- Borrow pit
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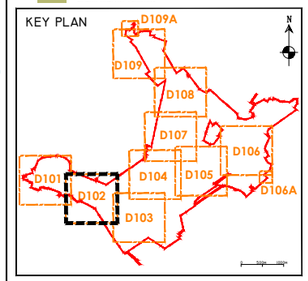
- Tower hardstand
- Temporary access track
- Existing overhead line
- Proposed grid connection
- Habitat enhancement areas
- Lapwing semi-grassland mosaic
- Linear habitat planting

KEY PLAN



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Date	Description	Chkd	Signed
Revisions			

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Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

Figure No: D102

Drawing No: P1540-0-0326-A1-D102-00A	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be discharged or pumped directly to any natural watercourse. All discharges will be made over open ground or into existing field drains with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material will be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that will not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of suitable splash plates, and/or other similar discharge controls.
8. Vegetation will not be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where (temporary) deep excavations are proposed, cut-off drains or existing field drains will be used to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of temporary exposed ground and temporary stockpiles open/exposed at any time will be minimised.

Site Tracks

11. Use of existing field drains or track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, on an impermeable surface and away from field drains / ditches and watercourses/waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Concrete pours will be managed and supervised to ensure there will be no leakage/seepage/discharge of concrete or concrete water during the construction phase.
16. Concrete wash water, and waste concrete will be managed appropriately on site at a lined concrete wash out pit(s).

If water pollution is identified the following steps would be adhered to:

Stop - work in the immediate area should be stopped and the source of the pollution identified.

Contain - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around any source of pollution.

Notify - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive receptors.

DRAINAGE NOTES:

1. Site Tracks and Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, will be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS drainage system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/silt traps or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / existinf field drains will be used to collect upstream surface water flows. Regular cross drains / discharge to field ditches/drains will be installed to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Optimum locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into any existing watercourses.
7. A buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches. This buffer will not be possible at river/stream crossings, but other suitable controls are proposed in those areas (i.e. additional silt fencing).
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
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10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depend on the catchment area being served. Sample pond sizes for various catchment areas shown on Drawing D501.
11. Straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. Silt fences may be removed when suitable vegetation cover is established.
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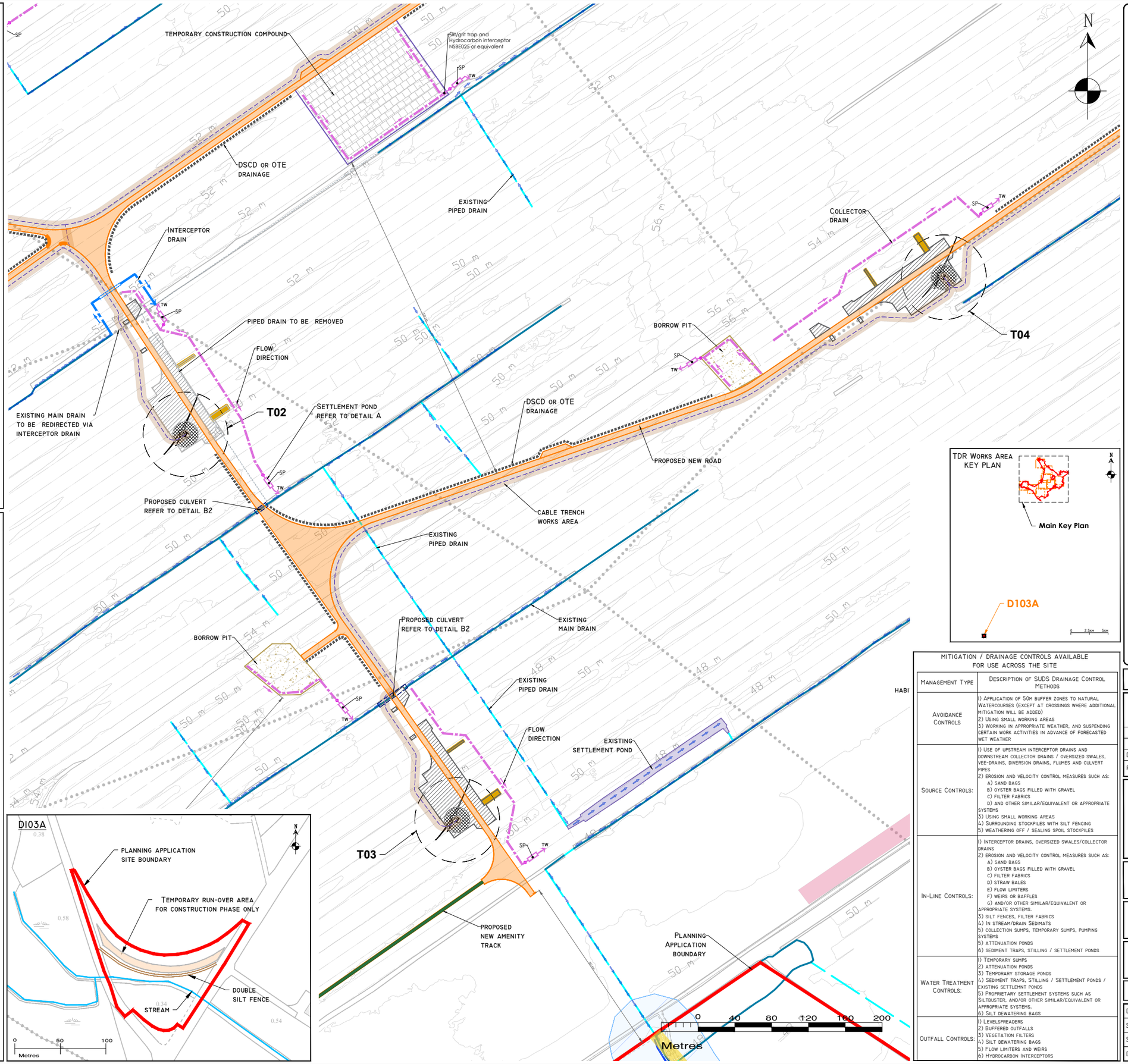
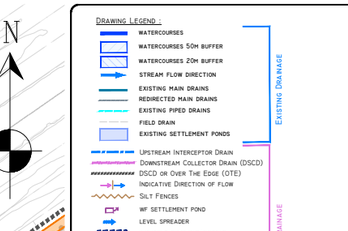
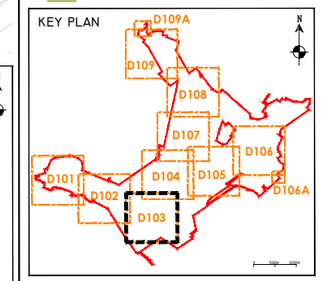
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams / silt traps will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams /silt traps to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will only be stored within bunded containment structures.
20. Temporary use of silt bags will be used on site where pumping from excavations is required.







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MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural watercourses (except at crossings where additional mitigation will be added) 2) Using small working areas 3) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) Weathering off / sealing spoil stockpiles
In-Line Controls:	1) Interceptor drains, oversized swales/collector drains 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) Straw bales E) Flow limiters F) Weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) Silt fences, filter fabrics 4) In stream/drain Sedimats 5) collection sumps, temporary sumps, pumping systems 5) Attenuation ponds 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) Attenuation ponds 3) Temporary storage ponds 4) Sediment traps, Stilling / Settlement ponds / existing settlemnt ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs 6) Hydrocarbon interceptors

Date	Description	Chkd	Signed
Revisions			

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Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

Figure No: DI03

Drawing No: P1540-0-0326-A1-D103-00B	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

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8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

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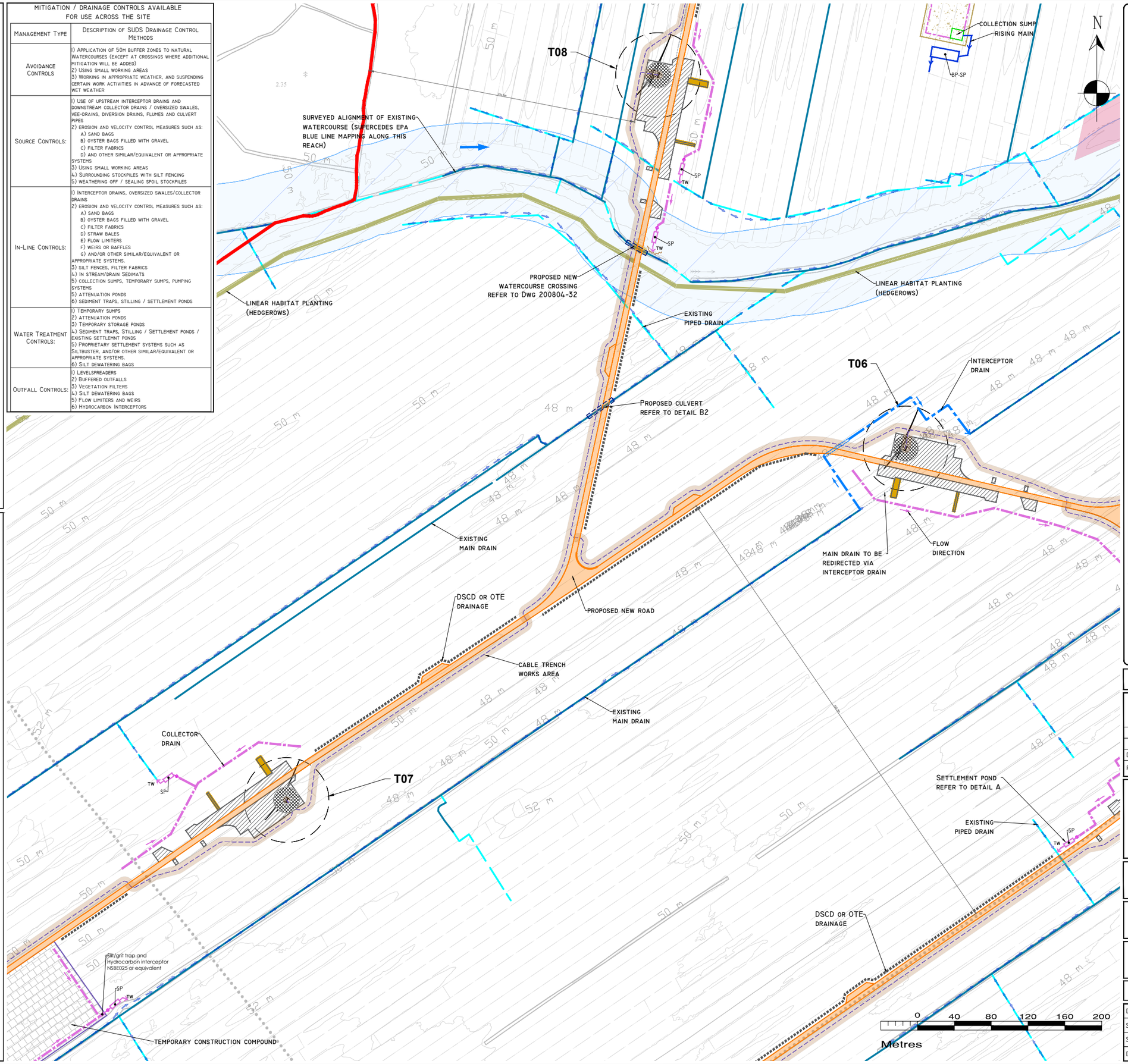
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs 6) Hydrocarbon Interceptors



Drawing Legend :

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- Peat deposition areas
- Cable trench and works area
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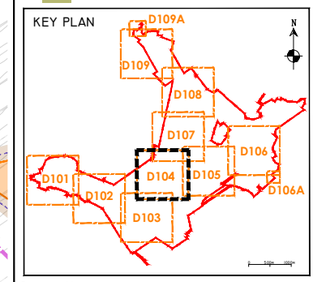
- Habitat enhancement areas
- Lapwing semi-grassland mosaic
- Linear habitat planting

KEY PLAN



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Date	Description	Chkd	Signed
Revisions			

HYDRO ENVIRONMENTAL SERVICES
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Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

Figure No: D104

Drawing No: P1540-0-0326-A1-D104-00A	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be discharged or pumped directly to any natural watercourse. All discharges will be made over open ground or into existing field drains with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material will be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that will not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of suitable splash plates, and/or other similar discharge controls.
8. Vegetation will not be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where (temporary) deep excavations are proposed, cut-off drains or existing field drains will be used to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of temporary exposed ground and temporary stockpiles open/exposed at any time will be minimised.

Site Tracks

11. Use of existing field drains or track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, on an impermeable surface and away from field drains / ditches and watercourses/waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Concrete pours will be managed and supervised to ensure there will be no leakage/seepage/discharge of concrete or concrete water during the construction phase.
16. Concrete wash water, and waste concrete will be managed appropriately on site at a lined concrete wash out pit(s).

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NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive receptors.

DRAINAGE NOTES:

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3. SUDS drainage system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/silt traps or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
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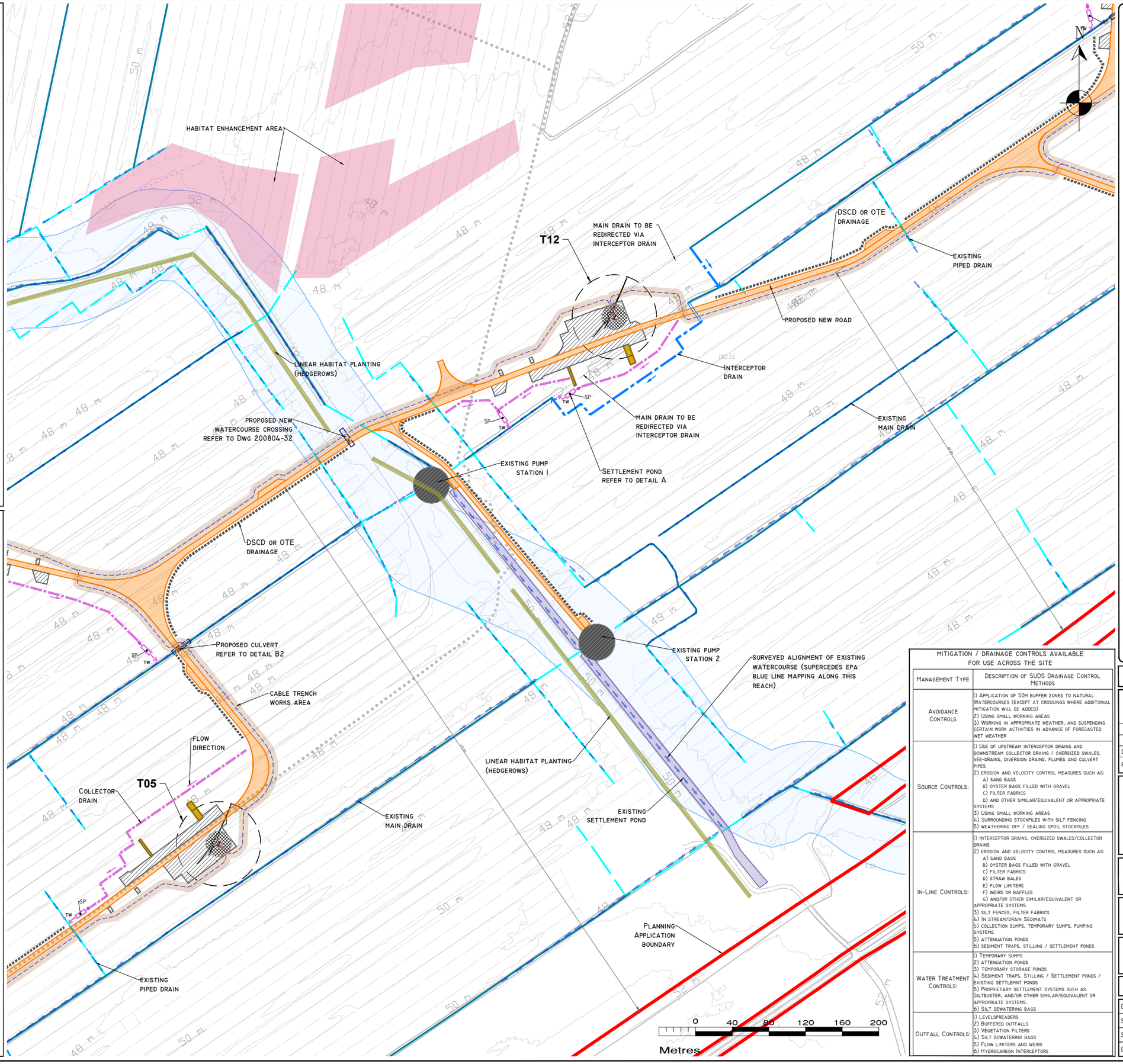
7. A buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches. This buffer will not be possible at river/stream crossings, but other suitable controls are proposed in those areas (i.e. additional silt fencing).
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / field drains to be shallow with moderate gradients to prevent scouring. In steep areas check dams will be installed to reduce flow velocities and provide source control of silt containment. These have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depend on the catchment area being served. Sample pond sizes for various catchment areas shown on Drawing D501.
11. Straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provided along the edge of existing watercourses where works comes within <15m of edge of any ditch / drain / ephemeral channel.
13. Slopes of the swales / ditches to be vegetated or protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation will be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams / silt traps will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams /silt traps to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will only be stored within bunded containment structures.
20. Temporary use of silt bags will be used on site where pumping from excavations is required.



Drawing Legend :

- Existing Drainage
  - Watercourses
  - Watercourses 50m buffer
  - Watercourses 20m buffer
  - Stream flow direction
  - Existing main drains
  - Redirected main drains
  - Existing piped drains
  - Field drain
  - Existing settlement ponds
- Proposed Drainage
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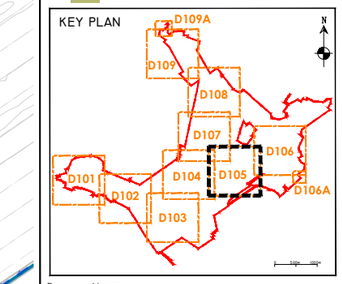
  - Downstream Collector Drain (DSCD)
  - DSCD or Over The Edge (OTE)
  - Indicative Direction of Flow
  - Silt Fences
  - WF settlement pond
  - Level spreader
  - Proposed culverts/bridges
  - Interceptor Drain Culvert
  - Collector Drain Culvert
  - O Overland Flow Discharge
  - TW Treated Water Discharge
  - SP WF Settlement Pond
  - BP-SP Borrow Pit Settlement Pond
- Planning Application Boundary
- Existing ground surface minor contour (2 m interval)
- Turbine and swept area
- Turbine foundation
- Crane platform/hardstand
- Existing roads to be upgraded
- Proposed new roads
- Existing roads to be upgraded for amenity
- New amenity tracks
- Borrow pit
- Substation
- Temporary construction compound
- Substation temporary construction compound
- Met mast
- Peat deposition areas
- Cable trench and works area
- Lay by for delivery vehicles
- Existing pump stations
- Crane pads
- Tower hardstand
- Temporary access track
- Existing overhead line
- Proposed grid connection
- Habitat enhancement areas
- Lapwing semi-grassland mosaic
- Linear habitat planting

KEY PLAN



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MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses (except at crossings where additional mitigation will be added) 2) Using small working areas 3) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) Weathering off / sealing spoil stockpiles
In-Line Controls:	1) Interceptor drains, oversized swales/collector drains 2) Erosion and velocity control measures such as: A) Sand bags B) Oyster bags filled with gravel C) Filter fabrics D) Straw bales E) Flow limiters F) Weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) Silt fences, filter fabrics 4) In stream/drain Sediments 5) Collection sumps, temporary sumps, pumping systems 5) Attenuation ponds 6) Sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) Attenuation ponds 3) Temporary storage ponds 4) Sediment traps, Stilling / Settlement ponds / existing settlemnt ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs 6) Hydrocarbon interceptors

Date	Description	Chkd	Signed

Revisions

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Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

Figure No: DI05

Drawing No: P1540-0-0326-A1-D105-00A

Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

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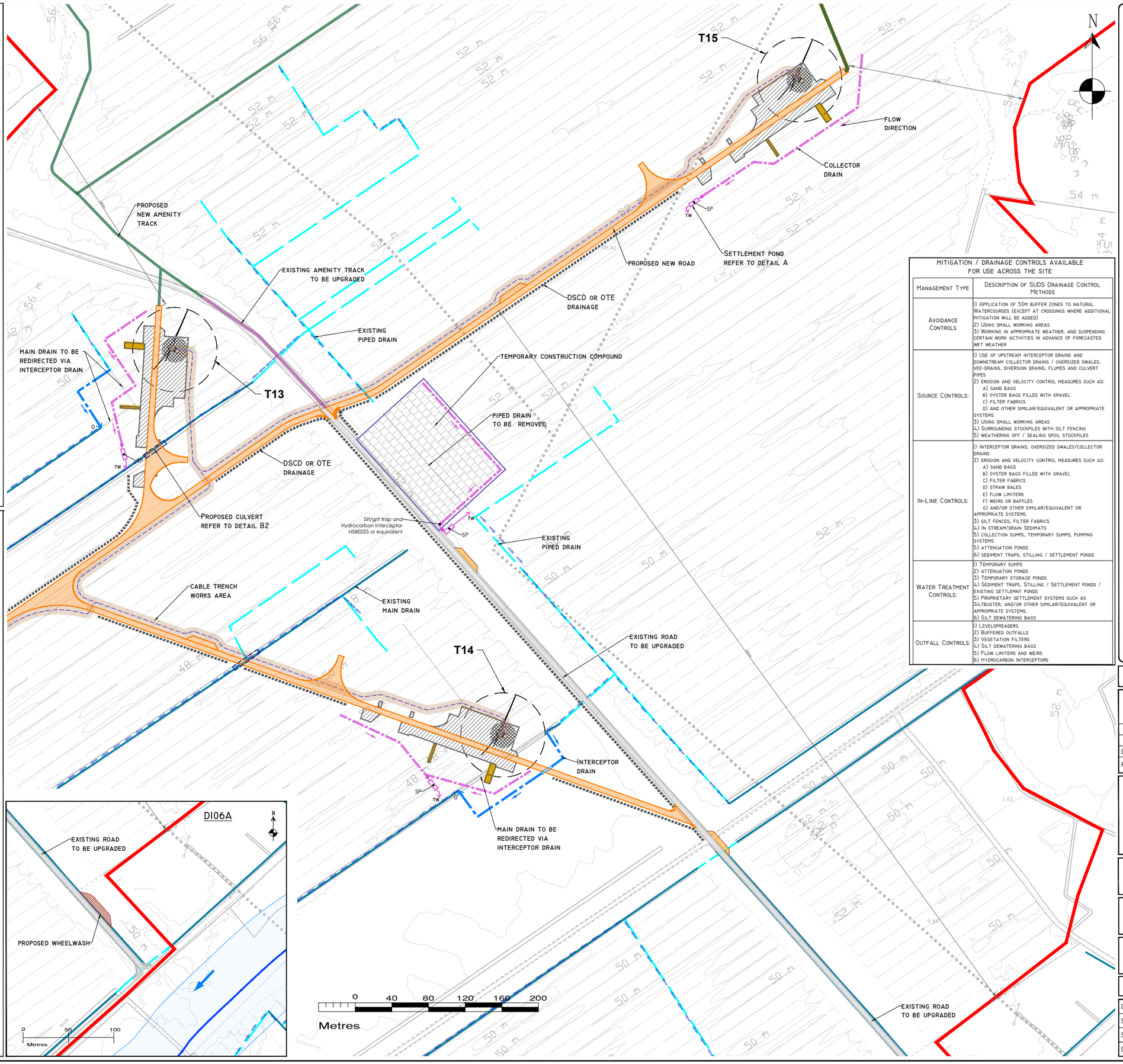

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Drawing Legend :

- Existing Drainage
  - Watercourses
  - Watercourses 50m buffer
  - Watercourses 20m buffer
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- Substation
- Temporary Construction Compound
- Substation Temporary Construction Compound
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- Habitat Enhancement Areas
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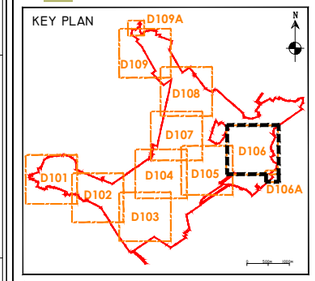
- Linear Habitat Planting

KEY PLAN



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Date	Description	Chkd	Signed
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Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

Figure No: DI06

Drawing No: P1540-0-0326-A1-D106-00A	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

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9. Track side swales / field drains to be shallow with moderate gradients to prevent scouring. In steep areas check dams will be installed to reduce flow velocities and provide source control of silt containment. These have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
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11. Straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. Silt fences may be removed when suitable vegetation cover is established.
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16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams / silt traps will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams /silt traps to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
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MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses (except at crossings where additional mitigation will be added) 2) Using small working areas 3) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
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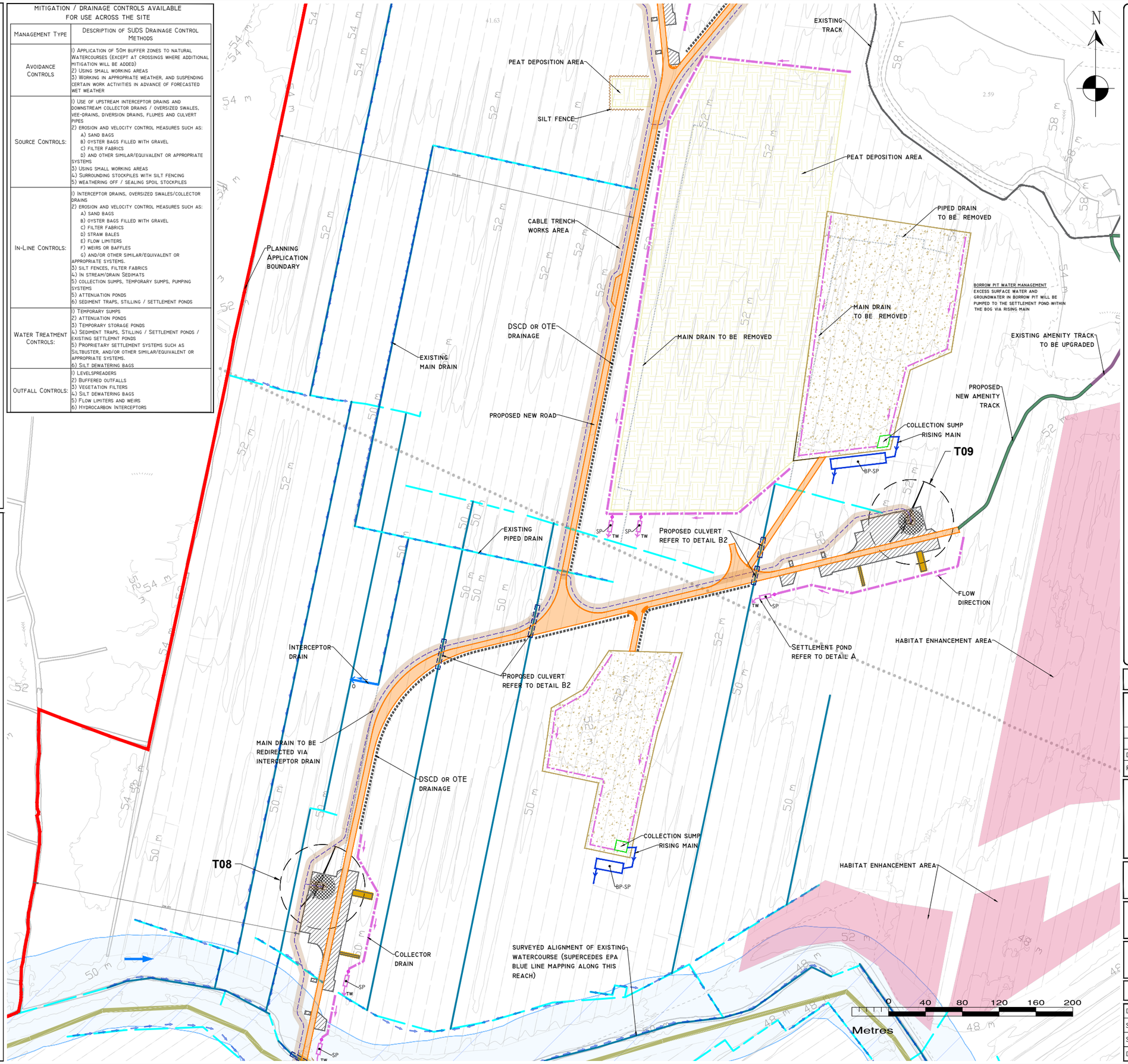
In-Line Controls:	1) interceptor drains, oversized swales/collector drains 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) straw bales E) flow limiters F) weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream/drain Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation ponds 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage ponds 4) Sediment traps, Stilling / Settlement ponds / existing settlemnt ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs 6) Hydrocarbon interceptors



Drawing Legend :

- Watercourses
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- Planning Application Boundary
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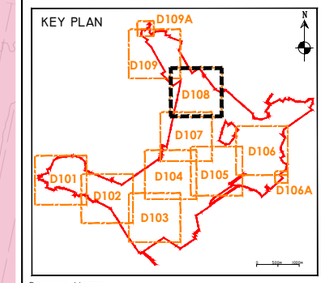
- Turbine and swept area
- Turbine foundation
- Crane platform/hardstand
- Existing roads to be upgraded
- Proposed new roads
- Existing roads to be upgraded for amenity
- New amenity tracks
- Borrow pit
- Substation
- Temporary construction compound
- Substation temporary construction compound
- Met mast
- Peat deposition areas
- Cable trench and works area
- Lay by for delivery vehicles
- Existing pump stations
- Crane pads
- Tower hardstand
- Temporary access track
- Existing overhead line
- Proposed GRID CONNECTION
- Habitat enhancement areas
- Lapwing semi-grassland mosaic
- Linear habitat planting

Existing Drainage / Proposed Drainage

KEY PLAN



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Date	Description	Chkd	Signed
Revisions			

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web: www.hydroenvironmental.ie

Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

Figure No: DI07

Drawing No: P1540-0-0326-A1-D107-00A	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be discharged or pumped directly to any natural watercourse. All discharges will be made over open ground or into existing field drains with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material will be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that will not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of suitable splash plates, and/or other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where (temporary) deep excavations are proposed, cut-off drains or existing field drains will be used to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of temporary exposed ground and temporary stockpiles open/exposed at any time will be minimised.

Site Tracks

11. Use of existing field drains or track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, on an impermeable surface and away from field drains / ditches and watercourses/waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Concrete pours will be managed and supervised to ensure there will be no leakage/seepage/discharge of concrete or concrete water during the construction phase.
16. Concrete wash water, and waste concrete will be managed appropriately on site at a lined concrete wash out pit(s).

If water pollution is identified the following steps would be adhered to:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around any source of pollution.

NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive receptors.

DRAINAGE NOTES:

1. Site Tracks and Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, will be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS drainage system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/silt traps or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / existinf field drains will be used to collect upstream surface water flows. Regular cross drains / discharge to field ditches/drains will be installed to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Optimum locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into any existing watercourses.
7. A buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches. This buffer will not be possible at river/stream crossings, but other suitable controls are proposed in those areas (i.e. additional silt fencing).
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
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MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
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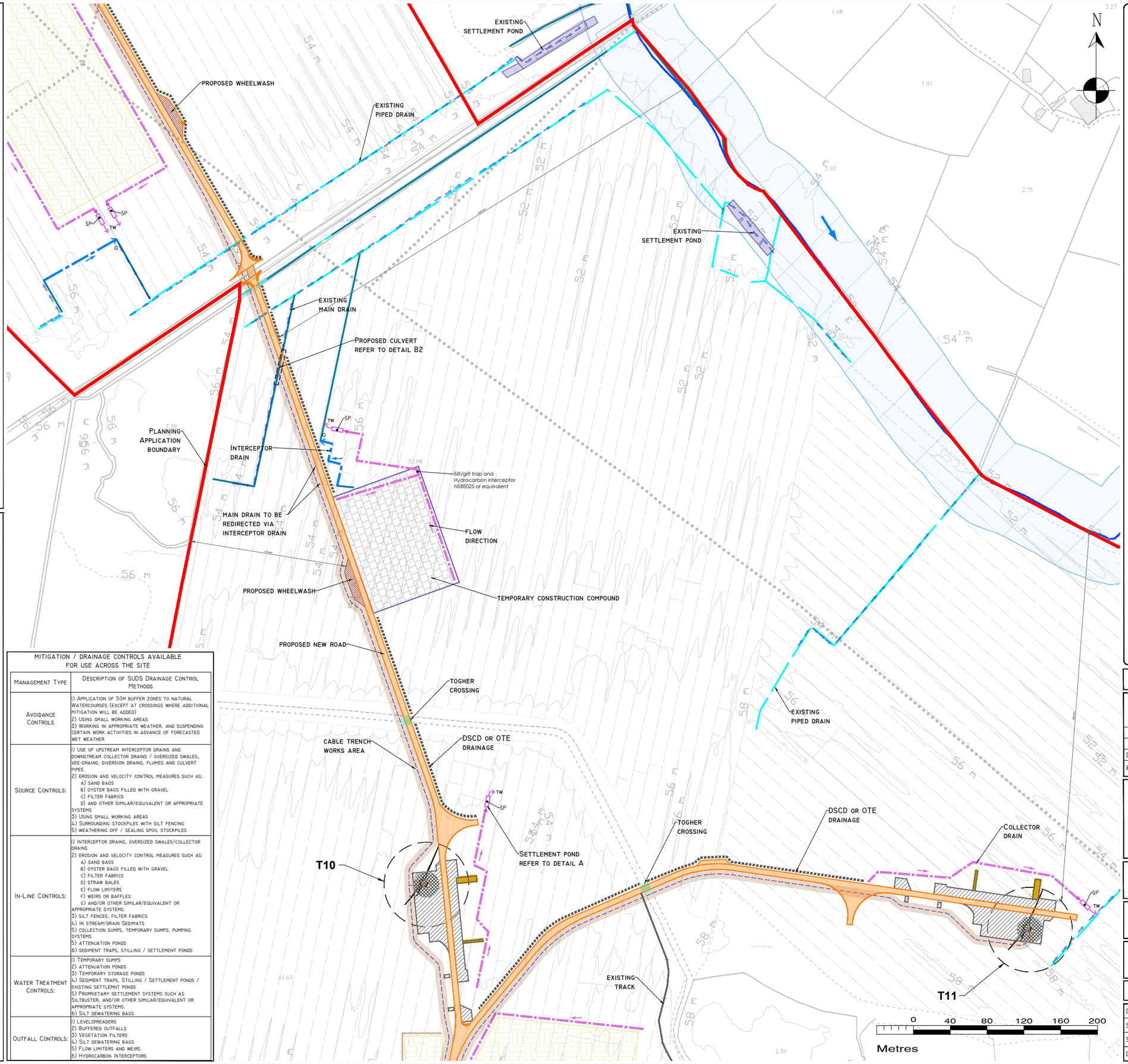

Drawing Legend :

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- Substation Temporary Construction Compound
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- Crane Pads
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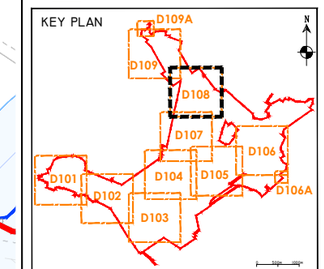
KEY PLAN



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Date	Description	Chkd	Signed

Revisions

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Client: Lemanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

Figure No: DI08

Drawing No: P1540-0-0326-A1-D108-00A	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

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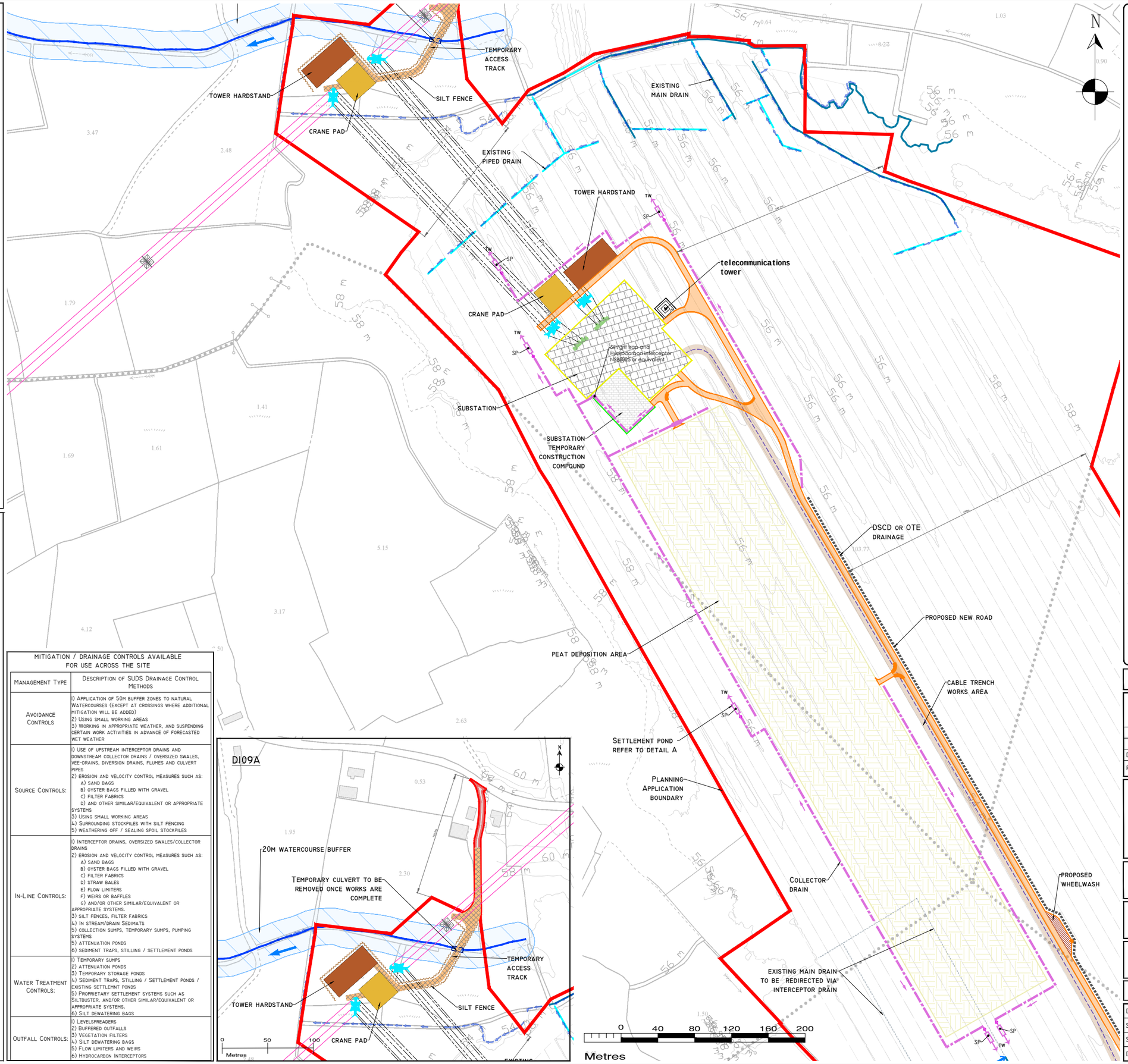

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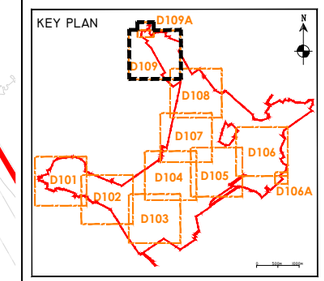
- Existing Roads to be Upgraded
- Proposed New Roads
- Existing Roads to be Upgraded for Amenity
- New Amenity Tracks
- Borrow Pit
- Substation
- Temporary Construction Compound
- Substation Temporary Construction Compound
- Met Mast
- Peat Deposition Areas
- Cable Trench and Works Area
- Lay by for Delivery Vehicles
- Existing Pump Stations
- Crane Pads
- Tower Hardstand
- Temporary Access Track
- Existing Overhead Line
- Proposed Grid Connection
- Habitat Enhancement Areas
- Lapwing Semi-Grassland Mosaic
- Linear Habitat Planting

KEY PLAN



Drawing Notes

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3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.
5. Drawings includes 1:5,000 OSi basemap tiles.

Date	Description	Chkd	Signed
Revisions			

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Client: Lemanaghan Wind Farm DAC

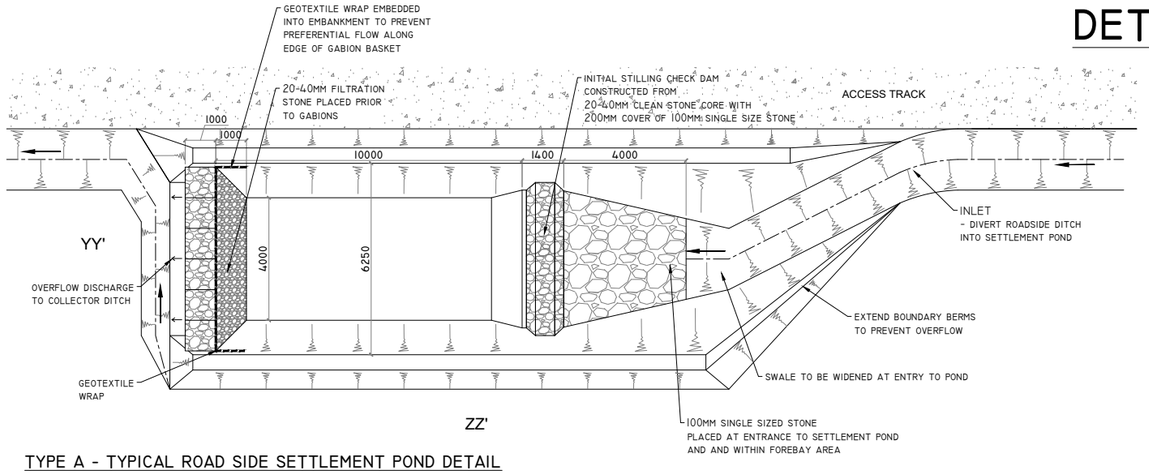
Job: Lemanaghan WF, Co. Offaly

Title: Proposed Drainage Layout

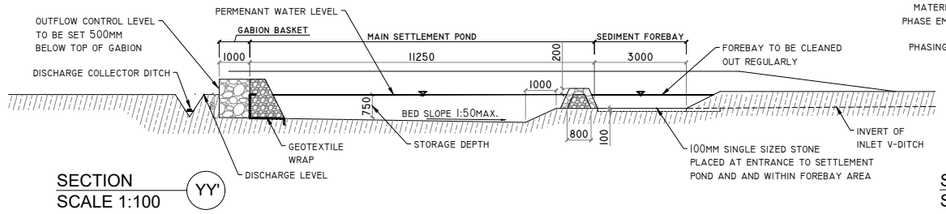
Figure No: D109

Drawing No: P1540-0-0326-A1-D109-00A	
Sheet Size: A1	Project No.: P1540-0
Scale: 1:2,000 (A1)	Drawn By: GA
Date: 18/03/2026	Checked By: MG

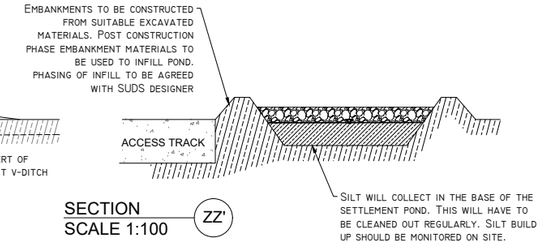
DETAIL AI



TYPE A - TYPICAL ROAD SIDE SETTLEMENT POND DETAIL
SCALE 1:100 (NOTE DIMENSIONS VARY DEPENDING ON CATCHMENT SIZE - SEE ATTACHED TABLE)

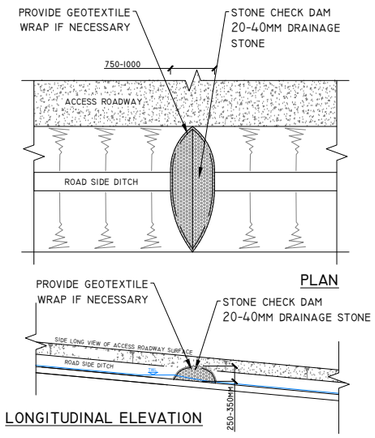


SECTION YY'
SCALE 1:100



SECTION ZZ'
SCALE 1:100

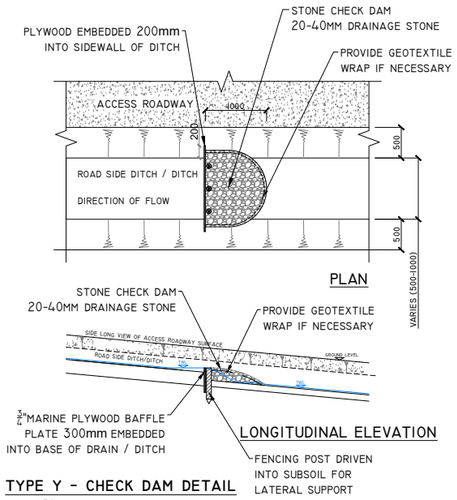
DETAIL C



LONGITUDINAL ELEVATION

TYPE X - CHECK DAM DETAIL
SCALE 1:50

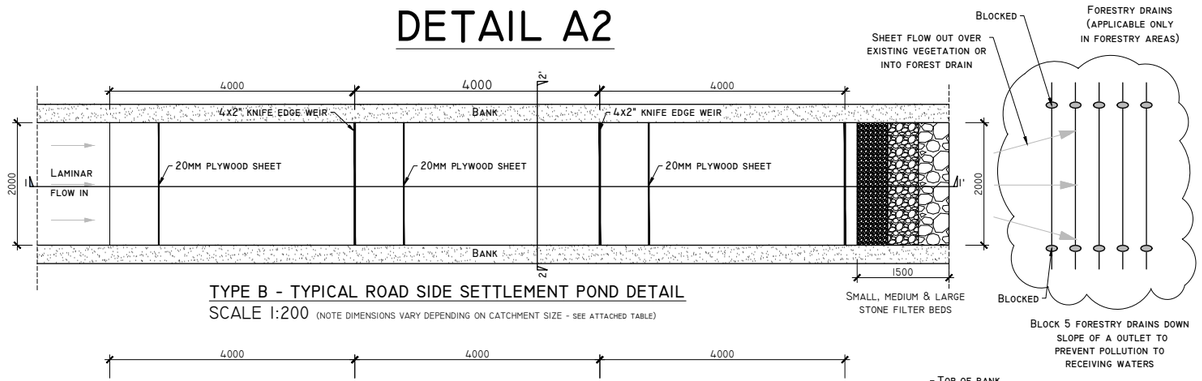
DETAIL D



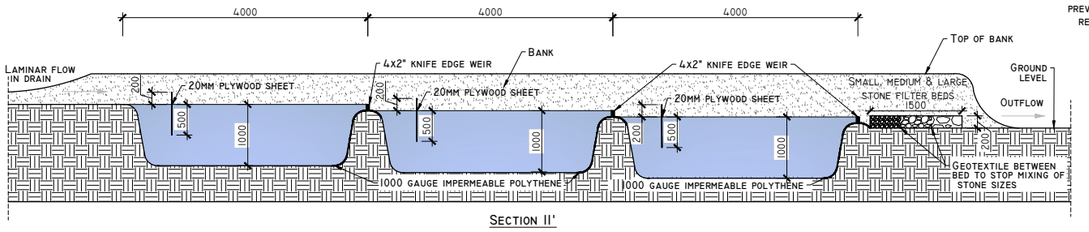
LONGITUDINAL ELEVATION

TYPE Y - CHECK DAM DETAIL
SCALE 1:50

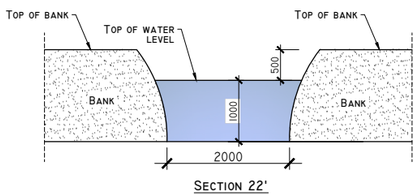
DETAIL A2



TYPE B - TYPICAL ROAD SIDE SETTLEMENT POND DETAIL
SCALE 1:200 (NOTE DIMENSIONS VARY DEPENDING ON CATCHMENT SIZE - SEE ATTACHED TABLE)

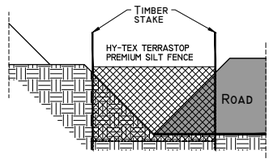


SECTION 11'



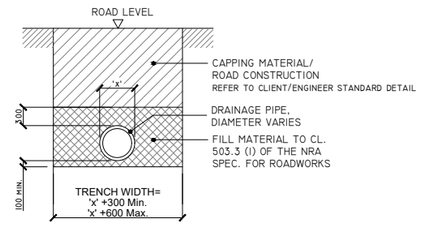
SECTION 22'

SEDIMENT FENCE/CHECK DAM DETAIL



POND SIZE W [M] x L [M] x D [M]			CATCHMENT SIZE (M^2)		
RETURN PERIOD	*10 YRS*	STORM DURATION	500	1000	2000
6HR RETENTION FOR COARSE SILT		6 HRS	2.6 x 6.8 x 1 M	3.6 x 10.0 x 1 M	5.1 x 14.0 x 1 M
11HR RETENTION FOR MEDIUM SILT		11 HRS	3.8 x 10.0 x 1 M	5.5 x 14.0 x 1 M	7.7 x 20.0 x 1 M
24HR RETENTION FOR FINE SILT		24 HRS	6.5 x 16 x 1 M	9.0 x 23.0 x 1 M	12.8 x 32.0 x 1 M

DETAIL B2



'TYPE B' CULVERT - DRAINAGE CROSSING BENEATH EXCAVATED ROAD
SCALE 1:50

Date	Description	Chkd	Signed

Revisions

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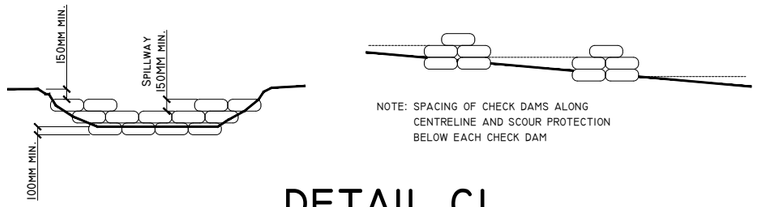
Client: LEMANAGHAN WIND FARM DAC

Job: LEMANAGHAN WF, CO. OFFALY

Title: DRAINAGE DETAILS 1

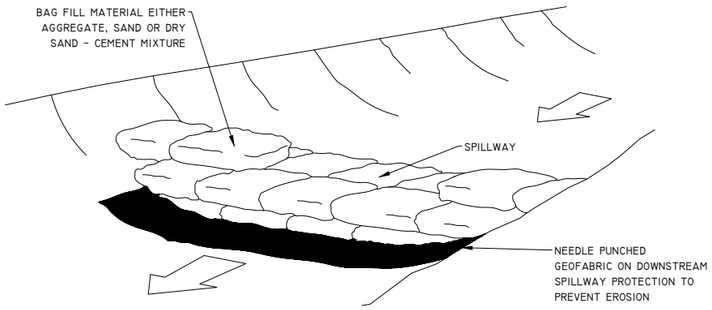
Figure No: D501

Drawing No: P1540-0-0326-A1-D501-Rev A	
Sheet Size: A1	Project No.: P1540-0
Scale: as shown (A1)	Drawn By: GA
	Checked By: M.G.



NOTE: SPACING OF CHECK DAMS ALONG CENTRELINE AND SCOUR PROTECTION BELOW EACH CHECK DAM

DETAIL CI

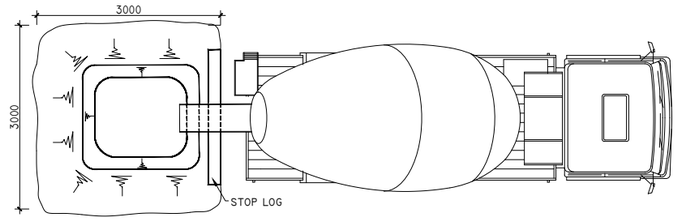


TEMPORARY CHECK DAM / SETTLEMENT POND OVERFLOW
SAND FILLED BAG CONSTRUCTION
SCHEMATIC - NOT TO SCALE

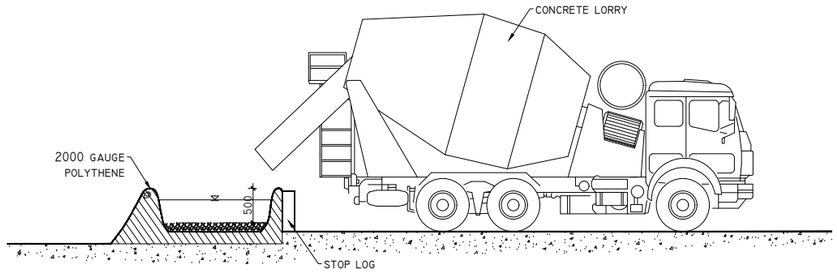
DETAIL F

TEMPORARY CONCRETE WASH OUT PIT
SCALE 1:50

PLAN

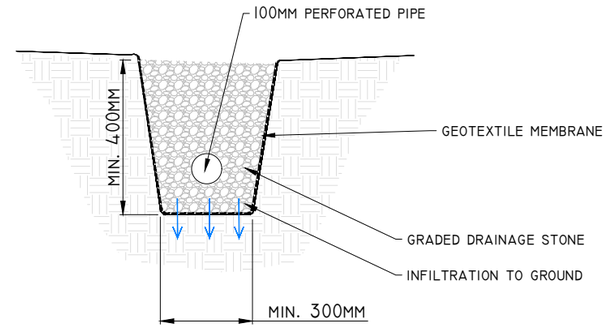


ELEVATION



DETAIL H

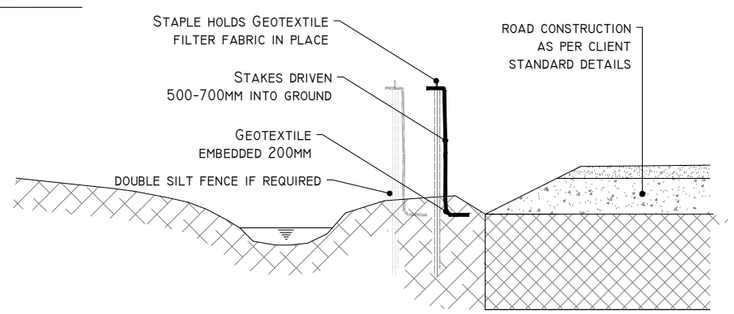
FILTER DRAIN DETAIL
SCALE 1:50



DETAIL EI

SILT FENCE
SCALE 1:25

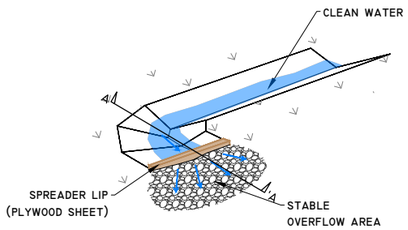
DETAIL E2



SILT FENCE FOR WATERCOURSE PROTECTION
SCALE 1:25

DETAIL GI

LEVEL SPREADER DETAIL
SCHEMATIC - NOT TO SCALE



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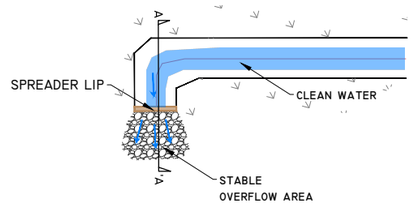
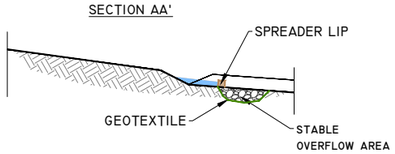
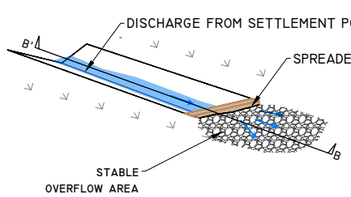


SECTION AA'

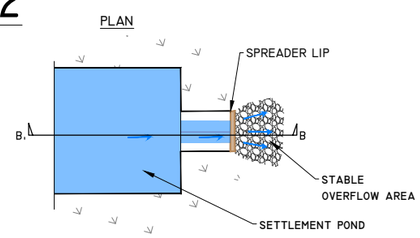


DETAIL G2

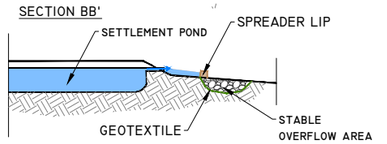
LEVEL SPREADER DETAIL
SCHEMATIC - NOT TO SCALE



PLAN



SECTION BB'



Date	Description	Chkd	Signed

Revisions

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Client: Lamanaghan Wind Farm DAC

Job: Lemanaghan WF, Co. Offaly

Title: Drainage Details 2

Figure No: D502

Drawing No: P1540-0-0326-A1-D502-Rev A	
Sheet Size: A1	Project No.: P1540-0
Scale: as shown (A1)	Drawn By: GA
	Checked By: M.G.

APPENDIX B

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 any 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 Surface Water (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 >15 Nephelometr-ic Turbidity Units (ntu) – subject to baseline data analysis	Works cease and investigation conducted.	Schedule 2 rainfall figures (see below)
2	Preliminary enabling works and peat 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

6	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

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 C

DAILY VISUAL CHECK SHEET TEMPLATE

MKO	**Daily Visual Inspections**	**Project**	200804 - Lemanaghan	**Draft Date**	19/03/2026
		Client	Lemanaghan Wind Farm DAC	**Version**	1
		File Name	200804 – Daily Visual Inspection – 2026.03.19 – F		

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 Lemanaghan Wind Farm.
4. Water silty as a result of works associated with the Lemanaghan Wind Farm works. ACTION REQUIRED.

	Daily Visual Inspections	Project	200804 - Lemanaghan	Draft Date	19/03/2026
		Client	Lemanaghan Wind Farm DAC	Version	1
		File Name	200804 – Daily Visual Inspection – 2026.03.19 – F		

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 Lemanaghan Wind Farm.
4. Water silty as a result of works associated with the Lemanaghan Wind Farm works. ACTION REQUIRED.