TOBIN

# Rooaunalaghta Green Energy Project

## Appendix 2-6
## Surface Water Management Plan (SWMP)

ROOAUNALAGHTA
Green Energy

BUILT ON KNOWLEDGE

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# 1. INTRODUCTION

This Surface Water Management Plan (SWMP) details control measures for avoiding, preventing or reducing impacts on the surface water environment during proposed construction, as identified in Chapter 9 and associated technical appendices of the Environmental Impact Assessment Report (EIAR).

The objective of this SWMP is to manage the movement of surface water during the construction, operation and decommissioning of the proposed Rooaunalaghta Wind Farm site (proposed project). The measures implemented for the proposed construction phase will provide flow management for the operational and decommissioning phases.

The measures in the SWMP are consistent with those detailed within the Chapter 9 (Hydrology and Hydrogeology) of the EIAR. This is a working document and will be finalised by the appointed Contractor following appointment and prior to commencing works on the proposed project to include any additional conditions stipulated by An Coimisiún Pleanála.

All of the content provided in this SWMP will be delivered by the appointed Contractor and its finalisation by the appointed Contractor will not affect the robustness and adequacy of the information presented here and relied upon in the EIAR and Natura Impact Statement (NIS). Relevant guidelines were considered in the development of this surface water management plan.

This document also considers groundwater protection measures where relevant, reflecting the hydrogeological setting of the Proposed Project and the potential interaction between surface water and groundwater identified within the conceptual site model (Section 9.4.3 of Chapter 9 of the submitted EIAR).

## 1.1 OVERVIEW OF THE PROPOSED PROJECT

EIAR Chapter 2 describes the proposed project in detail. The proposed project includes the construction of 13 no. wind turbines and all associated infrastructure including turbine foundations, hardstanding areas, borrow pit, access tracks, temporary construction compounds, permanent Light Detection and Ranging (LiDAR) device and ancillary works, installation of a Grid Connection Route (GCR) with a 33 kV private grid connection cable (circa 8.7 km in length) from the on-site control building to a proposed 110 kV substation. The proposed 110 kV substation in the townland of Killamanagh Co. Galway with associated works (including two steel lattice end masts) to connect to an existing overhead line in the townlands of Killamanagh and Bunnasillagh.

# 2. PROPOSED SITE DRAINAGE

The proposed wind farm is located within a karstified limestone aquifer where groundwater and surface water are hydraulically connected through fractures, weathered bedrock horizons, preferential flow pathways and groundwater resurgence features. Consequently, the potential for contaminants entering groundwater to subsequently affect downgradient surface water receptors has been specifically considered within the design of the drainage system and the construction phase water management strategy.

The principal groundwater-related construction risks comprise:

- mobilisation of suspended sediments through excavation and dewatering activities;
- accidental hydrocarbon, concrete or chemical spills entering permeable ground;
- interception of shallow groundwater during borrow pit excavation or foundation construction;
- direct ingress of runoff into karst features, fractures or solutionally enlarged pathways; and
- migration of contaminants through groundwater to connected drains, streams and springs.

To address these risks, the surface water management system adopts a treatment-train approach and incorporates groundwater protection measures. Clean surface water will be diverted around active work areas using interceptor drains, while potentially contaminated runoff will undergo settlement, filtration and attenuation prior to discharge or infiltration. Groundwater quality monitoring will be undertaken throughout construction to verify the effectiveness of these controls and to provide an early warning mechanism should groundwater quality deteriorate. Monitoring results will be reviewed alongside surface water monitoring data to assess any linkage between groundwater quality and surface water receptors.

Prior to construction of infiltration features, excavations will be inspected by a suitably qualified hydrogeologist. Where karst features, open fractures, voids, conduits or evidence of rapid groundwater pathways are encountered, infiltration will not occur directly to these features. The Karst Protocol (Appendix 8-1) will be implemented and alternative drainage arrangements, including lining or relocation of the drainage feature, will be adopted where necessary.

## 2.1 DRAINAGE DESIGN OVERVIEW

The proposed wind farm site is located in the catchment of the Black [Shrule] River and Lough Corrib. The drainage measures described will be implemented for the construction phase of the proposed project and the majority of the measures will remain in place for the operational phase. The proposed wind farm site contains no mapped Environment Protection Agency (EPA) watercourses but includes a network of drains and local drainage features which provide hydrological connectivity to the Black (Shrule) catchment. A wet drainage ditch is located 80

m southwest of turbine T10 and T11, within the proposed wind farm site. The proposed wind farm surface water management will require control of sediment with infiltration to ground.

The proposed wind farm site is located within a karstified limestone setting where groundwater recharge may occur through fractures, joints and locally enhanced permeability pathways. Drainage infrastructure has therefore been designed to maximise treatment prior to infiltration and to prevent direct discharge to groundwater.

The permeability of the limestone is characteristically along fractures or zones of weathering. In the natural environment, recharge to limestone where there is no karst relies in part on storage in the overlying subsoil which provides superficial storage to the fracture flow network in the underlying limestone.

Diffuse recharge will occur within the construction footprint where thin subsoils occur. Runoff will infiltrate to ground following treatment in a treatment train of ponds, swales etc.

Prior to the construction of infiltration features, the underlying ground conditions will be verified. Should preferential groundwater pathways be encountered during excavation works, the Karst Protocol (Appendix 8-1) will be implemented. A suitably qualified hydrogeologist will inspect the feature and recommend appropriate measures.

There are no EPA streams on the footprint of the proposed 110 kV substation. On the substation site a dry drainage ditch will be rerouted to accommodate the substation.

All runoff will undergo treatment through multiple stages including sediment settlement, filtration and vegetated treatment systems prior to infiltration. This management approach will protect both groundwater quality and connected surface water receptors.

### 2.1.1 Sustainable urban drainage systems (SuDS)

The surface water drainage system follows the recommendations of sustainable urban drainage systems (SuDS) and uses SuDS measures. The principle behind SuDS is to reduce the quantity of discharge from developments to predevelopment flows and to also improve the quality of run-off from proposed projects.

SuDS are drainage measures designed to manage surface water runoff in a way that mimics the natural drainage regime that existed before development. Rather than rapidly collecting and discharging runoff through pipes, SuDS seek to:

1. Control runoff quantity (reduce peak flows and flood risk).
2. Improve water quality (remove sediment and pollutants).
3. Promote infiltration and groundwater recharge where appropriate.
4. Provide biodiversity and amenity benefits.

A drainage evaluation has been carried out for the proposed wind farm and 110 kV substation using the HR Wallingford Website (http://geoservergisweb2.hrwallingford.co.uk/uksd/index.htm - accessed August 2026) to identify appropriate SuDS measures for use on the proposed wind farm site.

For the proposed wind farm site the drainage design will decrease the quantity of run-off by using permeable road construction for the access roads and on the hardstanding areas and by providing surface water sedimentation/infiltration ponds. While operational phase pressures are expected to be negligible, the following SuDS features will be installed during the construction and decommissioning phases and included in the drainage design for the proposed wind farm site:

- **Swales/Check Dams:** Sloped channels with check dams will slow down water flow, improving water quality, infiltration and reducing erosion:
- **Filter strips:** a gently sloped, vegetated area designed to treat stormwater runoff by filtering pollutants and allowing water to infiltrate into the soil. Filter strips are utilised at the level spreader locations:
- **Settlement/Infiltration Ponds:** Vegetated ponds designed to temporarily store surface water runoff, aiding in flood control; and
- **Hydrocarbon Interceptor:** a device designed to remove hydrocarbons, silt and other pollutants from surface water runoff before it enters the drainage system. The hydrocarbon interceptor will be located at the substation and construction compound. The substation hydrocarbon interceptor will remain in place during the operational phase.
- **Silt Fences:** During the construction phase, Permeable barriers have been incorporated into the site design and will be installed along the drainage network at regular intervals to intercept local surface runoff in the drainage channels, thereby slowing water flow velocity, promoting sedimentation of suspended solids, enhancing infiltration, and reducing erosion potential.
- **Silt Buster or similar proprietary silt control:** These are modular stormwater treatment systems can be incorporated into the site design, if required, following onsite water quality testing, at key drainage outfalls to intercept surface runoff from construction areas, thereby slowing water flow velocity, promoting rapid sedimentation of suspended solids, enhancing pollutant removal through flocculation, and reducing erosion potential prior to discharge.

The layout of the proposed wind farm site has been designed to collect surface water runoff from hardstanding areas and discharge to settlement/infiltration ponds within the proposed wind farm site boundary. From here the water will discharge to the ground by means of finger drains in a fan arrangement at the appropriate greenfield run off rates. A drawing of the proposed surface water details and drainage design are shown in Drawings 11981-2024 and 11981-2040.

Check dams will be provided in drainage channels to reduce the velocity of surface water run-off and are depicted in Figure 2-1. Swales will be constructed adjacent to the access roads to provide drainage as depicted in Figure 2-2.

*Figure 2-1: Check dam and silt fence examples (Source: Guidelines for Environmental Management, EPA Australia, 2004)*

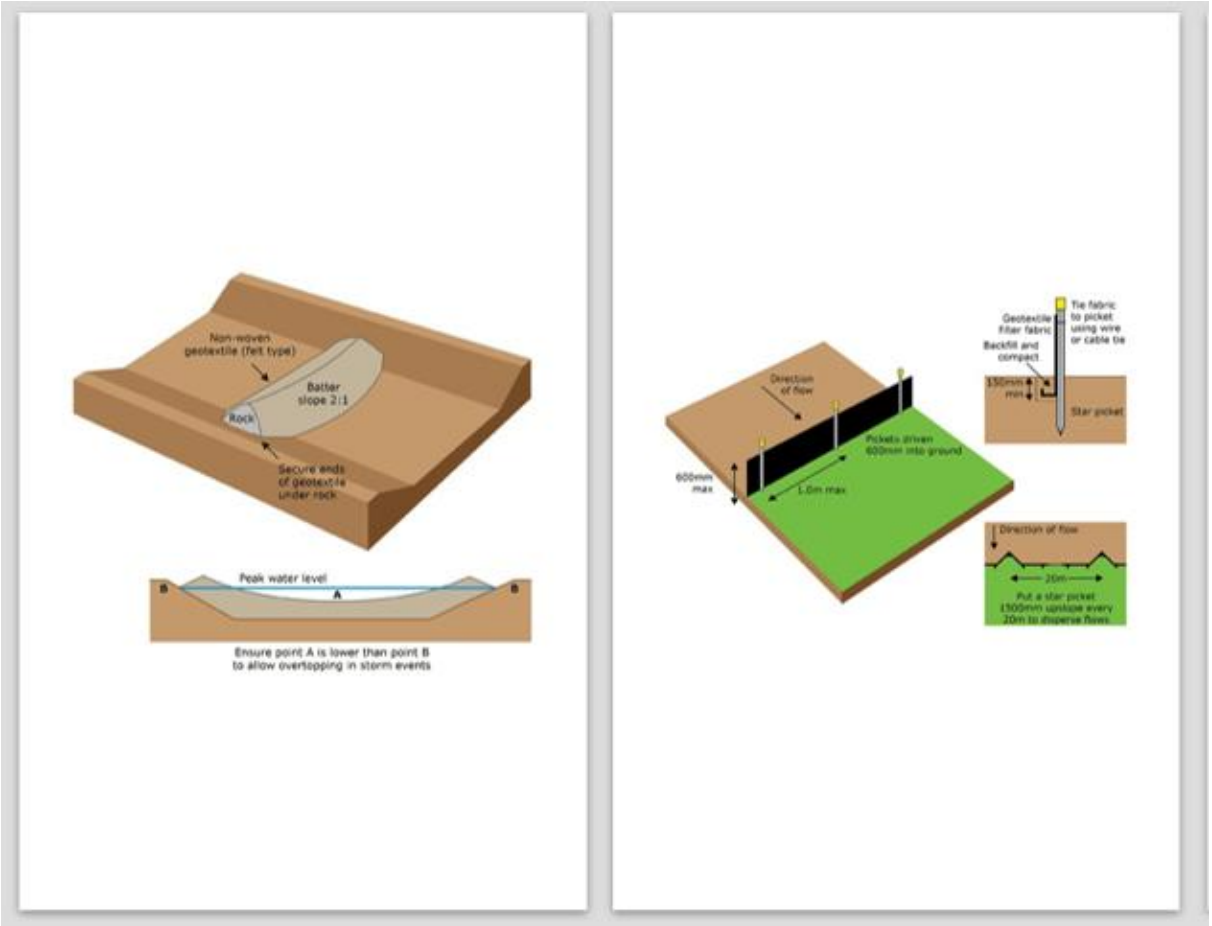


*Figure 2-2 Typical Example of vegetated swale*



## 2.2 TURBINE HARDSTANDS

**Hardstand Areas and Compliance with HD45/15**

The turbine hardstand areas have been designed in accordance with the principles of Transport Infrastructure Ireland (TII) Publication HD45/15 *Drainage Design of Road Pavements*, with specific consideration given to the karstified limestone hydrogeological setting encountered across the proposed wind farm site. Traffic volumes associated with the operational wind farm will be very low and will primarily comprise routine maintenance visits and occasional inspections. Unlike public roads, the internal access tracks are not subject to significant daily traffic loading and consequently will generate negligible contaminant loadings or sediment mobilisation during the operational phase. The operational phase contribution to surface water runoff quality from vehicular activity is expected to be negligible, and significantly lower than that associated with typical public roads or industrial developments.

The principal source of traffic-related runoff will occur during the construction phase. During construction, temporary increases in traffic movements may increase the potential for sediment entrainment on access tracks and hardstanding areas. These risks will be managed through the implementation of the proposed drainage network, including swales, interceptor drains, check dams and settlement ponds/infiltration areas. Runoff from areas subject to higher construction traffic volumes, including the borrow pit and construction compound and temporary material storage areas, will be directed through the treatment train prior to discharge or infiltration.

The proposed drainage infrastructure has therefore been designed primarily to manage construction phase runoff and sediment generation, which represents the highest-risk period for surface water protection.

Site investigation works indicate that the majority of turbine locations are underlain by shallow granular overburden comprising sandy silts, gravelly silts and limestone gravels over competent limestone bedrock. Bedrock was encountered at relatively shallow depths at several turbine locations including T1 (2.1m bgl), T4 (1.1m bgl), T7 (3.1m bgl), T9 (4.9m bgl), T10 (4.1m bgl) and T13 (2.7m bgl), while other locations comprise free-draining gravel deposits with frequent cobbles and boulders (i.e. T10). The ground investigation therefore confirms the presence of permeable strata suitable for controlled infiltration subject to adequate protection of groundwater quality. Based on the HD45/15 requirements for infiltration systems in karst areas, infiltration drainage will only be employed where a minimum of 2m of unsaturated subsoil is present beneath the invert level of the drainage feature, or where a minimum of 1m of engineered subsoil meeting TII specifications can be provided.

In areas requiring infiltration, a minimum 1m thickness of engineered subsoil, comprising material with a minimum 10% fines content and hydraulic conductivity between $5 \times 10^{-5}$ m/s and $5 \times 10^{-7}$ m/s, will be provided. This approach ensures compliance with HD45/15 groundwater protection requirements while maintaining greenfield runoff conditions, protecting groundwater quality and preventing the direct migration of sediment or contaminants into the underlying aquifer. The hardstand drainage design therefore mimics the existing hydrological regime, maintains groundwater recharge processes and avoids adverse effects on groundwater or connected surface water receptors.

At all locations where infiltration is proposed and where natural subsoil thickness is less than 2 m, a minimum 1 m layer of engineered soil or engineered subsoil shall be provided beneath the infiltration feature in accordance with current TII drainage guidance.

**Table 2-1 Summary table for infiltration areas**

| Turbine | Overburden Thickness (m) | Bedrock Encountered | Recommended Drainage Approach |
|---|---|---|---|
| T1 | 2.1 | 2.1 m bgl | No groundwater encountered. Confirmation required of Infiltration >2 m unsaturated zone beneath drainage invert. |
| T2 | >1.5 | >1.5 m bgl | Lined settlement pond with a minimum 1 m layer of engineered soil or engineered subsoil. Shallow infiltration/bioretention |
| T3 | >2.3 | >2.3 m bgl | No groundwater encountered. Confirmation required of Infiltration >2 m unsaturated zone beneath drainage invert |
| T4 | 1.1 | 1.1 m bgl | Lined settlement pond with a minimum 1 m layer of engineered soil or engineered subsoil. Shallow infiltration/bioretention |

| Turbine | Overburden Thickness (m) | Bedrock Encountered | Recommended Drainage Approach |
|---|---|---|---|
| T5 | 1.4 | >1.4 m bgl | Lined settlement pond with a minimum 1 m layer of engineered soil or engineered subsoil. Shallow infiltration/bioretention |
| T6 | >2.35 | >2.3 m bgl | No groundwater encountered. Confirmation required of Infiltration >2 m unsaturated zone beneath drainage invert |
| T7 | 3.1 | 3.1 m bgl | No groundwater encountered. Confirmation required of Infiltration >2 m unsaturated zone beneath drainage invert |
| T8 | 1.7 | >1.7 m bgl | Lined settlement pond with a minimum 1 m layer of engineered soil or engineered subsoil. Shallow infiltration/bioretention |
| T9 | 4.9 | 4.9 m bgl | No groundwater encountered. Confirmation required of Infiltration >2 m unsaturated zone beneath drainage invert |
| T10 | 4.1 | 4.1 m bgl | No groundwater encountered. Confirmation required of Infiltration >2 m unsaturated zone beneath drainage invert |
| T11 | 0.7 | >0.7 m bgl | Lined settlement pond with a minimum 1 m layer of engineered soil or engineered subsoil. Shallow infiltration/bioretention |
| T12 | 0.8 | >0.8 m bgl | Lined settlement pond with a minimum 1 m layer of engineered soil or engineered subsoil. Shallow infiltration/bioretention |
| T13 | 2.7 | 2.7 m bgl | No groundwater encountered. Confirmation required of Infiltration >2 m unsaturated zone beneath drainage invert |

## 2.3 Borrow Pit

Based on the site investigation data, no significant dewatering would be required at the borrow pit due to the relatively shallow excavation (5m) and the local groundwater level (4 to 10 m bgl); however, inflows may occur in the proposed excavations. Groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).

Water in the borrow pit will be managed by a dedicated outlet and silt bag. This outlet, along with pre-installed upgradient interceptor drains, will control runoff from both the pit and its immediate surroundings. During the construction phase, any standing water will be removed using a mobile pump to maintain dry working conditions. To minimise sediment entering the pump, the intake will be positioned above the pit floor on a stable platform. The pump

operation will be managed to maintain a stable water level, preventing turbulence that resuspends settled solids.

The pumped water will be discharged into the drainage network (silt bag, settlement tank, settlement ponds) that serves the outlet. Following treatment in the proprietary settlement tank and in the settlement ponds, water will flow overland towards the surface water network, see Drawing 11981-2040 to 11981-2042 as part of the planning application pack for this application. Further treatment will occur via the vegetated areas.

## 2.4 Flood Risk Attenuation

The creation of gravel areas, such as hardstands, has the potential to locally increase rates of runoff and this may increase flood risk and flood severity downstream. The proposed wind farm site has relatively high infiltration rates and therefore limited potential to increase runoff volume.

The risk of flooding associated with the proposed wind farm site is minimal based on the project specific Flood Risk Assessment (FRA) carried out for the proposed project (see Appendix 9-2 of the EIAR). The layout of the proposed wind farm site has been designed to minimise the flood risk to people, property, the economy and the environment. The proposed project will not increase the flood risk elsewhere.

It is proposed to provide temporary storage within the drainage channels by creating check dams within them at regular intervals. The spacing of the dams is every 50 metres on average, where the slope ratio is greater than 1/12 (8.3%). Runoff from the gravel hardstand areas will be directed to swales and settlement ponds. The outflow from the settlement ponds will be released in a controlled and diffuse manner onto the vegetation and existing drains.

The attenuation ponds has been sized for the critical 1 in 30-year storm event – See Appendix A. Surface water runoff from the proposed development will be attenuated and discharged at greenfield runoff rates. The drainage design has been developed to collect runoff from the proposed hardstanding areas and route it to a dedicated attenuation and settlement pond prior to controlled discharge. Runoff will be managed by gravity flow with discharge restricted to the calculated greenfield rate of approximately 3.6 l/s.

A storage volume of approximately 169 $m^3$ is required to accommodate the 1 in 30-year rainfall event, including the adopted climate change allowance. The settlement/attenuation ponds will have sufficient attenuation to limit discharge rates and prevent any increase in downstream flood risk.

The restricted discharge rate and substantial storage volume will facilitate settlement of suspended solids entrained in runoff from the hardstands. When combined with drainage measures such as perimeter drains, swales, check dams, sediment controls and vegetated flow paths, the proposed drainage infrastructure will provide a robust treatment train for the management of surface water quality prior to discharge.

The proposed attenuation pond has been sized to fully accommodate this volume while maintaining discharge at greenfield runoff rates. More extreme events, including the 1 in 100-year storm plus climate change, can also be accommodated within the drainage design through appropriate freeboard and exceedance routing measures.

This assessment confirms that the proposed surface water drainage system can be designed to meet the required performance standards, with no on-site flooding during the 1 in 30-year event and effective management of exceedance flows during more extreme rainfall events, while also protecting downstream water quality and hydrological conditions.

## 2.5 Turbine Delivery Route and Grid Connection

There will be limited construction activities required for the grid connection and the temporary accommodation works areas (nodes) of the proposed Turbine Delivery Route (TDR). Further details in relation to the grid connection cable route and road/junction accommodation works on the TDR are outlined in the CEMP in Appendix 2-2 of the EIAR.

No refuelling of machinery will take place within 50 m of a watercourse. Excavated material will not be stockpiled or side-cast within 50 m of a watercourse. Appropriate steps will be taken to prevent soil/dirt generated during the temporary upgrade works to the TDR from being transported on the public road. Road sweeping vehicles will be used as required, to ensure that the public road network remains free of soil/dirt from the location of the TDR works when required. This will reduce the potential for sedimentation of surface watercourses locally.

Silt fencing will be erected at the location of all offroad HDD stream crossings along the grid connection. Where existing drainage ditches need to be realigned, new ditches will match profile of existing ditch in relation to width, existing side slope profile (or lower) and material at base of channel will be reused. The sizing of any new culverts will be designed to maintain existing flow characteristics and depth of flow. Culverts, where required, will be assessed to ensure no barriers to fish migration occur.

# 3. WATER QUALITY MEASURES

The drainage design measures outlined in Section 2 will manage flow and quality within the proposed wind farm site and grid connection. Specific water quality measures in relation to sediment, concrete and fuel management are detailed below.

Given the hydraulic connectivity between groundwater and surface water within the proposed wind farm site, all water quality protection measures described in this section apply equally to the protection of both groundwater and surface water.

## 3.1 CONCRETE

During the construction phase, concrete will primarily be supplied as ready-mixed material from local batching plants, delivered in sealed concrete trucks. On-site mixing will be limited to minor tasks, such as substation blockwork. The use of ready-mixed deliveries significantly reduces environmental risks associated with large-scale on-site batching. Excavations will be checked for any voids in accordance with the karst protocol (Appendix 8-1). Concrete pouring operations, washout facilities and storage of cementitious materials shall be located 50 m away from identified karst features.

Upon delivery, only the truck chute will be rinsed on site using the minimum necessary volume of water. Full washout of trucks will occur at the batching plant, where appropriate facilities are already in place. Water from chute rinsing will be directed into a temporary lined, impermeable containment area or metal skip. These areas will be excavated and lined with an impermeable membrane to prevent ground contamination. Residual solids and liquids will be collected and removed by a licensed waste contractor.

Concrete washout areas will be located near site entrances and at key concrete pour locations—such as turbine hardstands—to ensure accessibility.




**Image 1 example metal skid for concrete washout**

Although surplus concrete following a pour is unlikely, any excess will be returned and disposed of off-site at the concrete production facility. Localised mixing for minor works, such as blockwork, will be conducted only as required. Any small volumes of leftover concrete from these tasks will be disposed of in the designated on-site concrete washout area.

Further details on best practices and environmental controls related to concrete delivery and pouring are provided in the Construction Environmental Management Plan (CEMP) (see Appendix 2-2).

## 3.2 Fuels, Oils and Chemicals – Spill Control

The following will be employed on the proposed wind farm site:

- Fuels and chemicals will be stored within bunded areas as appropriate to guard against potential accidental spills or leakages. The bund area will have a volume of at least 110% of the volume of such materials stored.
- Store all containers of oil and fuel in a secure, bunded area.
- Regularly check tanks, containers and bunds for damage and leaks.
- Supervise all fuel and oil deliveries.
- Lock containers and tanks when not in use.
- Seek advice from a line manager before disposing of waste fuel or oil, or contaminated spill granules or absorbent mats – all contaminated materials to be disposed of in the appropriate manner.
- Liaise with a line manager to organise removal of contaminated water from bunds and trays by an appropriate contractor.
- Do not store fuel and oil, or carry out refuelling, within 50 m of a watercourse.
- All on-site refuelling will be carried out by a competent operative. Use a funnel when refuelling small plant. Use an automatic shut off or pistol grip delivery system when refuelling plant.
- Clear up and report all spillages immediately.
- Place a drip tray or absorbent mat under all static plant and mobile plant during fuelling.
- Mobile measures such as drip trays and fuel absorbent mats kept with all plant and bowsers and will be used as required during all refuelling operations.
- A spill kit will be stored with the bowser and the person operating the bowser will be trained in their use;
- All equipment and machinery will have regular checking for leakages and quality of performance and will carry spill kits;
- Any servicing of vehicles will be confined to designated and suitably protected areas such as construction compounds; and
- Additional drip trays and spill kits will be kept available on the proposed wind farm site, to ensure that any spills from vehicles are contained and removed off-site.

A hydrocarbon interceptor will be located at the proposed 110 kV substation (construction and operational phase), borrow pit and construction compound. Surface runoff from the substation has the potential to have hydrocarbons due to vehicular activities. Therefore, an oil interceptor is proposed to prevent contamination.

A class I Bypass Separator, typically a NSBP003 (capacity for 1670 $m^2$ drainage area – hardstand area within substation), is recommended due to the minimal risk of contamination expected at the site. The oil separator should comply with the requirements of EN-858-1 and 858-2 guidelines for oil separators.

# 4. EROSION AND SEDIMENT CONTROL MEASURES

It is proposed, that during the ground clearance of the proposed project, the contractor will implement water control measures to limit the impact on water quality using standards measures. Suspended solid (silt) removal features will be implemented in accordance with the Construction Industry Research and Information Association (CIRIA) C697 SuDS Manual, and CIRIA C648 Control of water pollution from linear construction projects. The conceptual drainage is shown on Figure 4-1.

Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. These flows will discharge diffusely overland, within the buffer zone before entering any watercourse. Regular cross flow and energy dissipation devices will be installed to divert overland flows and prevent these flows from entering the borrow pits.

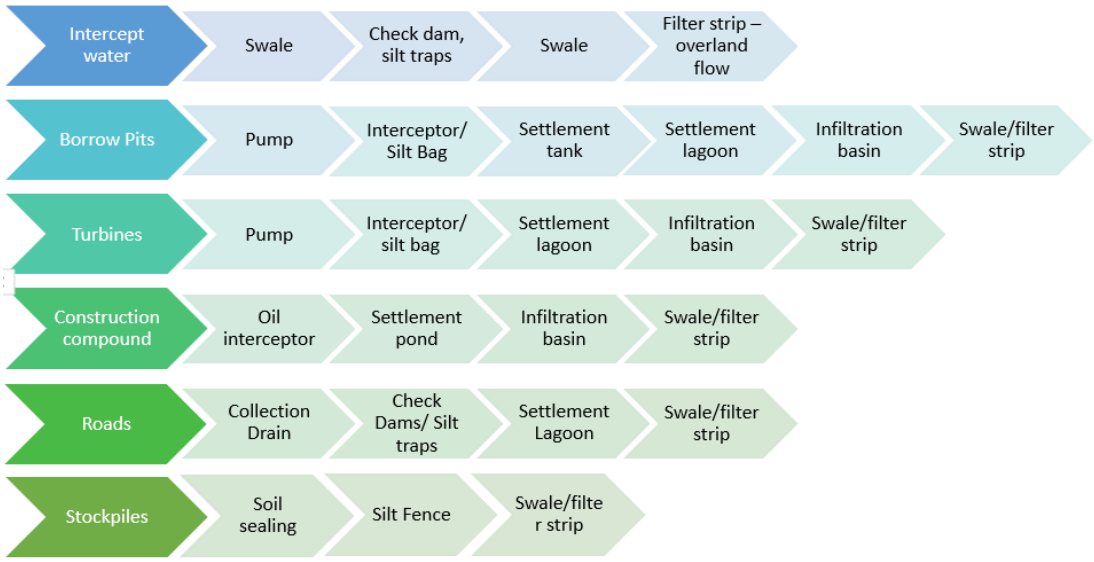
All drainage from the proposed wind farm site shall be designed to have as a minimum three stages of treatment, as defined in the SuDS Manual. Management of runoff will include the following:

- Filtration of water through filter media (sand/stone check dam, silt fence);
- Detention/settlement in settlement ponds or behind check dam in swales; and
- Conveyance of shallow depths of water in vegetated swale.

All surface water run-off from the proposed wind farm site will pass through settlement ponds. It is proposed to locate settlement ponds downstream of borrow pits and associated stockpile areas, each hardstand and along all the proposed wind farm site access tracks.

Drainage drawings are presented in Drawing 11981-2040 to 11981-2042.

*Figure 4-1 Conceptual Drainage measures*



Overall, the SWMP applies the core SuDS principles of runoff reduction, flow attenuation, sediment retention and water quality treatment. Through the implementation of a robust treatment train, provision of substantial settlement capacity, the proposed measures are considered fully consistent with current CIRIA guidance and provide protection of downstream receptors. The SWMP also reflects the recommendations of CIRIA C808F[1], which emphasise that SuDS should be considered from the earliest stages of construction and should remain functional throughout the construction period.

## 4.1 CHECK DAMS/SILT FENCES

Track edge drainage/swales are required to control surface water and to carry this flow to outlet points. Swales will be re-vegetated by hydro-seeding with indigenous seed mix following excavation. This will reduce the flow velocity, treat potential pollutants, increase filtration and silt retention.

Swales will be installed in advance of the main construction phase. Check dam/Silt fence designs are presented in Drawing 11981-2024. On sections of track where there is moderate longitudinal gradient (>1/7), regular surface water interception channels will be employed – these will typically be at 20m intervals to collect any surface water that is discharging as sheet flow along the track and discharge the flow into the trackside swale.

Check dams will have a minimum 0.2 m freeboard (from top of check dam) to top of swale level, to prevent overtopping of flows onto the access track. All check dams, etc to be checked at least once weekly via a walkover survey during the period of construction. All excess silt/sediment will be removed. Where check dams have become fully blocked with silt, they will be replaced.

The following measures will also be implemented:

All stockpiled material will be battered back (Slope of 1:2 or less) to reduce the rainfall erosion potential. Silt fencing will be utilised as the base of stockpiles.

Silt fencing is to be installed in the path of sheet flow runoff to filter out heavy sediments. Silt fences are to be located at the toe of stockpiled areas to reduce sediment transport. Additional silt fencing and emergency spill kits will be kept on the proposed wind farm site for use in emergencies. All silt fencing on the proposed wind farm site will also require regular cleaning and maintenance in accordance with manufactures guidelines.

Silt build ups, within settlement ponds, check dams, silt fences are to be removed as required to ensure no carryover/breakthrough of suspended matter downstream in the drainage system. Any sediment removed will be disposed of so as to prevent any reintroduction into the drainage system.

## 4.2 SETTLEMENT PONDS/INFILTRATION BASIN

Settlement ponds will be located downstream of road swale sections and at turbine/hardstand locations, to manage/buffer volumes of runoff discharging from the drainage system during

[1] CIRIA C808F (2021). SuDS Construction Guidance Using SuDS to reduce phosphorus in surface water runoff

periods of high rainfall, thereby reducing the hydraulic loading. Settlement ponds are designed in consideration of the greenfield runoff rates. A longitudinal cross-section and plan of a settlement pond is presented in Drawing 11981-2024. Prior to construction of infiltration features, the underlying ground shall be inspected to confirm the absence of conduits, solution cavities.

The settlement basins will be located at least 15 m from any known karst features like dolines. If any karst is found during construction, a karst protocol is followed to seal the feature and prevent polluted water from bypassing the soil filters.

In addition, the proposed site layout would include an infiltration basin which would be used for control of any surface water runoff. In accordance with NRA 2015 guidance (Road Drainage and the Environment)[2], where rock is shallow (<2m), the soakaway design would include a minimum of 1m of engineered material (1 x 10-7 permeability) across the base of the basin. While the guidance is for higher risk road construction scheme, the guidance will be applied to the proposed wind farm. The base of an infiltration basin will have a slope of <1% to allow infiltration throughout the entire basin. Side slopes will be <1/3 to prevent erosion of the sides of the basin. The outfall from the settlement will discharge to a filter strip to provide additional water quality treatment.

The treatment of site runoff during construction includes a settlement pond prior to discharge via infiltration basin. The settlement ponds will be used for containment if an accidental fuel spillage occurs so that the polluted water can be contained and tankered off site for appropriate disposal.

The proposed settlement pond design consists of a sediment forebay, which removes the majority of suspended solids from the inflow water. Inflow water enters the sediment forebay via an energy break, which removes energy from the incoming water resulting in a decrease in the incoming waters capacity to transport suspended solids and the deposition of material in the sediment forebay. The water then flows over a section of elevated channel bed into the flow control bay. Here the flow is controlled by a weir constructed of tightly fixed straw bales (or silt fence or equivalent). The straw acts as an effective silt trap for any remaining suspended solids while allowing the water to filter through its medium. Once the water has been filtered by the flow control device it then outfalls to an area of intact vegetation, which acts as a secondary filter.

After pre-treatment, the water flows into a dedicated infiltration basin. This is an excavated area designed to allow the water to percolate into the ground. The design requires 2 metres of natural material or 1 m of constructed material at the bottom of the infiltration basin. Groundwater levels on the proposed wind farm site are >3.5 mbgl. This material will have a specific, low permeability to ensure further filtration. Appropriate material is defined as per TII HD45 (DN-DNG-03065) and will have a hydraulic conductivity of <1x10-5m/s.

Settlement ponds will be installed concurrently with the formation of the road. Additional settlement ponds will be constructed as required on the proposed wind farm site. Settlement

[2] NRA (2015) DN-DNG-03065 - Road Drainage and the Environment

ponds are to be located as close to the source of sediment as possible with a buffer zone between the settlement pond outfall and any existing drain/watercourse.

The settlement pond design (Drawing 11981-2024) is based on primary settling out of suspended solids from aqueous suspension. The theory behind the design of the settlement ponds is the application of Stoke's Law. The settlement ponds will be designed to provide sufficient retention time and a low velocity environment to allow suspended solids of small particle size to fall out of suspension prior to allowing the water to outfall to the receiving environment.

The layout of the wind farm site has been designed to collect surface water runoff from hardstanding areas and discharge to associated surface water attenuation lagoons adjacent to the proposed infrastructure. All runoff will undergo treatment through multiple stages including sediment settlement, filtration and vegetated treatment systems prior to infiltration. This management approach will protect both groundwater quality and surface water receptors.

## 4.3 Works near Watercourses

As mentioned above, where main drain crossings and stream crossings occur (i.e., GCR), it is proposed to use a HDD crossing for the Black River and a culvert upgrade with an open cut undercrossing required on the Shancloon stream. Installation of such features will take place during dry periods to reduce the risk of sediment entering the watercourse.

No bridges are required on the wind farm site as no EPA stream crossings are required. No instream works are proposed for the proposed wind farm site. Instream works are required on the Shancloon Stream as part of the proposed GCR to replace an existing undersized culvert and pass the cables beneath it. A section 50 will be prepared for the Shancloon stream crossing. The culvert is sized for the 1:100 year flood event. Any recommendations relating to fisheries protection, construction timing, sediment management, channel reinstatement and post-construction monitoring will be incorporated into the final method statement.

As a further precaution, near-stream construction work will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works guidance document *"Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites"*.

Culverts will be designed to be of a size adequate to carry expected peak flows in accordance with CIRIA Culvert design and operation guide (C689). Culverts will be installed to conform, wherever possible, to the natural slope and alignment of the drainage line. Where required, culverts will be buried at an appropriate depth below the channel bed and the original bed material placed at the bottom of the culvert. The sizing of any new internal drainage crossings will maintain existing depth of flow and channel characteristics.

Earth embankments will be protected against erosion e.g., by re-vegetation or rock surfacing etc.

## 4.4 Grid Connection

Management of surface water is set out in Appendix 2-3 Grid Connection Construction Methodology Report. Cable trenches are typically developed in short 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.

The permanent substation, and associated drainage infrastructure have been designed to prevent uncontrolled infiltration of potentially contaminated runoff to ground. All operational hardstand runoff from the substation will be collected by a drainage system and directed through appropriately sized hydrocarbon interceptors prior to discharge. The drainage network will incorporate shut-off valves or equivalent containment measures to allow the drainage system to be isolated in the event of a pollution incident. This will enable potentially contaminated runoff, firefighting water or accidental spillages to be contained within the drainage infrastructure and removed off-site for appropriate treatment and disposal, thereby preventing contamination of groundwater and connected surface water receptors.

One HDD crossing is proposed on the GCR. HDD is a trenchless method to remove direct impact to watercourses/drains however a number of control measures are proposed to ensure there are no significant effects from the HDD. Mitigation measures applicable to HDD include:

- A competent and experienced Contractor will be appointed to undertake the HDD works;
- The Contractor will prepare a HDD Method Statement using industry best practice and relevant guidance to inform the optimal methodology for the works. The Method Statement will include ***biosecurity*** controls and an incident response plan for any potential frac-out;
- The Contractor will undertake the directional drilling in accordance with industry best practice including British Standard EN 16191:2014 Tunnelling machinery, safety requirements and CIRIA C648 '*Control of water pollution from linear construction projects Technical Guidance*' (CIRIA, 2006a);
- The contractor will ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required to avoid works in very wet conditions. The Contractor will be required to prepare a response plan in advance of the works commencing;
- Weather conditions will be considered when planning construction activities to minimise the risk of runoff from site, no works will be scheduled when an orange or red weather warning is in place;
- There will be no storage of fuels/drilling fluid within 30 m of a watercourse;
- Provision of exclusion zones and barriers (sand bags and silt fences) between any excavated material and any surface water features will be installed to prevent sediment washing into the receiving water environment. Silt fences will be installed and the contractor will ensure that silt fences are regularly inspected and maintained during the construction phase;

- Clay (Bentonite) based drilling fluids will not be used; instead, inert food-grade, biodegradable drilling fluids will only be used for these works. The drill profile will achieve a minimum 1.5 m depth beneath the riverbed.
- To prevent loss of drilling fluids or 'frac-out' from occurring, a series of actions and controls will be implemented; the drill fluids operator will monitor drill fluid density, viscosity and solids content on an ongoing basis, to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility;
- Viscometers will be used to measure drill fluid gel strength and shear strength. Filtrate can also be measured to calculate the amount of filter cake building up on the internal wall of the bore. Any increases in pump pressure experienced by the drill operator will be investigated immediately to prevent the risk of pressure build up within the annulus. In some circumstances, depending on the drilling equipment used, the pilot drill borehole assembly will be fitted with a down hole pressure monitor to measure pressure in the annulus between the drill and the bore wall. This will give an early indication of pressure build up in the hole and allow the drill operator to prevent a 'frac-out'. If there is a risk of a 'frac-out' a number of measures will be implemented including:
    - pumping a high viscous drilling fluid with a higher density to the risk zone; and
    - circulate and pump loss circulation material (typically cork or manufactured inert polymers) to the risk zone to seal the risk zone, grouting of the risk zone, and, or launch a packer before the risk zone.
- Reception pits will be situated outside of the riparian zone. A buffer zone width of 30 m or greater will be maintained from the drainage channel;
- The contractor will implement procedures to maximise the recirculation or reuse of drilling fluid to minimise waste disposal;
- Disposal of drilling fluids will be the responsibility of the contractor to an approved and licensed waste facility;
- Monitoring of the drilling operations will be undertaken at all times by the contractor under the supervision of an Ecological Clerk of Works (ECoW) with stop works authority. The monitoring will include visual inspection of the pits and monitoring of the volume of returns flowing back to the entry pit. The monitoring personnel will be in constant communication with the drilling rig operator and thus will be able to immediately cease drilling if necessary; and
- Pre-construction and construction phase baseline water quality monitoring will be undertaken.

With regard to the Shancloon stream crossing, instream works will be scheduled during periods of low flow and undertaken within the appropriate fisheries working window, as set out in IFI

(2016)[3] guidance document *"Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites"*,

A section 50 will be prepared for the Shancloon stream crossing. The culvert is sized for the 1:100 year flood event. Prior to commencement of the Shancloon stream crossing works, appropriate sediment and erosion control measures, including geotextile silt curtains, straw bales, silt fences or equivalent filtration measures, will be installed downstream of the works area, to minimise the release of suspended solids and to protect downstream water quality.

The Shancloon Stream is a historically straightened, heavily modified watercourse characterised by a U-shaped channel. Owing to its small catchment area and limited contributing flows, the watercourse exhibited semi-dry conditions in summer period including the August 2026 aquatic survey, with only isolated standing pools present and no observable flow.

To facilitate the crossing works, temporary upstream and downstream dams will be installed using sandbags and water-filled dams, and flume pipe(s) will be placed to convey all stream flows around the work area. Once the diversion system is operational, the existing culvert will be removed and the crossing works undertaken within the isolated section of channel.

Any residual water within the work area will be directed to a temporary sump and removed by pumping. Where ground conditions are suitable, water will be discharged to a vegetated infiltration area. Where infiltration is not feasible due to saturated ground conditions, water will first be directed through an appropriately sized settlement tank prior to discharge. This will ensure that suspended sediments are removed before any water leaves the work area.

## 4.5 Surface Water Monitoring

Details of the proposed surface water monitoring and maintenance activities are provided in this section of the SWMP. Post construction monitoring will be undertaken until vegetation is established. This will cover a minimum period of 12 months into the early operational phase.

The Contractor will retain records of all monitoring and maintenance activities carried out during the construction phase.

## 4.6 Recording And Reporting

Inspections will be recorded for the proposed project. In the event that pollution indicators are observed, works will cease, and sampling will immediately be undertaken as described for the weekly monitoring, and an investigation of the potential cause will be undertaken by the appointed Contractor. Where the construction works are identified as the source causing the exceedance, the following details will be recorded;

- Nature of the impacts and mechanism of pollution;

[3] IFI (2016) *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites* https://www.fisheriesireland.ie/media/guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters *[Accessed February 2026].*

- Details of the activity identified as causing the incident or, in the event no clear pathway still exists, activities capable of causing the incident and an assessment undertaken as to the most likely source; and
- Details of measures proposed and implemented to ensure that such an incident does not re-occur.

This information will be shared with the Employer and the regulators. Through monitoring and this open and transparent reporting, there is a much-reduced likelihood of a small incident becoming a serious one that may require regulator action; proactively providing this information gives the regulator and the applicant comfort that these issues are taken seriously on the proposed wind farm site and addressed in a professional manner.

## 4.7 Details of Monitoring Locations On Site

There are five surface water monitoring locations and five groundwater wells (see Table 5-5 , Table 5-6 and Figure 4-2) to monitor surface and groundwater quality. These points are focussed on potential receiving areas based on turbine layout and topography. The proposed monitoring schedule is robust and sufficient for the scale of the proposed wind farm site and in line with the relevant guidance.

The effectiveness of drainage controls will be reviewed continuously throughout the construction phase by the Environmental Manager, Environmental Clerk of Works (ECoW) and Site Management Team.

Where monitoring, inspections or changing site conditions indicate that existing drainage controls are not performing as intended, additional measures may be implemented including:

- Additional interceptor drains;
- Installation of proprietary treatment systems;
- Supplementary silt fencing;
- Additional check dams;
- Temporary pumping and treatment systems; and
- Modification of drainage pathways.

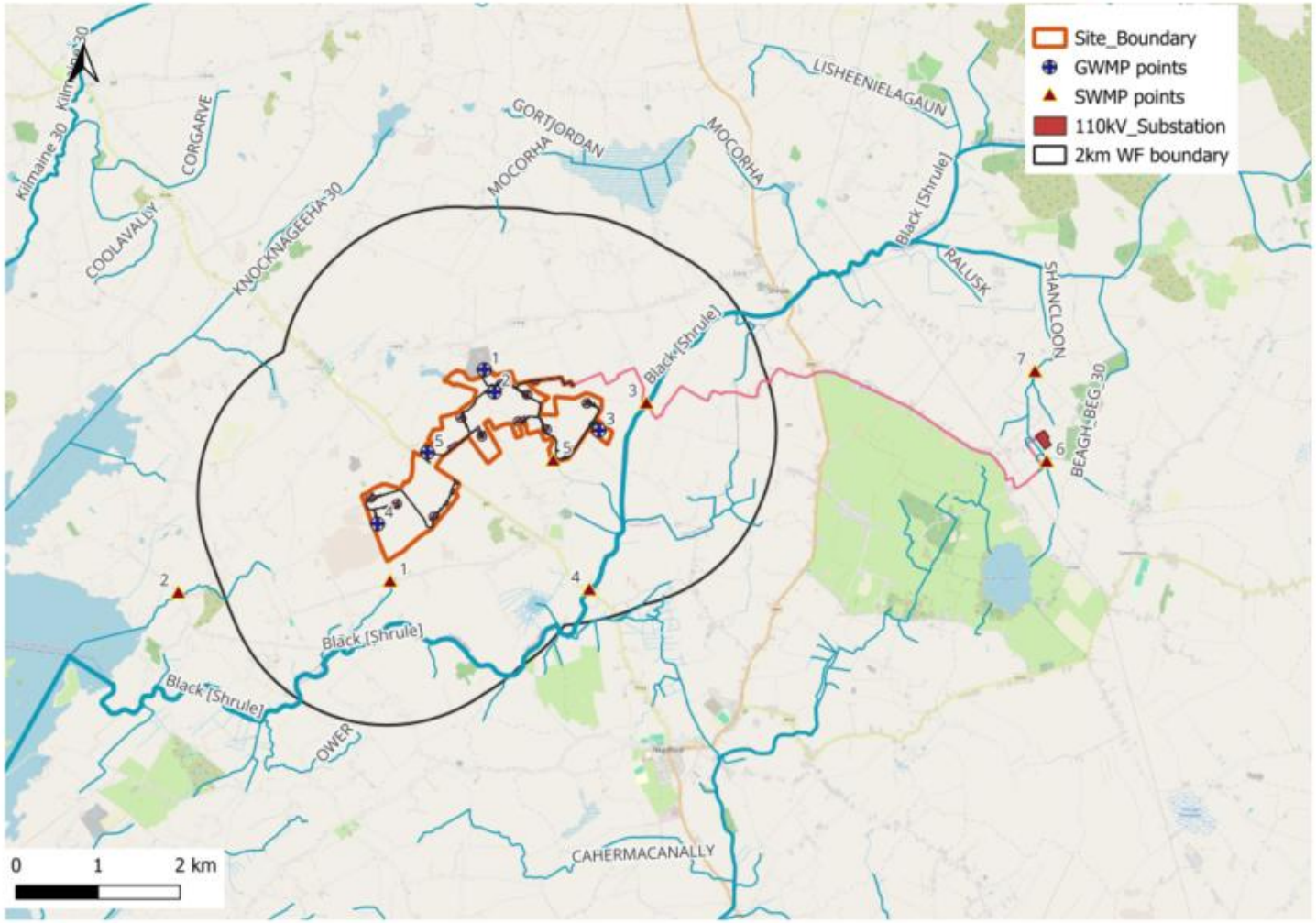



**Figure 4-2 Surface and groundwater monitoring locations**

[1] SWMP – Surface water monitoring point
GWMP - Groundwater monitoring point

### 4.7.1 Surface Water Monitoring Schedule

All surface water control measures for the proposed project will be implemented in accordance with the Construction Environmental Management Plan (CEMP) (Appendix 2-2 of the EIAR). A surface water monitoring schedule for the construction phase has been developed (see Table 5-1), detailing the selected monitoring locations, parameters, and associated trigger limits (see Table 5-2). The schedule also specifies the frequency of monitoring to be undertaken before, during, and after construction. Further details of the proposed surface water monitoring locations are provided in Table 5-3.

### 4.7.2 Schedule of Monitoring

The critical water parameters in terms of their potential to cause damage to aquatic life, ecosystems, human health and water quality in the receiving waters are outlined in the surface water monitoring schedule (see Table 5-1).

The groundwater and surface water monitoring programmes will be assessed together to identify any evidence of groundwater-surface water interaction. Where monitoring indicates deterioration in groundwater quality, an investigation will be undertaken to determine whether any additional monitoring is required at the surface water receptor. Where such a pathway is identified, additional mitigation measures, including temporary cessation of works, installation of containment systems or modification of drainage arrangements, will be implemented.

**Table 4-1: Surface Water Monitoring Schedule for the proposed wind farm**

| Phase | Preconstruction | Construction | Post- construction |
|---|---|---|---|
| Monitoring Period | 3 Months | 24 Months | 3 Months |
| Frequency | Continuous | | |
| Parameters | Turbidity | Turbidity | Turbidity |
| Frequency | Daily | | |
| Surface Water Parameters | N/A | Turbidity and visual checks (examination of surface drainage/sediment control measures/watercourses) | Turbidity and visual checks (examination of surface drainage/sediment control measures/watercourses) |
| Frequency | Weekly (Handheld Meter) | | |
| Surface Water Parameters | pH,<br>Electrical Conductivity,<br>Turbidity,<br>Temperature | pH,<br>Electrical Conductivity,<br>Turbidity,<br>Temperature<br>(Monitoring during clearance phase and construction works at Turbines) | N/A |
| Frequency | Monthly (Grab samples) | | |
| Surface Water Parameters | Conductivity,<br>Chloride,<br>Molybdate Reactive Phosphorus,<br>Mineral Oil,<br>pH,<br>Turbidity,<br>Total Ammonia,<br>Total Phosphorus,<br>Total Suspended Solids | Conductivity,<br>Chloride,<br>Molybdate Reactive Phosphorus,<br>Mineral Oil,<br>pH,<br>Turbidity,<br>Total Ammonia,<br>Total Phosphorus,<br>Total Suspended Solids | Conductivity,<br>Chloride,<br>Molybdate Reactive Phosphorus,<br>Mineral Oil,<br>pH,<br>Turbidity,<br>Total Ammonia,<br>Total Phosphorus,<br>Total Suspended Solids |

| | | | |
|---|---|---|---|
| Frequency | Quarterly (Grab Samples) | | |
| Surface Water Parameters | N/A | Conductivity,<br>Chloride,<br>Dissolved Oxygen,<br>Molybdate Reactive Phosphorus,<br>Mineral Oil,<br>pH,<br>Turbidity,<br>Total Ammonia,<br>Total Suspended Solids | N/A |
| Frequency | Pre-Construction Report | Monthly and Quarterly Monitoring Report | Final Monitoring Report |
| Surface Water Parameters | Upgrade limits/trigger values for construction phase water monitoring | Results screened against construction phase surface water monitoring trigger levels | Results screened against construction phase surface water monitoring trigger levels |

**Table 4-2: Groundwater Monitoring Schedule for the proposed wind farm**

| Phase | Preconstruction | Construction | Post- construction |
|---|---|---|---|
| Monitoring Period | 3 Months | 24 Months | 3 Months |
| Frequency | Continuous | | |
| Parameters | Water levels | Water levels | Water levels |
| Frequency | Weekly (Handheld Meter) | | |
| Parameters | pH,<br>Electrical Conductivity,<br>Turbidity,<br>Temperature | pH,<br>Electrical Conductivity,<br>Turbidity,<br>Temperature<br>(Monitoring during clearance phase and construction works at Turbines) | pH,<br>Electrical Conductivity,<br>Turbidity,<br>Temperature<br>(Monitoring during clearance phase and construction works at Turbines) |
| Frequency | Monthly ((based on BS5390) | | |
| Parameters | Conductivity,<br>Chloride,<br>Mineral Oil,<br>pH,<br>Total Suspended Solids | Conductivity,<br>Chloride,<br>Mineral Oil,<br>pH,<br>Total Suspended Solids | Conductivity,<br>Chloride,<br>Mineral Oil,<br>pH,<br>Total Suspended Solids |
| Frequency | Quarterly (Grab Samples) | | |
| Frequency | Pre-Construction Report | Quarterly Monitoring Report | Final Monitoring Report |
| Parameters | Upgrade limits/trigger values for construction phase water monitoring | Results screened against construction phase surface water monitoring trigger levels | Results screened against construction phase surface water monitoring trigger levels |

### 4.7.3 Surface water/Groundwater Monitoring Trigger Values

Surface Water Quality Monitoring (SWQM) will be conducted by the appointed Contractor in accordance with the monitoring schedule proposed in Table 5-1. Prior to the commencement of construction, baseline preconstruction monitoring will be carried out. The results of this monitoring suite will determine the baseline and trigger values for the construction monitoring phase of the development. This will be completed in order to establish if local trigger values are required due to existing water quality exceedances.

The final details of the monitoring schedule will be agreed with the relevant authorities, prior to the commencement of construction. Construction and post-construction sampling results will be screened against the agreed trigger values as proposed in Table 5-3, except where local triggers are required.

**Table 4-3: Analysis and Proposed Trigger Values (Surface water)**

| Parameter | Proposed Limits | Units |
|---|---|---|
| Conductivity | 1,000 µS/cm or within preconstruction values | µS/cm |
| Chloride | 200 mg/l or lower i.e. within trigger values established by preconstruction monitoring | mg/l |
| Dissolved Oxygen | 80% to 120% | % Saturation |
| Biochemical Oxygen Demand | 1.5 mg/l annual average or within preconstruction values | |
| Molybdate Reactive Phosphorus | 0.035 mg/l annual average or within preconstruction values | mg/l |
| Mineral Oil | 10 µg/l or within preconstruction values | µg/l |
| pH | 6.0-9.0 | pH units |
| Turbidity | 50 NTU or within preconstruction values | Nephelometric Turbidity Unit (NTU) |
| Total Ammonia | 0.14 mg/l (95%ile) or within preconstruction values | mg/l |
| Total Phosphorus | 0.1 mg/l or within preconstruction values | mg/l |
| Total Suspended Solids | 25 mg/l or within preconstruction values | mg/l |

**Table 4-4: Analysis and Proposed Trigger Values (groundwater)**

| Parameter | Proposed Limits | Units |
|---|---|---|
| Conductivity | 1000 µS/cm or within preconstruction values | µS/cm |
| Chloride | 200 mg/l or lower i.e. within trigger values established by preconstruction monitoring | mg/l |
| Mineral Oil | 10 µg/l or within preconstruction values | µg/l |
| pH | 6.0-9.0 | pH units |
| Total Ammonia | 0.14 mg/l (95%ile) or within preconstruction values | mg/l |
| Total Suspended Solids | 25 mg/l or within preconstruction values | mg/l |

Field measurements will be taken by the contractor on a weekly basis during the main earthworks stage of the construction period. In addition, daily visual inspections of the surface drainage and sediment control measurements and the watercourses will be completed. Turbidity monitoring will also be undertaken on the proposed wind farm site. Indicators that show evidence of water quality issues include the following and will be noted.

- Changes in surface water/groundwater quality; and
- Changes in surface water transparency.

Investigations will be triggered by any sustained increase in turbidity, conductivity or hydrocarbon concentration relative to established baseline conditions.

In-situ field monitoring will also be conducted during major rainfall events i.e., 15 mm in a 6-hour 30 yr period. The clerk of works will undertake monitoring during the rainfall events. Laboratory samples will be taken monthly during construction.

### 4.7.4 Surface Water Quality Monitoring Locations

Monitoring will be carried out at five locations surrounding the proposed wind farm site and GCR (see Figure 4-2). Construction-phase surface water monitoring will take place at the stream locations listed in the table below (Table 5-5). The sampling point labels are consistent with those used during site investigations to allow for comparison.

**Table 4-5: Surface Water Monitoring locations details**

| Name | Easting | Northing | River / Stream Name | EPA Segment code |
|---|---|---|---|---|
| SW 1 | 523114 | 749205 | Cloughmoyne | 30_1406 |
| SW 2 | 520528 | 749066 | Ballycurrin | 30_3217 |
| SW 3 | 525547 | 749104 | Black [Shrule] | 30_1507 |
| SW 4 | 526244 | 751381 | Black [Shrule] | 30_1507 |
| SW 5 | 530990 | 751767 | Drainage ditch | NA |

Groundwater monitoring is proposed at the following locations – See Table 5-6. Monitoring will include hydrocarbons and suspended solids.

**Table 4-6: Groundwater Monitoring locations details**

| Name | Easting | Northing | Location |
|---|---|---|---|
| GW 1 | 524264 | 751807 | Quarry |
| GW 2 | 524388 | 751536 | Borrow Pit |
| GW 3 | 525666 | 751067 | GW well |
| GW 4 | 522961 | 749924 | GW well |
| GW 5 | 523570 | 750797 | GW well |

Monitoring records will include the date and time of the monitoring period and relate to the relevant consent conditions. A written log of the environmental performance of the works will be maintained. A monthly monitoring report on the findings of the monitoring exercises will be prepared within two weeks of receipt of analytical results. The monthly monitoring reports will cover the construction and post-construction works.

### 4.7.5 Proposed Monitoring Frequency and Parameters

#### *4.7.5.1 Pre-Construction Monitoring*

It is proposed that the surface water monitoring will be scheduled in conjunction with the pre-construction stage. Continuous turbidity monitoring will be undertaken upgradient and

downgradient on the Black [Shrule] River HDD and Shancloon preconstruction and during construction.

#### *4.7.5.2 Construction Stage Monitoring*

Surface water monitoring will be undertaken daily during the construction stage of the proposed project, with continuous turbidity monitoring. The daily monitoring will include a walk around the proposed wind farm site, visual inspection of the watercourses (i.e. Black [Shrule] River and tributaries) and field measurements for turbidity to be undertaken as required and, as a minimum, on a weekly basis. Weekly surface water monitoring will take place as per the daily surface water inspection and will include for a routine weekly measurement of turbidity at the surface water locations.

Monthly surface water samples will be collected during the construction stage of the proposed project and laboratory analysis will be undertaken for those monitoring parameters included in Table 5-7 of this SWMP.

#### *4.7.5.3 Post-Construction*

Immediately post-construction for three months, surface water samples will be collected, and laboratory analysis will be undertaken for those monitoring parameters included in Table 5-1 of this SWMP.

### 4.7.6 Trigger Values

The trigger values for the surface water monitoring programme are those listed in Table 5-7 of this SWMP and where relevant Surface Water Quality standards given in the Surface Water (Environmental Objectives) Regulations S.I. 272 of 2009 as amended, or as otherwise agreed with the Planning Authority.

An Environmental Manager will be engaged for construction stage monitoring. Should the trigger values not be met, the Environmental Manager will have 'Stop Works Authority' to direct the contractor's construction manager to cease all works and activities on the proposed wind farm site pending further instruction. Where turbidity increases above 50 NTU, immediate investigation and action will be taken.

**Table 4-7: Proposed Surface Water Parameters and Trigger Values**

| Parameter | Units | Proposed Trigger Values | SI No. 272 of 2009 EU Surface Water Environmental Objective Regulations (as amended) | SI No. 293 of 1988 EC Regulations (Quality of Salmonid Waters) |
|---|---|---|---|---|
| Electrical Conductivity (EC) | µS/cm | 1000 | | |
| pH | pH units | >6 and <9 | Soft Water 4.5< pH < 9.0 | >6 and <9 |
| MRP | mg/l | 0.025 (mean – high status)<br>0.035 (mean- good status) | 0.025 (mean – high status)<br>0.035 (mean- good status) | |
| Dissolved Inorganic Nitrogen as N | mg/l | 2.6 | 2.6 | |

| | | | | |
|---|---|---|---|---|
| Total Suspended Solids | mg/l | 25 (annual average) | | 25 (annual average) |
| BOD | mg/l | <5 | <2.6 (95%ile) good status<br><2.2 (95%ile) high status | <5 |
| COD | mg/l | 40 | | |
| Total Alkalinity as $CaCO_3$ | mg/l | No abnormal change | | No abnormal change |
| Hydroxide Alkalinity as $CaCO_3$ | mg/l | No abnormal change | | No abnormal change |

Weather conditions can significantly influence sediment generation and runoff from construction areas. Accordingly, construction activities will be planned with reference to weather forecasts and observed site conditions. Activities involving large excavations, stripping of vegetation, earthworks, borrow pit excavation and drainage installation will be reduced or suspended where forecast rainfall presents an unacceptable risk to surface water quality.

As a minimum, construction activities will be reviewed where any of the following forecast conditions occur:

- Rainfall intensity exceeding 10 mm/hr (yellow rainfall warning);
- Rainfall exceeding 25 mm within a 24-hour period;
- Greater than 50% of average monthly rainfall forecast within a 7-day period; or
- Orange or Red weather warnings issued by Met Éireann.
- Prior to suspension of works, all exposed areas, stockpiles and excavations will be secured and temporary drainage controls inspected to ensure adequate protection is maintained

Where monitoring identifies a deterioration in water quality that may be attributable to construction activities, a structured response procedure will be implemented.

**Table 4-8 Trigger Response Actions**

| Trigger Exceedance | Action |
|---|---|
| Minor | Inspect controls, Additional sampling |
| Significant | Stop works |
| Hydrocarbon spill | Emergency response procedure |

# 5. MAINTENANCE ACTIVITIES

## 5.1 CONSTRUCTION PHASE

Settlement ponds will be regularly cleaned/maintained to provide effective and successful operation throughout the works. Swales will be maintained, when required, starting upstream. Settlement pond management will also include the following:

Sediment/silt removed via the contractor from ponds is to be disposed of at suitable locations on the proposed wind farm site, away from watercourses. Machine access is required to enable the accumulated sediment to be removed. Settlement pond maintenance and/or cleaning will not take place during periods of extended heavy rain. Settlement ponds will be clearly marked for safety.

Settlement ponds will be constructed on even ground and not on sloping ground and where possible will discharge into vegetation areas to aid dispersion.

The settlement ponds will be monitored closely over the construction timeframe to ensure that they are operating effectively.

## 5.2 OPERATION PHASE

During the operational phase impediments to flow can occur as a result from blockages to watercourse crossings, ditches and watercourses themselves, resulting from vegetation and erosion debris. The surface water infrastructure will be maintained by the operator through the lifetime of the planning permission.

## 5.3 DECOMMISSIONING PHASE

A review of the relevant guidelines will be undertaken prior to the decommissioning phase. The existing surface water management infrastructure will be utilised for the decommissioning phase. Decommissioning activities will generate similar to some of the environmental risks to those arising during construction, removal of infrastructure and reinstatement activities. Limited excavation works or soil disturbance will occur as roads and hardstands will remain in place. Accordingly, the majority of the construction-phase drainage, sediment control, groundwater protection, monitoring and pollution prevention measures outlined in this SWMP will be re-implemented during decommissioning.

The operational road layout will remain in place and therefore limit the potential for siltation during the decommissioning phase. Water quality measures as outlined in Section 3 will be implemented. The operational drainage infrastructure will remain available to facilitate management of runoff.

# 6. APPENDIX A SWMP CALCULATIONS

## Surface water storage volume design tool

hr wallingford

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

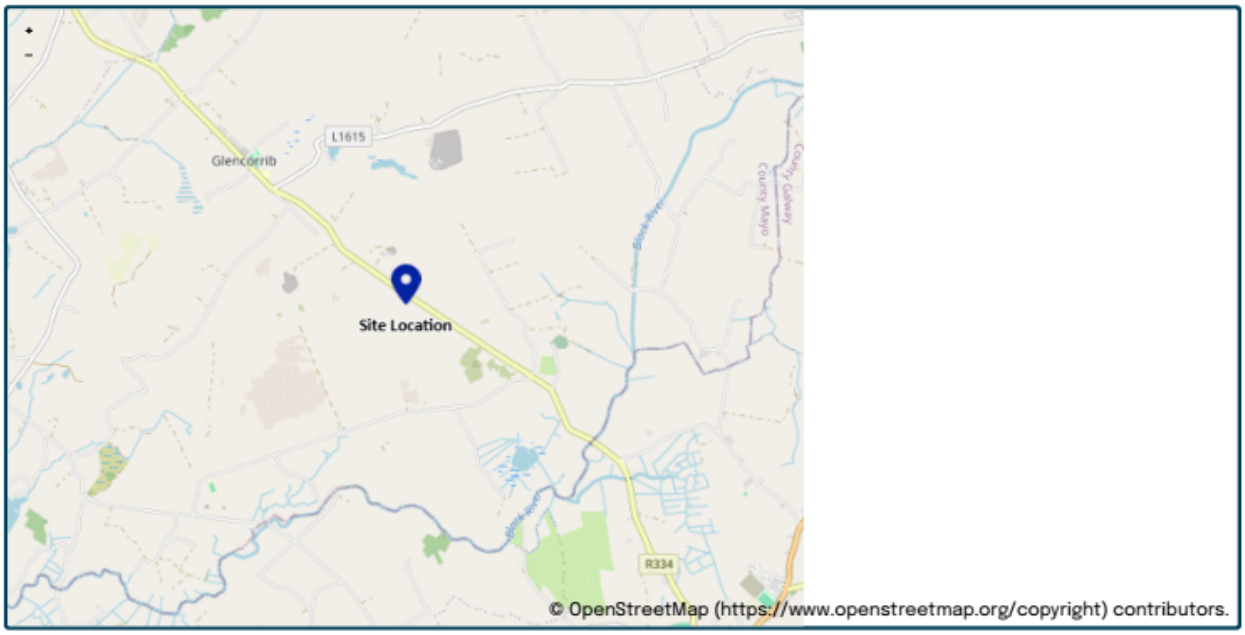
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

### Project details

| | |
|---|---|
| Date | 23/10/2026 |
| Calculated by | J.Dillon |
| Reference | 11981 |
| Model version | 2.2.3 |

### Location

| | |
|---|---|
| Site name | Rooaunalaughta |
| Site location | Mayo |




| | |
|---|---|
| Site easting (Irish Grid) | 123813 |
| Site northing (Irish Grid) | 250246 |
| Site easting (Irish Transverse Mercator) | 523780 |
| Site northing (Irish Transverse Mercator) | 750270 |

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## Site areas

| | | |
|---|---|---|
| Total site area (ha) | 0.35 | ha |

## Roof area

| | | |
|---|---|---|
| Total roof area (ha) | 0.05 | ha |
| Contributing roof area (ha) | 0.05 | ha |
| Non-contributing roof area (ha) | 0 | ha |

## Paved area

| | | |
|---|---|---|
| Total paved area (ha) | 0.3 | ha |
| Contributing paved area (ha) | 0.3 | ha |
| Non-contributing paved area (ha) | 0 | ha |

## Grass / vegetated area

| | | |
|---|---|---|
| Total grass / vegetated area (ha) | 0 | ha |
| Contributing grass / vegetated area (ha) | 0 | ha |
| Non-contributing grass / vegetated area (ha) | 0 | ha |

## Total area

| | | |
|---|---|---|
| Total contributing area (ha) | 0.35 | ha |

## Contributing areas with urban creep allowance

| | |
|---|---|
| Urban creep allowance factor | +0% (no creep) |

## Storage design parameters

| | | |
|---|---|---|
| Storage base shape | Rectangular / square | |
| Storage base length to width ratio | 3:1 | |
| Storage design depth (m) | 2 | m |
| Storage side slope (1 in x) | 1 in 1 | |
| Storage voids ratio (%) | 100% (all voids) | |
| Storage volume design return period (years) | 1:30 years | |

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# Discharge flow rate from the site

## Method

| | |
|---|---|
| Type of site | Greenfield |
| Specify the method | IH124 |

## IH124

| | My value | | Map/default value |
|---|---|---|---|
| SAAR (mm) | 1298 mm | | 1298 |
| How should SPR be derived? | WRAP soil type | | |
| WRAP soil type | 1 | | 1 |
| SPR | 0.1 | | |
| Total area for greenfield runoff calculation (ha) | 0.35 ha | | 0.35 |
| QBar (l/s) | 0.1 l/s | | |
| Hydrological region | 13 | | 13 |
| Return period (years) | Qbar (1:2.3 years) | | |
| Growth curve factor | 1 | | |
| Flow rate (IH124) (l/s) | 0.1 l/s | | |

## Final discharge rate

| | |
|---|---|
| Runoff calculation method | IH124 |
| Design flow rate (l/s) | 0.1 l/s |

# Blockage risk

| | |
|---|---|
| Specify the method | Orifice diameter |
| Minimum orifice diameter to prevent blockage (mm) | 35 mm |

| | My value | | Calculated value |
|---|---|---|---|
| Design orifice diameter (mm) | 35 mm | | 35 |
| Flow rate of orifice (l/s) | 3.61 l/s | | |

# Rainfall and runoff

| | |
|---|---|
| Rainfall input type | Generic rainfall CSV file |
| | rainfall DURATION roo.csv |
| Climate change allowance factor | 120% |

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## Model results

- **Maximum discharge flow rate:** 3.6 (l/s)
- **Outflow orifice diameter:** 35 (mm)
- **Storage base length:** 12 (m)
- **Storage base width:** 4.0 (m)
- **Storage base area:** 48 ($m^2$)
- **Storage total volume:** 169 ($m^3$)
- **Storage total water volume:** 169 ($m^3$)
- **Storm return periods run:** 1, 2, 5, 10, 30, 50, 100 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 1080, 1440 (minutes)

| Return Period (years) | Critical Duration (minutes) | Peak Flow Rate (l/s) | Max Depth (m) | Max water volume ($m^3$) | Max storage volume ($m^3$) |
|---|---|---|---|---|---|
| 1 | 720 | 2.5 | 0.98 | 63 | 63 |
| 2 | 720 | 2.7 | 1.09 | 72 | 72 |
| 5 | 720 | 3.0 | 1.42 | 103 | 103 |
| 10 | 720 | 3.3 | 1.64 | 126 | 126 |
| 30 | 1080 | 3.6 | 2.00 | 169 | 169 |
| 50 | 1080 | 3.8 | 2.18 | 193 | 193 |
| 100 | 1080 | 4.0 | 2.44 | 229 | 229 |

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 $m^3$ value, unless storage volumes are less than 10 $m^3$, in which case, storage volumes are provided to 1 decimal place.

### Disclaimer

This report was produced using the surface water storage volume design tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate surface water storage volumes for the whole site based on a limiting discharge rate from the site. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

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## Appendix A - Rainfall Depths

### Rainfall depths (mm) with climate change

| Duration (minutes) | Duration (hours) | 1 years | 2 years | 5 years | 10 years | 30 years | 50 years | 100 years |
|---|---|---|---|---|---|---|---|---|
| 15 | 0.25 | 7.80 | 9.00 | 12.84 | 15.84 | 21.36 | 24.48 | 29.40 |
| 30 | 0.5 | 10.08 | 11.64 | 16.32 | 20.04 | 26.76 | 30.60 | 36.36 |
| 60 | 1 | 13.20 | 15.00 | 20.88 | 25.44 | 33.60 | 38.04 | 45.00 |
| 120 | 2 | 17.28 | 19.56 | 26.76 | 32.16 | 42.00 | 47.40 | 55.68 |
| 180 | 3 | 20.16 | 22.68 | 30.84 | 36.96 | 48.00 | 53.88 | 63.00 |
| 240 | 4 | 22.44 | 25.32 | 34.20 | 40.80 | 52.68 | 59.04 | 68.76 |
| 360 | 6 | 26.28 | 29.40 | 39.48 | 46.92 | 60.00 | 67.08 | 77.88 |
| 540 | 9 | 30.72 | 34.32 | 45.60 | 53.88 | 68.52 | 76.32 | 88.20 |
| 720 | 12 | 34.20 | 38.16 | 50.52 | 59.40 | 75.24 | 83.52 | 96.24 |
| 1080 | 18 | 39.96 | 44.40 | 58.32 | 68.28 | 85.80 | 95.04 | 108.96 |
| 1440 | 24 | 44.64 | 49.56 | 64.56 | 75.36 | 94.20 | 104.04 | 119.04 |

### Rainfall depths (mm) without climate change

| Duration (minutes) | Duration (hours) | 1 years | 2 years | 5 years | 10 years | 30 years | 50 years | 100 years |
|---|---|---|---|---|---|---|---|---|
| 15 | 0.25 | 6.50 | 7.50 | 10.70 | 13.20 | 17.80 | 20.40 | 24.50 |
| 30 | 0.5 | 8.40 | 9.70 | 13.60 | 16.70 | 22.30 | 25.50 | 30.30 |
| 60 | 1 | 11.00 | 12.50 | 17.40 | 21.20 | 28.00 | 31.70 | 37.50 |
| 120 | 2 | 14.40 | 16.30 | 22.30 | 26.80 | 35.00 | 39.50 | 46.40 |
| 180 | 3 | 16.80 | 18.90 | 25.70 | 30.80 | 40.00 | 44.90 | 52.50 |
| 240 | 4 | 18.70 | 21.10 | 28.50 | 34.00 | 43.90 | 49.20 | 57.30 |
| 360 | 6 | 21.90 | 24.50 | 32.90 | 39.10 | 50.00 | 55.90 | 64.90 |
| 540 | 9 | 25.60 | 28.60 | 38.00 | 44.90 | 57.10 | 63.60 | 73.50 |
| 720 | 12 | 28.50 | 31.80 | 42.10 | 49.50 | 62.70 | 69.60 | 80.20 |
| 1080 | 18 | 33.30 | 37.00 | 48.60 | 56.90 | 71.50 | 79.20 | 90.80 |
| 1440 | 24 | 37.20 | 41.30 | 53.80 | 62.80 | 78.50 | 86.70 | 99.20 |

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