

## **Dinorwig – Pentir 400 kV - Water Management Plan**

### Project Control Document

Morgan Sindall, Infrastructure – Energy and Water

Document title: **Dinorwig – Pentir 400kV Cabling Water Management Plan**

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Project number: 4M4000

Customer: National Grid Electricity Transmission Ltd




**Location:** National Grid Co PLC, Morgan Sindall Site Compound (off B4547), Llanddeiniolen (Pentir), Bangor, Gwynedd, Wales, LL57 4ED

Grid Reference: SH 55887 67546

#### **Morgan Sindall Construction & Infrastructure Ltd**

Corporation Street, Rugby, Warwickshire, CV21 2DW

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<b>Originator:</b>	Siôn Williams	<b>Date:</b>	18/06/2021	<b>Sign:</b>	
<b>Reviewer:</b>	Rob Sinclair	<b>Date:</b>	25/06/2021	<b>Sign:</b>	
<b>Approver:</b>	Ian Burns	<b>Date:</b>	25/06/2021	<b>Sign:</b>	

## Revision History

Rev:	Issue Date:	Comments/Details of amendment	Approved by:
Rev 01	18/06/2021	First Draft	Ian Burns
Rev 02	12/07/2021	Updated to reflect NG comments / Woods FCA comments / recommendations	Ian Burns
Rev 03	12/08/2021	Section 17 – Update On-Site Water Quality Monitoring Regime & Proposed Dewatering Discharge Locations.	Rob Sinclair

For full revision schedule see Project Execution Plan (PEP) (Part 1).

## **Dinorwig – Pentir 400 kV - Water Management Plan**

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## 1. Introduction

- 1.1. This document sets out the water discharge practices that shall be used at all Dinorwig to Pentir 400kV cable replacement work locations where the discharge of clean, uncontaminated water is required.

## 2. Purpose and Applicability

- 2.1. This document applies both to those working directly for Morgan Sindall and those undertaking works on behalf of Morgan Sindall. This requirements document is in accordance with Guidance for Pollution Prevention – works and maintenance in or near water note: GPP 5 (Version 1.2 February 2018). This document shall only be used with the permission of NRW and the landowner at the discharge location (such permission to be obtained through National Grid).

## 3. Scope

- 3.1. This document covers discharges of clean, uncontaminated water to grassland, in accordance with GPP 5 at any Morgan Sindall work location(s) associated with the Dinorwig to Pentir 400kV cable Project. (First phase - A4086 Cable Duct Construction).
- 3.2. This document does not refer to any water discharges that would require a permit from NRW. This document does not apply to any areas of contamination.

## 4. Terms and Definitions

- 4.1. The following terms and definitions are used in this document.

Table 1.1 Terms and Definitions

Term	Definition
<b>MS</b>	Morgan Sindall
<b>NG</b>	National Grid
<b>NRW</b>	Natural Resources Wales
<b>CEMP</b>	Construction Environmental Management Plan
<b>GPP 5</b>	Guidance for Pollution Prevention (Works and maintenance in or near water)
<b>HDD</b>	Horizontal Directional Drilling
<b>RAMS</b>	Risk Assessment(s) Method Statement(s)
<b>IBC</b>	Intermediate Bulk Container
<b>Sensitive receptor</b>	Referring to the 'Source – Pathway – Receptor' model. A sensitive receptor is an environmental feature that could be affected by pollution.
<b>Pathways</b>	Referring to the 'Source – Pathway – Receptor' model. A pathway is a route for pollution to travel.
<b>Dinorwig to Pentir 400kV cable Project</b>	A full description of the scheme is provided in the Core Project Execution Plan (PEP (1)). However, the key elements of the scheme are: Installation of two new 400kV underground cable circuits to replace the existing Circuit 1 and 2 underground cables, these will run from Dinorwig Power station, before crossing the Afon Rhythallt, running under the A4086 from Llanberis to Dol Afon, before crossing the Afon Rhythallt downstream of Llyn Padarn and heading north running under the A4244 to the existing Pentir substation. The removal of the existing Circuit 1 and 2 cables beneath the Llanberis Lake Railway will enable the installation of an entirely new Circuit 3 underground cables between Dinorwig Power Station and the existing Overhead Line at Penisa'r Waun. A new bay will be constructed at Pentir substation for Circuit 3. The underground cables will cross watercourses via Horizontal Directional Drilling (HDD) or open trenches. Associated with these works will be a range of construction activities and temporary infrastructure, including access tracks (including watercourse crossings), storage mounds, and construction compounds.

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Once constructed the only permanent above ground infrastructure would be the new substation bay at Pentir. All temporary construction works associated with the scheme will be removed with the ground being reinstated to a similar condition and elevation as at present, upon completion.

### 5. Responsible Parties

5.1. This section describes all the responsible parties associated with this process

Table 1.2 Responsible parties

Responsible party	Description
<b>Project Manager</b>	Ultimate responsible for ensuring that there is no pollution from site; ensure temporary works can accommodate necessary water storage and treatment. Support and check that the water management plan, associated guidance, and processes are being followed with support from the environmental advisor and contracted environmental support. Secure environmental permits and consents. Foster the dynamic nature of water management, highlighting new areas of work that may present environmental risk and ensure these are proactively managed.
<b>Site Manager</b>	Highlight new areas of work that may present environmental risk. Lead on developing new ways of working to avoid, reduce and mitigate pollution, obtain support from the environmental advisor and contracted environmental support and sign off from the SHEQ manager. Communicate and where necessary supervise the delivery of the agreed work and any additional actions. Act in the event of pollution incidents.
<b>Sub - Contractor i.e. Earthworks, Groundworks and Water Management Support</b>	Follow processes communicated with respect to environmental protection and specific methods of work to prevent pollution. Delivery of temporary works including the implementation of site drainage, water storage and treatment following the water management plan and any site-specific measures. Report to site manager any pollution and near miss incidents. Act in the event of pollution incidents.
<b>Environmental Advisor / SHE Manager</b>	Lead on proposals to address strategic environmental risk and present these to the business. Ensure incidents, monitoring, non-conformances, and complaints are discussed at weekly team progress meetings and ensure environmental risk is considered with any change or variation in the working method. Support development and sign off method statements for high-risk activities. Ensure that update to the water management plan and site-specific protection measures are communicated. Provide environmental training to all staff.
<b>Site Staff</b>	Follow processes communicated with respect to environmental protection and specific methods of work. Report to their immediate supervisor any pollution and near miss incidents observed. Act in the event of pollution incidents.
<b>Contracted Environmental Support</b>	Provide silt control products and services as contracted; support to evaluate environmental risk and advise on developing ways of working to avoid, reduce and mitigate pollution. Site monitoring and advise on new site-specific protection measures; discuss recommended actions with site manager, environmental advisor and

HSEQ manager; agree responsible persons and timeframe for delivering on actions. Provide advice in the event of pollution incidents. Provide environmental training to all staff.

Table 1.3 Points of contact for water management during temporary works

Point of contact	
Person(s) acting as normal contact with NRW about this plan	<p>Name: Ian Burns (Project Manager)</p> <p>Tel: 07976181839</p> <p>Email: <a href="mailto:ian.burns@morgansindall.com">ian.burns@morgansindall.com</a></p> <p>Name: Rob Sinclair (Ops Manager)</p> <p>Email: <a href="mailto:Robert.sinclair@morgansindall.com">Robert.sinclair@morgansindall.com</a></p> <p>Tel: 07580702378</p>
Person(s) acting as 24- hour contact with NRW in case of emergency (i.e. if there is an imminent risk of pollution or where pollution is occurring)	<p>Name: Ian Burns (Project Manager)</p> <p>Tel: 07976181839</p> <p>Email: <a href="mailto:ian.burns@morgansindall.com">ian.burns@morgansindall.com</a></p> <p>Name: Rob Sinclair (Ops Manager)</p> <p>Email: <a href="mailto:Robert.sinclair@morgansindall.com">Robert.sinclair@morgansindall.com</a></p> <p>Tel: 07580702378</p>
Person(s) acting as the environmental lead with NRW about this plan	<p>Name: Siôn Williams (Environmental Advisor)</p> <p>Tel: 07971922073</p> <p>Email: <a href="mailto:Sion.Williams@morgansindall.com">Sion.Williams@morgansindall.com</a></p>
Person(s) acting on behalf of the operator as a contracted environmental support (Mott MacDonald)	<p>Name: Joanne Bates (Technical Principal)</p> <p>Tel: 078 5552 7720</p> <p>Email: <a href="mailto:joanne.bates@mottmac.com">joanne.bates@mottmac.com</a></p>

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### 6. Pollution Control Risk Assessment

- 6.1. A site meeting and walkover was undertaken on the 11<sup>th</sup> May 2021 by Ian Burn (MS), Sion Williams (MS), Bev Dyer / Melisa Morris / Walter Hanks (NRW) to discuss Horizontal Directional Drilling Activities at four locations near to and within designated SSSI's features (Llyn Padarn, Llyn Peris, Coed Dinorwig). The walkover sought to identify sources of silt pollution from site as well as foreseeable sources based on information provided by site staff, the construction programme and the geography of the site.

### 7. Topography

- 7.1. The proposed Scheme extends across a predominantly rural area from Pentir Substation in a south easterly directional following the A4244 highway to the A4086 highway which includes small/medium sized pasture fields for HDD works passing through sloping/undulating ground. The proposed Scheme falls within the western extent of the Padarn Country Park and to the east of the A4086, with all Cable Circuits running either side of Llyn Padarn prior to connecting to Dinorwig Substation. At its closest point, the proposed Scheme is located approximately 500m from the Snowdonia National Park. To the south east of the proposed Scheme, the cable circuit route passes through a small part of the recently nominated World Heritage Sites - Dinorwig Slate Quarry and would follow the existing road to the rear (east) of the National Slate Museum buildings.

### 8. Geology

- 8.1. Data from the BGS (2021) and shows the solid geology along the route, this comprises a mix of mudstone, siltstone, sandstone, felsic tuff and interbedded sandstone and conglomerate. The northern section of the route, around Pentir Substation is underlain by the Minfford Formation (interbedded sandstone and conglomerate). To the south of this, roughly following the B4366 is a band of the Lwyd Formation (sandstone), with a larger band of the Nant Ffrancon subgroup (siltstone) running to the south and in parallel with it. Beneath the majority of the route along the A4244 to the Afon Rhythallt floodplain the bedrock is the Fachwen Formation (siltstone and limestone interbedded). The southern half of the floodplain is however, underlain by the Padarn Tuff Formation (tuff, felsic, igneous bedrock) which also underlies the northern half of Llyn Padarn, with the exception of a small area of unnamed igneous intrusion Ordovician (microgabbro) in the south. Between the end of the Padarn Tuff Formation and the Dinorwig Power Station are alternating bands of the Fachwen Formation (interbedded sandstone and conglomerate), Llanberis Slates Formation (mudstone, siltstone and sandstone). With one unnamed igneous intrusion (Ordovician Microgabbro) in the very east of the route. Beneath Llanberis there is an area of the Bronllwyd Grit Formation (sandstone).
- 8.2. Data from the BGS (2021) and shows the superficial geology along the route. The northern section of the route (between Pentir Substation and just to the north of the Afon Rhythallt floodplain) is underlain by low permeability, superficial deposits of Devensian till and glaciofluvial deposits (comprising dense clays but also silts, sands gravels and boulders). There are small areas of peat, alluvium and river terrace deposits around Pentir and the north of the route, however further south along the A4244 in the however to where the route follows the A4244 the superficial geology is predominantly Till. The Afon Rhythallt floodplain area is mainly underlain by alluvium deposits but there is an area of river terrace deposits (sand and gravel), in the south-west of the floodplain. There are predominantly no superficial deposits recorded along the southern section of the route (along the shores of Llyn Padarn to the

Dinorwig Power Station), with the exception of a small area of alluvial fan deposits around Llanberis and beneath the Llanberis Lake railway line on the north bank of Llyn Padarn south east of Cei Llydan Station.

- 8.3. The generally low permeability of superficial deposits such as till will impede infiltration. However, sand and gravel deposits may allow for higher levels of infiltration where groundwater levels permit, such as the areas of glaciofluvial sands and gravels located away from the main watercourse valley bottoms. Within floodplain areas groundwater levels would be expected to be closer to the surface reflecting levels in adjacent watercourses.

Table 1.4 Details of Nationally Designated Wildlife Sites within 5 km of the Site

Name of Site	Designation	Approximate Distance (m) from proposed Scheme	Primary Reason for Designation
Eryri / Snowdonia	Special Areas of Conservation (SAC)	0.3 km east of Circuit 1 & 3	<p>The majority of this site forms the Eryri / Snowdonia SAC. It is of special interest for its upland habitats including lichen and bryophyte heath, montane heath, dry heath, wet heath, blanket bog, flush and spring, calcareous grassland, tall herb and fern ledges, vegetated scree and broadleaved woodland communities and for its inland rock exposures with crevice vegetation and low nutrient lakes.</p> <p>The site is also of special interest for chough <i>Pyrhacorax pyrrhacorax</i> and for an assemblage of upland moorland and grassland birds, including peregrine. Other animal species of interest include salmon <i>Salmo salar</i>, the rainbow leaf beetle <i>Chrysolina cerealis</i> and an upland invertebrate assemblage.</p> <p>The site is also designated for its geological and geomorphological interest.</p>
Llyn Padarn	Site of Special Scientific Interest (SSSI)	Within the site boundary crosses Circuit 1, 2, & 3	<p>This site is notified for its biological and geological interest. It is one of only three remaining natural localities in Wales for the Arctic charr <i>Salvelinus alpinus</i> L., a glacial relict fish species, and is a classic geological site of national importance. Llyn Padarn also has some aquatic plant interest, notably floating water-plantain and small. Otters and small numbers of wildfowl frequent the lake and the outflow,</p> <p>The site is also designated for its geological interest.</p>
Coed Dinorwig	SSSI	Within the site boundary crosses Circuit 1 & 2	Coed Dinorwig is a large representative example of a wood sage - oak/birch <i>Teucrium scorodonia</i> - <i>Quercus/Betula</i> type woodland. It is situated on a dry, south-west facing hillslope on an ancient woodland site and has been little grazed by sheep in recent times. Bluebell are locally abundant. The uncommon long-leaved helleborine is present. The fauna includes wood ants, speckled wood butterfly and a range of characteristic oakwood bird species including pied flycatcher and redstart.
Llwyn y Coed	SSSI	Adjacent to site to Circuit 2	A small grazed sessile oakwood of the <i>Teucrium scorodonia</i> – <i>Quercus/Betula</i> (wood sage-oak/birch) type situated on a steep rocky north-east facing slope. The principle interest of the wood is its Atlantic flora which includes both British species of filmy ferns. It is one of the most important woodland sites in North Gwynedd for its woodland Atlantic bryophyte flora.
Llyn Peris	SSSI	0.09 km south of Circuit 3	Designated for its geological interest only.
Cwm Dwythwch	SSSI	1.2 km south west of Circuit 2 & 3	Designated for geological interest



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Eithinog	SSSI	2.8 km north of Circuit 1 & 3 and Pentir Substation	Eithinog is of special interest for the presence of a Red Data List fairy club fungus <i>Ramariopsis crocea</i> at its only location in Wales and for its diverse assemblage of grassland fungi, including 21 species of pinkgill <i>Entoloma spp.</i> , making it one of the best sites in Wales for this group, and 10 species of fairy club <i>Clavaria spp.</i> , together with species of waxcap <i>Hygrocybe</i> and earthtongue <i>Geoglossum</i>
Moelyci a Chors Ty'n y Caeau	SSSI	2.9 km east of Circuit 1 & 3 and Pentir Substation	This site is of special interest for its diverse assemblage of grassland fungi, including over 26 species of waxcaps <i>Hygrocybe spp.</i> , 10 species of Clavarioids (clubs, spindles and corals), 5 species of Geoglossids (earthtongues), 14 species of Entoloma (pink-gills) and 3 species of <i>Dermoloma</i> (crazed caps, fanvaults and meadowcaps), and for its neutral grassland and mire habitats.
Cwm Idwal	NNR	3.1 km south east of Circuit 1, 2 & 3 and Dinorwig Substation	Falls within the Eryri / Snowdonia SAC. Supports a number of Annex I habitats and Annex II species. The cwm forms an amphitheatre behind a glacial lake, Llyn Idwal, and this makes the reserve one of the finest places to see how glaciation and the subsequent retreat of the glaciers affected and shaped this kind of dramatic landscape. On the ledges, beyond the reach of the feral goats, there are a host of rare arctic alpine plants, including the moss campion, Snowdon lily, alpine lady's mantle and purple saxifrage
Coedydd Afon Menai	SSSI	3.2 km north of Circuit 1 & 3 and Pentir Substation	Coedydd Afon Menai is a representative example of an ivy-oak/ash <i>Hedera Helix Quercus/Fraxinus</i> type woodland. The woodland largely occurs on steep, sometimes rocky slopes although flatter sections of interesting woodland above the slope are included.
Glannau Porthaethwy	SSSI	3.5 km north of Circuit 1 & 3 and Pentir Substation	The site has been selected for its marine biological features. The shore is of special interest as it is the most extensive sheltered rock shore in the area between Bardsey Island and Great Orme's Head and because it supports the greatest diversity of marine plant and animal communities on this type of shore within this area. The shore is also important for the presence of five marine communities of restricted national distribution, five diverse rockpool and overhang communities, and for exhibiting the most comprehensive community zonation characteristic of sheltered rocky shores.
Ynys Mon, Anglesey	AONB	3.5 km north of Circuit 1 & 3 and Pentir Substation	Almost the entire 201 km coastline of Ynys Mon, the Isle of Anglesey, is designated as an AONB. Varied habitats, from marine heaths to mud-flats, give the AONB a high level of marine, botanical and ornithological interest. Some of the main features of the Anglesey AONB are: *low cliffs alternating with coves and pebble beaches *sheer limestone cliffs interspersed with fine sandy beaches *stretches of sand dunes with beaches
Pant Cae Haidd	SSSI	4.03 km south west of Circuit 1 & 3	The site is of special interest for its fen meadow vegetation and associated habitats.
Afon Gwyrfaï a Llyn Cwellyn	SSSI	4.2 km south west of Circuit 1 & 3	Afon Gwyrfaï a Llyn Cwellyn is of special scientific interest for its geological and biological features. Features of special interest on this site are running and standing water, aquatic

			plant assemblage, floating water-plantain, Arctic charr, Atlantic salmon and otter.
Sgista Glas Ynys Mon	SSSI	4.2 km north west of Circuit 1 & 3 and Pentir Substation	Designated for geological interest
Caeau Tyddyn Dicwm	SSSI	4.4 km north east of Circuit 1 & 3 and Pentir Substation	This site is selected for its biological interest as a habitat example. It comprises a group of freely draining small fields lying on the north-east slopes of the Ogwen Valley at an altitude of 80m to 110m. The site is one of the few remaining examples of traditionally managed, enclosed pastures and hayfields in Arfon which has not been agriculturally improved by ploughing and reseeded in recent times. Two sub-communities of <i>Centaurea Nigra</i> - <i>Cynosurus Cristatus</i> grassland are represented.
Cadnant Dingle	SSSI	5 km north of Circuit 1 & 3 and Pentir Substation	Cadnant Dingle, a woodland in a narrow valley near Llandegfan, has been selected as a representative example of the <i>Brachypodium sylvaticum</i> - <i>Quercus/Fraxinus</i> (slender falsebrome - oak/ash) group of broadleaved woodlands.

## 9. Method of works along the A4086 Duct Construction

- i. The following technical note demonstrates the method for laying 400kV XPLE cable ducts within the highway in the A4086 from Llanberis to Cwm-y-Glo. The method for excavation, duct installation and reinstatement will be explained. Only the ducts will be laid initially, with the cable joint bays constructed after all duct works in the section of road completed.
- ii. Before work commences in each section, traffic management will be arranged by contractor Amberon. Traffic management will be split into section of up to 300m. To accommodate a lane closure a two-way traffic light system will be put in place. Signage warning road users of upcoming road works and two-way lights will be placed in the road. Road safe barriers will be placed in the carriageway to set up a working area. The traffic management will accommodate a working area with a 0.5m safe working distance from live traffic. Works entry and exit points will be marked.
- iii. Before works commences, a permit to break ground will be issued by the buried services coordinator. The area will be scanned by the MS buried service locator using a cable avoidance tool, as well as ground operatives before the dig commences. All discovered services will be clearly marked and explained to ground operatives by the buried service coordinator. When working within 1m of a live service the excavation will be hand dig only.
- iv. The labour for each section will consist of 2 gangs of 4 operatives- 1 plant operator, 1 banksman and 2 general operatives. Each gang will accompany a 14-tonne narrow tracked excavator, as well as either an 8 wheeled dirt wagon or an 8-tonne dumper for refuse. One gang will be responsible for excavation and the other responsible for laying ducts and road reinstatement. A sub-contractor will be used for surfacing. The gangs will be laying approximately 12m of ducting per day. The work will begin in Llanberis and work towards Cwm-y-Glo.
- v. The road surface will be cut using a hand operated petrol floor saw. A marked-out area 2.5m wide will be cut to a depth of 300mm for a length of 12m for the excavation that day. The road surface will be broken using a breaker attachment on the excavator. Road surface will be cleared by the excavator and loaded onto an 8 wheeled debris truck or an 9-tonne dumper, depending on the section. Material will be removed from the working area and stored carefully at a temporary compound (at Point X) for collection by an approved waste contractor. Once road surface has been removed, sub-base will be excavated down to a depth of 1m using the excavator with a toothless bucket. In the event of nearby services, insulated handheld tools will be used for excavation. After trench excavation, temporary trench supports will be lifted into the trench using a hook and chain attachment to the excavator.
- vi. The following gang will begin with a concrete bound sand (CBS) pour. CBS will be brought to the excavation and poured from a 9-tonne dumper. A bed of CBS will fill the bottom of the trench. Three 250mm diameter cable ducts will then be laid upon the CBS in either flat or trefoil formation, dependent on the section. A 25mm diameter DTS fibre optic cable duct and a

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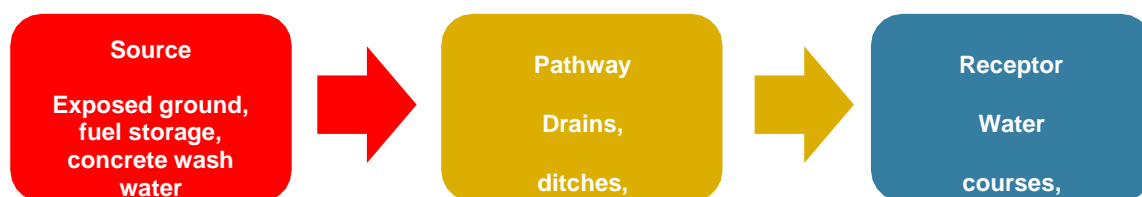
communications ducts (size TBC) will be laid alongside the cable ducts. CBS will then surround the ducts and form a covering layer. Once the CBS layer is set, a polymeric cable tile will be laid on top by hand. This will be followed by 100mm of Type 1 sub-base, placed using the dumper. As the trench is being backfilled the trench support will be lifted out gradually. A 2.5mm thick cable warning tape is laid on top of the backfill. The rest of the backfill will be laid on top of the tape. The backfill will be compacted using a petrol vibration plate compactor. To finish the reinstatement a surfacing contractor will lay two layers of asphalt.

**Note:** This document is a “live document” and key work activities related to HDD’s, Heritage Railway, Pentir Substation, Penisa’r Waen Sealing end Compound, A4244 highway works will be contained within in this section following finalised detailed design.

### 10. Pollution Sources, Pathways and Receptors Risk Assessment

All pollution risks have three features:

- a source of pollution,
- a pathway for pollution to travel and,
- a receptor where the potential damage or harm is done.



The environmental risk assessment using the Source-Pathway-Receptor model can be viewed in Appendix A.

The assessment also provides an overview of the control measures that would be needed to ensure the risk is reduced. These Pollution Control Measures are detailed in Section 18 of this report.

### 11. Discharge Rate and Location

The surface water discharge from site will be intermittent, only undertaken as the need arises following local rainfall events. It will not be a continuous flow and unlikely to occur in dry weather.

The rate of discharge will be dictated by the pump operating at a maximum rate of 0.69 l/s (0.00069 cubic m/s). This is the equivalent flow rate of 2500 l/hr (2.5 cubic m/hr).

Calculation:

- $0.00069 \times 60 = 0.04 \text{ m}^3/\text{minute}$
- $0.04 \times 60 = 2.4 \text{ m}^3/\text{hour}$

- operating for 12 hours = 28.8m<sup>3</sup>
- operating for 24 hours = 57.6m<sup>3</sup>

Whilst the pump is allowed for the above pumping volumes the anticipated discharge volume would be <20m<sup>3</sup> a day.

The surface water will be released via a 2" hose via a silt sock into the surface water drainage gullies along the A4086 & A4244.

Proposed discharge locations:

Discharge locations / outfalls A4086		
Discharge Point Name	National Grid reference	Name of effluent through this discharge point
Discharge Point A	256145,361904	Discharge surface water
Discharge Point B	257204,360866	Discharge surface water
Discharge Point C	257765,360540	Discharge surface water
Discharge Point D	257808,360417	Discharge surface water
Discharge Point E	257895,360239	Discharge surface water
Discharge Point F	257997,360132	Discharge surface water
Discharge Point G	255754,362192	Discharge surface water
Discharge Point H	257336,360741	Discharge surface water
Discharge Point I	256487,361437	Discharge surface water

Guidance provided in the regulatory position statement (RPS) for [temporary dewatering from excavations to surface water](#) states that only uncontaminated water consisting of clean and clear rainwater or infiltrated groundwater may be released from a site for up to three consecutive months under exemption.

In order to qualify for the exemption a series of conditions aimed to prevent pollution in the receiving water body must be met. Consequently, the discharge must not:

- result in muddy water
- contain any chemical agent such as a coagulant or flocculant
- contain any contaminant such as oil
- contain concrete wash water even if it has been treated
- contain site drainage from surfaces such as haul roads, storage areas
- spread invasive plants animals or diseases
- be within or close to a sensitive ecological site

It will not be possible to meet the conditions set out in the RPS at locations along the A4086 adjacent to Llyn Padarn (SSSI), Llwyn Y Coed (SSSI), Heritage Railway Line & Coed Dinorwig (SSSI) and therefore a bespoke environmental permit will be required for discharge activities during the excavation and installation works.

This report will form the method statement documenting the control measures to reduce the risk of pollution including how to:

- minimise the level of contaminants being generated such as silt
- minimise water entering an excavation such as from rainfall or runoff
- prevent contaminated water moving to a river or stream
- dispose of water that enters the excavation including any silt control interventions

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- maintain silt control interventions and monitor water quality leaving site

Permits can take several months to be determined, so early engagement with the local environment officers from NRW will be required. Information regarding stakeholder engagement can be obtained from Viewpoint4Projects online.

Relevant information can be obtained from Natural Resources Wales website:

<https://www.gov.uk/guidance/discharges-to-surface-water-and-groundwater-environmental-permits>

## 12. Environmental Management System

This water management plan is part of the Morgan Sindall Environmental Management System (EMS), certified to ISO 14001:2015 (Appendix C).

The plan follows the impact and aspect register (Ref. MS-4M4000-1675-MSI-1405-XX-PL-Z-000001 Construction Environmental Management Plan) and is designed to identify environmental risk and outline the methods and philosophy behind avoiding and reducing pollution risk, as well as mitigating effect; collecting, treating and discharging water from site in a suitable manner so as not to impact surface and ground waters during construction.

The water management plan is a live, dynamic document and will be a standing agenda item on the weekly site progress meeting.

## 13. Communication

Environmental issues will be reviewed internally at weekly site progress meetings, in accordance with the Morgan Sindall ISO 14001 EMS. The agenda will include:

- Identify change or variation in the working method and whether this alters the environmental risk profile
- Environmental incidents, complaints and non-conformance; assignment of corrective actions and sign off on previous actions
- Provide specific instruction to subcontractors and site staff
- Environmental information will be delivered to contract personnel in the following way:
  - Including environmental issues as an agenda item on project progress meetings
  - Inductions, topic-specific training, toolbox talks
  - Posting information on notice boards
  - Parent company communications, such as cascade briefings, magazine, intranet. Additionally, within the contract, information will be communicated through:
    - TP163 weekly SHEQ meetings
    - Supply chain meetings
    - Weekly Project review meeting

- Other meetings e.g. design team meeting

## 14. Record Keeping

Environmental records will be included in the Site Environment Folder and/or Viewpoint4Projects online;

- Staff competence and training records
- Environmental risk register and management systems, including instructions for methods of work and any pollution control plans
- Permits, licences and consents
- Daily / Weekly Project Management Inspections
- Site visit records (by others)
- Internal and external audit reports
- Minutes of progress meetings
- Correspondence including complaints and regulatory visits, including investigation reports
- Environmental survey reports
- Routine monitoring and compliance records and subsequent actions taken
- Incident and investigation reports
- Environmental data e.g. recycled aggregates, sustainable timber, etc.

## 15. Training and Awareness

Training is to be given in accordance with the relevant company's personnel development and training processes. However, as a minimum during this project:

- All project operatives and supervisory staff will receive a site-specific induction that covers environmental issues associated with their roles and responsibilities including environment.
- More detailed training, such as that required for pollution control measures and waste management plans, will be given to staff as required.
- Training on specific environmental topics will be given by suitably qualified personnel where required. Site supervisors, engineers or Environmental Advisor will give toolbox talks to operatives on key issues such as silt control, water pollution prevention, spill response, protected species and waste management, drawing upon the full suite of Toolbox Talk's (TBT's) as relevant to the project.
- Details of task specific Environmental Operations and Controls including any permit conditions and detailed methodologies shall be included in RAMS.
- ECoW / EnvCoW resource will be suitably competent to undertake the role. Competency will be checked to confirm membership of an appropriate professional body and previous, relevant experience in working with environmental management and protected species. Records of competency will be stored on Viewpoint4Projects.
- Display posters such as silt control and spill response.
- Ensure a permit to pump system is in place and records stored on Viewpoint4Projects.

## 16. Pollution Control Measures

Morgan Sindall have considered pollution control measures throughout the planning and implementation of the project. This section references and draws actions from several reports as well as providing additional recommendations for pollution control measures, compiling the salient

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points in a single action table.

Referenced documents include:

- Construction Environmental Management Plan (CEMP): Water Environment (*Ref. MS-4M4000-1675-MSI-1405-XX-PL-Z-000001*) details the environmental management during the construction of the project and mitigation that is in place to protect the environment.
- The Drainage Management Plan (DMP) (*MS-4M4000-16875-MSI-0608-XX-RP-C-010002*) details risks and controls for surface water management, surface water sustainable drainage, management of surface water runoff and dewatering, and management of flow or unwanted impact on groundwater. Prepared in conjunction with the Soil Management Plan (*MS-4M4000-16875-MSI-1405-XX-PL-Z-000005*).
- Initial Recommendations from Mott MacDonald's Hydrologist for consideration
- The Wood Flood Consequence assessment (42517-Wood-ZZ-XX-RP-0003).

The surface water management for the installation works will primarily use passive silt control options i.e., good working practices, drainage and settlement.

**Table 3:** Recommended pollution control measures

Action	Description
Good Practice, Passive Measures on Site	
A1	<ul style="list-style-type: none"> <li>• Identify a responsible person for environmental management</li> <li>• Ensure everyone on site has a basic awareness of silt control measures and their importance to avoid pollution (silt control toolbox talk appendix C)</li> <li>• Provide specific instruction to subcontractors and site staff</li> </ul>
A2	<ul style="list-style-type: none"> <li>• The construction swathe width within the highways will be minimised where practicable to mitigate construction effects/impacts. Within the agricultural land parcels for HDD's the construction swathe will also be minimised to 30m but may increase where the cable system design or construction constraints necessitate. i.e. low thermal resistivity ground, avoidance of steep topography or where a temporary working area is proposed.</li> <li>• Earthwork will be carried out in line with the construction phases to minimise the duration of any section having exposed soils as described in the Soil Management Plan (<i>Ref. MS-4M2000-1405-XX-PL-Z-000005</i>).</li> <li>• Following completion of construction operations all agricultural land will be fully reinstated to as near as practically possible to its former condition. Topsoil will be prepared and seeded using an appropriate seed mix or handed over to landowner to be returned to previous cultivation.</li> <li>• Ensure that all reinstated surfaces have the same runoff properties and are at the same elevation as existing as near as practically feasible.</li> <li>• Reinstatement will be implemented as soon as the construction has been completed in any section, and in an appropriate season to avoid waterlogging, and ensure rapid growth of vegetation.</li> </ul>




A3	<ul style="list-style-type: none"> <li>• Store materials at least 10m away from watercourses and cordon off to prevent damage.</li> <li>• Where possible, avoid stockpiling soil and alluvial sediment within areas of Flood Zone C2, critical overland flow pathways, and areas of groundwater flood risk. Soil stockpiles will be located in DAM Zone A where possible.</li> <li>• Segregate different grades of soil and store them in bunds no higher than 2m. The height and size of stockpile will depend on the moisture and soil consistency, stripping and storing soil in dry conditions will retain the best soil properties, storage of wet soils will require increased management on reuse</li> <li>• Protect from the weather or vegetate if being stored on site longer than six months.</li> <li>• If there is a risk of erosion or loss of material, then a containment barrier around the stockpile must be used.</li> <li>• If the above point is likely to occur a line of silt fencing will be installed approximately 2m - 3m from the base of the stockpiles.</li> <li>• Any potentially contaminated soil will be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters.</li> <li>• Soil stockpiles will be managed as described in the Soil Management Plan (Ref. MS-4M2000-1405-XX-PL-Z-000005).</li> <li>• Refer to the DEFRA Construction code of practice for the sustainable use of soils on construction sites (2009).</li> </ul>
A4	<ul style="list-style-type: none"> <li>• Silt fencing will be installed if there is a risk of silt mobilisation to residential properties.</li> <li>• Any remedial work to the silt fencing where surface water flow pathways are likely to occur and flow offsite should utilise at least two lines of silt fencing.</li> <li>• Correct silt fence installation should be practiced, creating a curve or tick that essentially returns the end of the fence upslope to reduce runoff around edge of silt fence.</li> <li>• Contour bunds will be formed from available soils to increase surface water attenuation on site, promote infiltration and reduce scour through the formation of rills and gullies.</li> <li>• The frequency of these contour bunds will depend on slope gradient but typically they should be sited at least every 30 - 50m.</li> <li>• Designed to be able to check the surface runoff at the point where flow attains an erosive velocity and begin to cause erosion/scour.</li> </ul>
A5	<ul style="list-style-type: none"> <li>• Check the directional drilling line for any leakage.</li> <li>• Remove excess bentonite slurry from site using approved contractor and duty of care checks to be undertaken.</li> </ul>
A6	<ul style="list-style-type: none"> <li>• Haul Roads are to be constructed and maintained to a design capable of carrying site traffic.</li> <li>• The roads will each have a cattle grid style drain close to the bell mouth entrances. This will receive and divert surface water flows into adjacent interception chambers, reducing the direct flow onto the public highway.</li> <li>• A wheel wash system will be introduced for all vehicles entering the haul road to minimise the transfer of mud from the standard haul road surface.</li> <li>• A regime of inspections &amp; maintenance will be implemented to keep the haul</li> </ul>

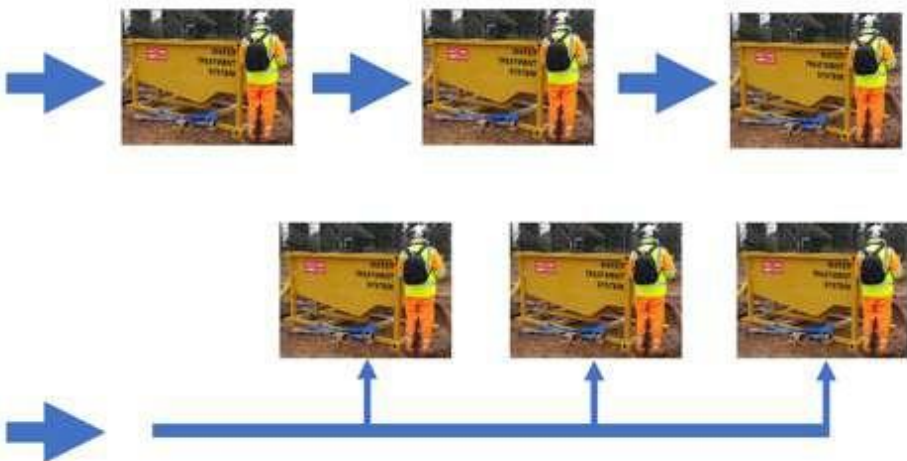


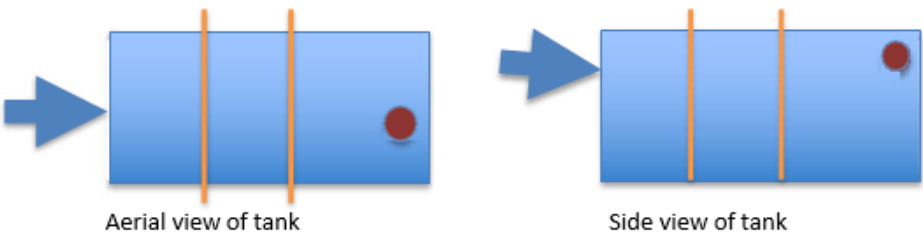
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	road and cattle grid (if required) free from excess material.
A7	<ul style="list-style-type: none"> <li>Do not allow site vehicles to track off the temporary haul roads into any areas of materials storage, and flood zones 2 &amp; 3 (NRW med &amp; high).</li> <li>Vehicles working off the haul road should be tracked or fitted with suitable tyres to minimise ground disturbance.</li> <li>Track along the contours where possible rather than creating vertical tracks that may form a preferential pathway for surface water.</li> </ul>
A8	<ul style="list-style-type: none"> <li>Make provisions and a method statement concerning high pH water/concrete wash water from various activities.</li> <li>Concrete washings or high pH water must not be allowed to flow into any drain or watercourse.</li> <li>Request that the concrete providers utilise an away wash unit to remove the need for any concrete wash out on site.</li> <li>If it is necessary to provide wash out facilities for concrete mixing plant and/or ready-mix concrete lorries, the plant must be appropriately sized for the lorry concrete pour expected on site and located away from watercourses. Separation of the solids will maintain capacity of the wash out as will covering the unit to prevent the ingress of rainfall.</li> <li>High pH water must be managed by removal from site or treatment; treatment should preferentially use carbon dioxide or a pH correction liquid.</li> <li>Shuttering must be checked by a suitably qualified and experienced person for integrity prior to pours and the rate of rise to be controlled during the pour.</li> <li>Complete concrete pours in good weather, as opposed to when rain is forecast. Protect newly poured concrete from the weather until it is fully set.</li> <li>Brush off the loose concrete dust/residue to prevent it from being washed into a drain or watercourse.</li> <li>A mobile on-site batching system will be used for the mixing and application of stabilised cement bound aggregate (sand) into the cable trenches. This will utilise deliveries of dry mix, minimising the need for concrete deliveries and associated washout. The mobile site batching system will be located at least 10m from any drain, watercourse / waterbody or sensitive groundwater area.</li> <li>Unexpected rainfall before the concrete has set may lead to high pH water runoff entering the permanent drains features. Be aware of this potential and be prepared to monitor for the occurrence, hold the water and pump it for treatment in a pH reduction plant.</li> </ul>
A9	<ul style="list-style-type: none"> <li>V-ditches adjacent to/downslope of the haul road will be created to move surface water runoff to an interceptor chamber (collection point).</li> <li>The design of the V-ditch is critical to its function.</li> </ul>

	<ul style="list-style-type: none"> <li>• V-Ditches must be profiled with a flat bottom and sloping banks (300 being the steepest), they must be sufficiently deep to connect to interception drains beneath the haul road and have sufficient capacity to move water.</li> </ul>  <p>Example v-ditch profile</p> <ul style="list-style-type: none"> <li>• V-ditches should not have a fall greater than 3o to minimise erosion of the bed material. Where the fall is greater than 3o form a series of step pools using clean aggregate bunds.</li> <li>• Shallow V-ditches would benefit from check dams or baffles being installed at regular intervals to help slow the runoff travelling downslope during heavy rainfall events.</li> <li>• The aggregate bunds should be contained within the profile of the ditch and allow for water to overtop the features in high rainfall events. Scour protection must be considered on the downslope side such as a rock mattress.</li> <li>• Where the aggregate bunds meet the level of the road, use sandbags on the edge of the road to increase the height of the bank at these locations. The sand bags should extend along the bank upstream to the point at which water won't breach them. Their use will retain water within the V-ditch by directing it over the bund's features.</li> <li>• Minimise ground disturbance when cutting ditches.</li> <li>• Move all excavated material away from the ditch. Do not place it on the edge of the ditch or within the flow path of water.</li> </ul>
A10	<ul style="list-style-type: none"> <li>• Ensure a 'permit to pump' is obtained prior to any pumping operations. The Permit will be issued by the Site Manager, who will confirm with the Environmental Advisor on a weekly basis for all pumping operations.</li> <li>• Don't pump standing water and excavations directly to any watercourses. Dewatering of excavations will primarily be to ground</li> <li>• Locate the pumps 10m away from any watercourse and position them on an oil containment bund or plant nappy.</li> <li>• Stop work within the excavation prior to it being pumped, this will prevent the disturbance of the material and contamination of the water.</li> <li>• All water pumped from excavations shall be pumped via a stone sump or floating pump head with stone pad to prevent silt being drawn into the pump.</li> <li>• If necessary, filter bags can be attached to discharge hoses to trap solids larger than &gt;0.4mm</li> <li>• Water will normally be pumped to a grassed surface for infiltration to ground, interventions such as a silt wattle may be used to slow the flow of small volumes of pumped water and promote infiltration.</li> <li>• Water must not be pumped to exposed soils unless the location provides containment and there is no chance of runoff</li> <li>• Discharge to the public highway surface water drainage will only be undertaken with an environmental permit from the regulator. Due to the proximity of the nationally designated features (SSSI's – Llyn Padarn, Llyn Peris, Llwyn Y Coed, Coed Dinorwig) that fall within and near to the cable routes a bespoke environmental permit application will be required for each</li> </ul>

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	<p>outfall location within 500m upstream of the designated site. Additional measures requiring further settlement and water treatment may be required to ensure the water quality can be achieved.</p> <ul style="list-style-type: none"> <li>• A supply of intermediate bulk containers will be kept on hand in case dewatering to the highway system becomes impossible due to over land flow towards the lake.</li> <li>• A road bowser will be mobilised to site should this become necessary to cope with large volumes of water.</li> <li>• Detail on site dewatering is in the DMP (MS-4M4000- 16875-MSI-0608-XX-RP-C-010002)</li> </ul>
A11	<ul style="list-style-type: none"> <li>• Surface water runoff from bellmouths will be collected, stored and conveyed by formal grass lined attenuation channels as shown on drawings 16875-MSI-0608-XX-DR-C-010113 to 010115 (Refer to Drainage Management Plan 16875-MSI-0608-XX-RP-C-010002)</li> <li>• Attenuation tanks will be available if required to hold any surface water runoff from excavations that have become silt laden.</li> <li>• Inspection chambers will provide access to the interceptor, enabling depth of water and sediments to be established. This would also become the point of pump out for water treatment and maintenance for the removal of heavy solids.</li> <li>• Further attenuation could be created in a series of tanks on site.</li> <li>• Further consideration to improving settlement by splitting the water between the attenuation tanks, thus reducing flow rate and increasing settlement of smaller particles. However, in doing this it would mean that two pumped treatment systems would be required and therefore it may not be feasible on site. The aim may just be attenuation.</li> </ul>  <ul style="list-style-type: none"> <li>• Alternative methods for enhancing settlement within the tanks could be introduced if required by presenting a physical measure such as nets to baffle</li> </ul>

	<p>the water, spreading the flow and promoting settlement.</p> <ul style="list-style-type: none"> <li>Nets may be hung from a batten spanning the width of the tank and weighted with a chain to ensure that they are not dragged by the flow of water</li> </ul>  <p style="text-align: center;">Aerial view of tank                      Side view of tank</p>
A12	<ul style="list-style-type: none"> <li>Should dust become an issue; wet down surfaces or vegetate to bind surface.</li> <li>Shield cutting and drilling operations, manage the water runoff from the activities to ensure it is collected and sediment fines settled prior to discharge.</li> </ul>
A13	<ul style="list-style-type: none"> <li>Fuels, oils, paints, solvents and other Control of Substances Hazardous to Health (COSHH) materials will be kept in lockable containers, with controlled access to keys, and in line with legal requirements including the Control of Pollution (Oil Storage) (Wales) Regulations 2016 e.g. 110% of the storage capacity of the largest container, 25% of the aggregate storage capacity of the container, use of drip trays, etc.</li> <li>Oil and diesel storage facilities will be at least 30m from any watercourse including surface water drains and at least 50m from any borehole or well.</li> <li>Regular maintenance on all vehicles and equipment. Daily check for oil leaks. Plant nappies and bunds on all static equipment.</li> <li>No refuelling will be undertaken within flood zones 2&amp;3 (NRW med &amp; high)</li> <li>Fuelling operations will be planned to minimise the risk of spillage and environmental risk. Plant nappies will be used during all refuelling activities. Appropriate spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed.</li> <li>A site-specific fuel delivery procedure shall be included within the site delivery RAMS. All those allocated the task of re-fuelling should be suitably briefed and maintain appropriate fuelling records where required.</li> <li>Suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including: each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and containers and equipment will be stored on a firm, level surface.</li> <li>CEMP section 6.1 Storage of fuels, oils and COSHH materials (Ref MS-4M4000-16875-MSI-1405-XX-PL-Z-000001) and the Pollution Incident Control Plan (Ref. MS-4M4000-16875_MSI_1405_XX_PL_Z_000003) – details how the project will respond to an environmental incident should one occur on site during construction.</li> </ul>
A14	<ul style="list-style-type: none"> <li>It may be necessary to employ a road sweep to remove mud from the public highway along the A4086 &amp; A4244 to maintain a clean surface.</li> <li>Regular inspections will be undertaken in according to risk, e.g. prevailing weather conditions.</li> <li>A plan of drain maintenance, upkeep of roads, disposal of road sweeper spoil and vehicle wash down material will greatly reduce impact on the local</li> </ul>

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	<p>highways and any unplanned pollution incidents.</p> <ul style="list-style-type: none"> <li>• Road sweep washings and vehicle wash down runoff will be dirty with silt and possibly other contaminants. It is important that it is not released directly into the surface water drains or direct into the watercourses due to the nationally designated features in close proximity to the scheme.</li> <li>• Preferentially remove road sweeper waste waters from site for disposal.</li> </ul>
A15	<ul style="list-style-type: none"> <li>• Ensure the waste hierarchy is followed (in order): reduce, re-use, recycle/compost, energy recovery and disposal.</li> <li>• A Site Waste Management Plan (SWMP) (MS-4M4000-16875_MSI_1405_XX_PL_000008) has been developed during the early design stage. This will be reviewed and updated throughout the project in relation to any design changes or change in material use and subsequent waste streams.</li> <li>• Foul effluent from welfare facilities during construction shall be collected and removed from site by licensed waste contractors.</li> <li>• Waste fuels, oils and COSHH items shall be stored and disposed in line with waste management process.</li> <li>• Waste Movement Duty of Care. All waste movements will be covered by or accompanied by the correct Duty of Care documentation.</li> <li>• Waste Characterisation. Anticipated waste streams and their EWC codes shall be estimated prior to construction</li> <li>• Waste Carrier License checks shall be carried out and the Environmental Permits/Exemptions of planned disposal sites obtained prior to any waste movements.</li> <li>• Waste Storage &amp; Segregation</li> <li>• Suitable skips, bins and storage areas shall be provided and closed or sheeted where required to prevent the escape of wind-blown debris. Waste storage must be suitably signed and display the correct EWC code.</li> </ul>
A16	<ul style="list-style-type: none"> <li>• Invasive non-native plants and animals have been identified at several locations along the red line boundary.</li> <li>• All contractors must follow site biosecurity measures including the protocol for cleaning equipment and PPE. Boot wash stations when leaving areas.</li> <li>• Do not enter any watercourses with machinery or pumps, if necessary, ensure that all equipment is cleaned prior to and following use in the watercourse</li> <li>• Reuse soil from on site, should any additional need to be sourced; use a reputable supplier who can guarantee that it does not contain any invasive plants. Any soil imported onto site must be from a trusted source to be clean of weeds.</li> <li>• Any trees and plants should be British grown where possible, sourced from pest and disease- free area and a supplier who adheres to the plan health management standard or other biosecurity management system.</li> <li>• Plant and tree stock health should be monitored</li> </ul>

Monitoring and Training	
A17	<ul style="list-style-type: none"> <li>• Prepare a monitoring plan for the site.</li> <li>• Monitor daily the surface water being released from site as well as background levels in local watercourse both upstream and downstream of the site.</li> </ul>
Emergency and Contingency	
A18	<ul style="list-style-type: none"> <li>• Construction will not be undertaken during extreme wet weather where it may lead to a safety concern.</li> <li>• Flood barriers composed of interlocking units will be installed at the bell mouths of the haul roads to prevent runoff onto the public highway.</li> <li>• Tanker water from the interception chambers off site during heavy rainfall events to increase capacity in the attenuation and reduce risk of pollution</li> <li>• Consider the merits of retaining a tanker or large containment vessel as additional attenuation during heavy rainfall events without the need to have a lead in before tankers can attend site</li> </ul>

## 17. On-Site Monitoring Regime

Baseline water quality will be established in the receiving surface water(s). Self-monitoring will be undertaken by trained site personnel on a weekly basis ideally this will capture turbidity in a range of weather conditions, in advance of the surface water discharge activity commencing. These inspections will increase daily during periods of rainfall. Monthly water monitoring reports will be made available on request.

**Table 4:** Monitoring locations (A4086 Section Cable Circuit 3)

Monitoring Ref.	Description	Grid Reference
WQM Point A (unnamed OWC u/s A4086)	A4086, Clegir, Llanberis, Gwynedd, Wales, LL55 4EL, United Kingdom	SH 56111 61885
WQM Point B (unnamed OWC d/s A4086)	A4086, Clegir, Llanberis, Gwynedd, Wales, LL55 4EL, United Kingdom	SH 56145 61909
WQM Point C (unnamed OWC u/s A4086)	Lake View, A4086, Clegir, Llanberis, Gwynedd, Wales, LL55 4EL, United Kingdom	SH 56637 61198
WQM Point D (unnamed Waterbody d/s A4086)	A4086, Clegir, Llanberis, Gwynedd, Wales, LL55 4EL, United Kingdom	SH 56728 61346
WQM Point E (Llyn Tomos Lewis u/s A4086)	Llanberis Touring Park, A4086, Clegir, Llanberis, Gwynedd, Wales, LL55 4EL, United Kingdom	SH 57311 60742
WQM Point F (Llyn Tomos Lewis d/s A4086)	Llanberis Touring Park, A4086, Clegir, Llanberis, Gwynedd, Wales, LL55 4EL, United Kingdom	SH 57329 60761
WQM Point G (Afon Goch u/s A4086)	Llanberis Electric Mountain carpark, A4086, Llanberis, Gwynedd, Wales, LL55 4TA, United Kingdom	SH 57878 60228

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WQM Point H (Afon Goch d/s A4086)	Llanberis Electric Mountain carpark, A4086, Llanberis, Gwynedd, Wales, LL55 4TA, United Kingdom	SH 57897 60252
WQM Point I (unnamed OWC u/s A4086)	Llanberis Electric Mountain carpark, A4086, Llanberis, Gwynedd, Wales, LL55 4TA, United Kingdom	SH 57975 60114
WQM Point J (Unnamed OWC d/s A4086)	Llanberis Electric Mountain carpark, A4086, Llanberis, Gwynedd, Wales, LL55 4TA, United Kingdom	SH 57997 60177

The monitoring will include as a minimum; turbidity (NTU). The discharge consent will require total suspended solids (TSS) measured in mg/l. NTU may be used to provide a correlation to TSS, this offers a feel for the relationship in various environmental conditions rather than build an absolute correlation graph. It would be possible to build greater confidence by checking the TSS values attained on site against a programme of sampling for TSS conducting in a laboratory.

To ensure that the mitigation process is working correctly, monitoring will utilise the standard MS monitoring proforma (Appendix D), to measure and record the following parameters:

**Table 4:** Water Testing Parameters

Parameter	Measurement	Range	Method
<b>Weather</b>	Visual	<b>Sun   Rain</b>	Observation
<b>Discharge from site</b>	Visual	<b>Yes   No</b>	Observation
<b>Water Clarity</b>	Visual	<b>Clear   Cloudy   Silty</b>	Observation
<b>Turbidity</b>	NTU	<b>0-150</b>	Turbidity Meter
<b>TSS</b>	Mg/l	<b>0-100</b>	Turbidity Meter
<b>pH</b>	pH	<b>6.5-8.5</b>	pH meter
<b>Hydrocarbons</b>	Visual	<b>sheen</b>	Observation

Should there be a build-up of silt in the roadside ditch, this will be reported to the Site Manager and the Environment Advisor. Should the issue be more serious such as silt runoff or a spill, the Site Manager and the Environment Advisor will implement procedures outlined within the PICP (Ref MS-4M4000-16875\_MSI\_1405\_XX\_PL\_Z\_000003) and notify the relevant authorities immediately as appropriate.

Appended to the Permit to Pump form will be the Water Quality Monitoring Form. This will be completed on a daily inspection of all discharges, at source (excavation) and at the outfall. Should the inspection report any sign of pollution (silt, oil, change in turbidity, change in pH) the pumping operation will be stopped and the Permit to Pump withdrawn. The construction site surface water will be tested, and the underlying cause investigated. If this test is within normal limits and proven not to be the source of the elevated results, then discharge will recommence. If the site water is found to be the source of the issue



the discharge will cease until appropriate measures have been put in place to remove the source of pollution. Any anomalies or elevated results must be discussed with all concerned parties on site.

If a pollution event is deemed to have occurred, then the Regulator (NRW) and Local Lead Flood Authority (GCC) will be notified of the event, as required, and remediation measures undertaken.

Managing silt is an iterative process and any system will need to be checked regularly when it is first set up to ensure that it is operating at its optimum. Monitor the effectiveness of the interventions on a weekly basis or immediately following a storm event and scale back or up as required. All silt control measures require regular review with the aim of safeguarding against pollution events as construction progresses. Always seek specialist advice when needed.

There will be a programme of weekly audits as part of the project's Environmental Management System. The audit will address all environmental measures including the pollution control measures (drainage management) to ensure their function and maintenance.

Whilst proactive silt management will be encouraged it is acknowledged that an element of reactive work will be necessary, making the plan dynamic. Change or variation in the working method and new site activities will be assessed for their potential to impact on the water environment as well as reviewing working documentation, the implementation of that documentation and an evaluation of the site condition. Should the audit raise any issues or non-conformance with the projects EMS or best practice they will be addressed immediately during the audit. Where this is not possible or a problem with documentation and/or the EMS is identified a corrective action will be raised to the project's Environmental Advisor with a timeframe for completion.

## 18. Environmental Incident and Emergency Preparedness

Control measures to prevent and control environmental incidents and emergencies on sites are referenced in the register of environmental effects and detailed in site emergency plans.

Generally, pollution prevention will be achieved by adequate training, by the provision of containment measures such as plant nappies, absorbent mats or materials, drain covers for preventing impact on sewers or watercourses and by complying with safe working methods.

Adequate and appropriately placed spill kits will be provided for rapid incident response when and where prevention fails.

Regular drills (either practical or desktop) shall be conducted and recorded to maintain competency levels of site personnel and adequacy of response plans.

## 19. Incidents and emergencies response

Actions in response to environmental incidents and emergencies will be communicated at inductions and task briefings. Further details are within the Pollution Incident Control Plan (Ref MS-4M4000-16875\_MSI\_1405\_XX\_PL\_Z\_000003). Spill response posters will be displayed on office and welfare facility notice boards.

Site plans showing the locations of spill kits and waste facilities, in addition to the locations of health and safety facilities, will be available on-site office and welfare cabin notice boards.

Plans will include the names of personnel with specific environmental responsibilities, and actions to be taken. Cross reference will be made to contingency planning requirements.

Provision of spill kits and drainage protection (drain covers and absorbent pads) will be available on site to be used in the event of a fuel spill to protect sewer and surface water drains. Pollution Prevention and Control measures are detailed in full in the CEMP and the Pollution Incident Control Plan (PICP).



## **Dinorwig – Pentir 400 kV - Water Management Plan**

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### 20. Incident reporting and investigation

Incidents are to be reported through the management hierarchy as soon as practically possible after they have been identified. Site management will assess the significance of the incident and determine the level of investigation.

Incidents and emergencies will be reported in accordance with Morgan Sindall and National Grid's Project Verbal Incident reporting chain.

All incidents must be reported to the Environmental Advisor and entered onto the appropriate reporting system.

Incidents must also be reported in accordance with the Morgan Sindall Environmental Incident Process (SE STD1).

### 21. Appendices

**Appendix A**

Potentially Sensitive Environmental Receptors Assessment Pollution, Pathway and Receptors Risk Assessment

**Appendix B**

ISO 14001:2015 Certification

**Appendix C**

Silt Control TBT

**Appendix D**

Installation of Silt Fencing

**Appendix E**

Monitoring Proforma

## Appendix A - Potentially Sensitive Environmental Receptors and Source Pathway Risk Assessment

<b>Office / depot / site:</b>	<b>Dinorwig – Pentir 400kV Cable Replacement.</b>	<b>Prepared by:</b>	<b>Siôn Williams</b>	<b>Date</b>	<b>09/07/2021</b>
<b>Assisted by:</b>	N/A				
		<b>Reviewed by:</b>	<b>Ian Burns</b>	<b>Date</b>	<b>09/07/2021</b>
<b>NOTES</b>					

**Table 1:** Risk Matrix

Likelihood of activity resulting in an impact	Severity of the impact		
	Low	Moderate	High
Negligible	Low	Low	Low
Unlikely	Low	Medium	Medium
Likely	Low	Medium	High
Certain	Medium	High	High

The likelihood of the activity resulting in an impact has been ascertained from discussion with the client, existing reports and professional judgement. The severity of the impact has been determined using the EIA Screening Assessment produced by National Grid. Site specific pollution control measures have been defined where the risk is assessed as Medium or High.

**Table 2:** Potentially Sensitive Environmental Receptors (the significance of risk to the environmental receptors has been assigned using the same principles above)

<b>Sensitivity Mapping</b>	<b>Yes/No</b>	<b>Comments</b>	<b>Risk</b>
Internationally designated sites or SSSI within 500m	Yes	Eryri/ Snowdonia (SAC) - 0.3 km east of Circuit 1 & 3 (The site is also designated for its geological and geomorphological interest).	High
		Llyn Padarn (SSSI) Within the site boundary crosses Circuit 1, 2, & 3 (This site is notified for its biological and geological interest. It is one of only three remaining natural localities in Wales for the	High

## Dinorwig – Pentir 400 kV - Water Management Plan

		Arctic charr <i>Salvelinus alpinus</i> L., a glacial relict fish species, and is a classic geological site of national importance).	
		Coed Dinorwig (SSSI) Within the site boundary crosses Circuit 1 & 2 (Coed Dinorwig is a large representative example of a wood sage - oak/birch <i>Teucrium scorodonia</i> - <i>Quercus/Betula</i> type woodland). Coed Dinorwig is also a locally designated wildlife site.	High
		Llwyn Y Coed (SSSI) Adjacent to site to Circuit 2 (A small grazed sessile oakwood of the <i>Teucrium scorodonia</i> - It is one of the most important woodland sites in North Gwynedd for its woodland Atlantic bryophyte flora.	High
		Llyn Peris (SSSI) Adjacent to site to Circuit 2 (Designated for geomorphological interest).	High
Internationally designated sites or SSSI within 2k downstream	Yes	Cwm Dwythych (SSSI) 1.2 km south west of Circuit 2 & 3 (Designated for geological interest)	Low
		Eithinog (SSSI) - 2.8 km north of Circuit 1 & 3 and Pentir Substation (Eithinog is of special interest for the presence of a Red Data List fairy club fungus <i>Ramariopsis crocea</i> at its only location in Wales)	Medium
Spring, well, borehole not used to supply water for domestic or food production purposes within 50m	No		Low
Spring, well, borehole not used to supply water for domestic or food production purposes within 250m	No		Low
Surface waters within 250m	Yes	According to NRW surface water flood mapping (see Figure 7.3 FCA), there are approximately 39 locations where the Red Line Boundary is intersected by surface water flood zones. Many of these locations are adjacent to watercourses (both Main Rivers and ordinary watercourses) and can be broadly split into those zones characterised by a relatively widespread extent, and those characterised by narrow extents confined to narrow flood extents along watercourse margins. There are a small number of mapped areas of surface water flooding that are not adjacent to watercourses such as isolated areas corresponding with localised low points.	High
Are the surface waters a fishery	Yes	Afon Y Bala Arctic Charr spawning site. Afon Rhythallt	High
Groundwater Source Protection Zone	Yes	According to the BGS data analysed (see section 6.4 FCA), significant groundwater emergence is not expected. With strata generally being classified as either Secondary aquifers or non-aquifers. Given the proposals involve extensive trenching for cable installation, there is the potential that groundwater will be encountered at some locations, particularly at low-points in the local topography. However, this will apply only to the construction activities as, in the case of underground cables, no significant threat is posed by groundwater to installed underground cabling with suitably waterproof cable joints.	Medium
Classified as a flood zone		There are 12 locations where construction activities will wholly or partially coincide with NRW High, Medium and Low risk or Welsh Government Development Advice Map (DAM) Zone C2, this includes 2 construction compounds and four HDD locations. There are a further four locations where construction activities will coincide only with DAM Zone B. <ul style="list-style-type: none"> <li>The Pentir substation extension bay is partly located in DAM Zone B;</li> </ul>	High

		<ul style="list-style-type: none"><li>There are five areas of DAM Zone C2 and NRW High, Medium and Low risk, and one area of DAM Zone B only mapping in which multiple sections of access track are located;</li><li>There is one area of DAM Zone C2 and NRW High, Medium and Low risk, and two areas of DAM Zone B only mapping in which drainage areas are located;</li><li>There are nine areas of DAM Zone C2 and NRW High, Medium and Low risk, and one area of DAM Zone B only mapping in which watercourse crossings are located;</li><li>Two construction compounds are located in areas of NRW High, Medium and Low risk; and</li><li>There are four HDD locations where at least one end of the HDD route is within DAM Zone C2 or NRW High, Medium or Low risk.</li></ul>		
Surface water NVZ area	No		Low	
Groundwater NVZ area	No		Low	
Eutrophic NZV area	No		Low	
Surface water safeguard zone (drinking water)	No	NRW Source Protection Zone mapping (NRW, 2020) shows that there are no Source Protection Zones (areas defined around public, potable groundwater abstraction sites in order to provide additional protection to safeguard drinking water quality) in the vicinity of the Red Line Boundary.	Low	
Groundwater safeguard zone (drinking water)	No		Low	
Water abstraction from surface waters within 250m	No		Low	
Water abstraction from ground water source within 250m	No		Low	
Public Rights of Way	Yes		Low	
Industrial Land Use	No		Low	
Contaminated land	No		Low	
Buildings/houses within 250m	Yes	Residential properties along the A4086 (Llanberis) and A4244 (Brynrefail to Pentir)	Low	
Groundwater Aspects				
Sensitivity	Superficial Aquifer	Bedrock Aquifer	Vulnerability	Detail
	None	The NRW superficial geology Aquifer designation map (NRW, 2020) shows that the areas of till and glaciofluvial deposits are Secondary (undifferentiated) aquifers which are defined where it "has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type". The areas of alluvium, river terrace deposits and alluvial fan deposits are classed as Secondary A aquifers.	Low productivity	The northern section of the route (between Pentir Substation and just to the north of the Afon Rhythallt floodplain) is underlain by low permeability, superficial deposits of Devensian till and glaciofluvial deposits (comprising dense clays but also silts, sands gravels and boulders). There are small areas of peat, alluvium and river terrace deposits around Pentir and the north of the route, however further south along the A4244 the superficial geology is predominantly Till.

## Dinorwig – Pentir 400 kV - Water Management Plan

**Table 3:** Source, Pathway and Receptor Risk Assessment

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Action Number	Residual Risk (Significance)
					Likelihood	Severity	Risk Significance				
					Negligible Unlikely Likely Certain	Low Moderate High	Low Medium High				
R1	Seasonal weather	Highway drains, site ditches, land drains, surface runoff and infiltration	local roads water courses groundwater	Deterioration in water quality (silt)	Certain	High	High	Project has to be undertaken through winter season when highest rainfall expected. History of local summer flooding	<p>Minimise subsoil exposure</p> <p>Make provision for water management on site and silt control as detailed in plan. Bespoke environmental permit for discharge activities within A4086 required within the highway. Conditions to be adhered too and kept with permit and briefed to all operatives on site.</p> <p>Ensure emergency provision is in place should attenuation reach capacity.</p> <p>A supply of intermediate bulk containers will be kept on hand in case dewatering to the highway system becomes impossible due to over land flow towards Llyn Padarn.</p> <p>A road bowser will be mobilised to site should this become necessary to cope with large volumes of water.</p>	A2 A6 A7 A11 A17	Low

R2	Access roads (for office, visitors and site vehicles)	Drainage	local roads	Mud on local roads Deterioratio n in water quality (silt)	Certain	High	High	The main haul road is used by site vehicles, no secondary access has been provided	Tarmacked access to site for all visitors is provided off the B4547 into the main compound. No visitor's cars are allowed on the haul road. Only site inspection vehicles are allowed to access the main haul road.  Road sweeper on site	A14	Low
R3	Car park and compound	Drainage and infiltration	local roads groundwater ground	Oil, chemical, concrete and silt pollution	Low	Low	Low	Main site car park used.  Attenuation pond designed to attenuate any surface water run- off from site compound area.	The main site office has a tarmacked car park for office vehicles and visitors.  Create a separate stoned compound for contractors, plant and machinery, material deliveries and storage. Supply suitable oil and chemical storage facilities.	A11 A13	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Action Number	Residual Risk (Significance)
					Likelihood	Severity	Risk Significance				
					Negligible Unlikely Likely Certain	Low Moderate High	Low Medium High				
R4	Foul and grey water	Office drainage system	water courses	Deterioration in water quality	Unlikely	Low	Low	Chemical toilet provided at the remote site hut  No permanent foul drainage is planned	Grey and foul water is collected in a sealed unit and removed from site by a specialist waste provider.	A15	Low

## Dinorwig – Pentir 400 kV - Water Management Plan

R5	Boot washing	Infiltration	groundwater	Deterioration in water quality (silt)	Low	Low	Low	Boot wash area located at the site compound.	Boot wash water collection and settlement.  Maintenance schedule to remove silt.	A16	Low
R6	Material storage	Wind, rainfall	Water courses groundwater r Soil	Deterioration in water quality (silt)	Certain	High	High	Materials will require storage through project: mainly stripped soils at Site compound and HDD locations	Defined storage facility or area with protection from the weather. Loose materials must be separated and stored in compliance with best practice. If there is a risk of loss then containment barrier in place, seeding loose soils being stored longer than 6 months.	A3	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Action Number	Residual Risk (Significance)
					Likelihood	Severity	Risk Significance				
					Negligible Unlikely Likely Certain	Low Moderate High	Low Medium High				

R7	Earthworks, removal of topsoil, subsoil etc	Silt production from surface water runoff	water courses groundwater	Increased sediment load in runoff	Certain	High	High	Removal of topsoil at the main site compound and satellite compound areas. Removal of topsoil will also be required for HDD's	<p>Phase the work to retain as much of the vegetated areas as possible and avoid exposing soils.</p> <p>Introduce a series of pollution control measures including silt fencing and bunds to promote infiltration, interception of runoff and treatment should it exceed attenuation</p> <p>Plan to reinstate the area at the soonest opportunity when seed will grow optimally.</p>	A2 A3 A4 A9 A11	Low
R8	Haul roads (for site machinery)	Surface water runoff	water courses groundwater	Increased sediment load in runoff	Certain	High	High	This is a haul road crossing - critical infrastructure to the project	<p>Create raised haul road infrastructure to prevent ground disturbance and rutting.</p> <p>Water grids in the road to trap and divert runoff.</p> <p>Wheel-wash-site vehicles/machinery accessing haul road to minimise transfer of mud deposits.</p> <p>Use a road sweep at crossings to maintain public road. Stop work and erect emergency flood defense barriers for heavy rainfall events.</p>	A6 A14 A17	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Action Number	Residual Risk (Significance)
					Likelihood	Severity	Risk Significance				
					Negligible Unlikely Likely Certain	Low Moderate High	Low Medium High				



## Dinorwig – Pentir 400 kV - Water Management Plan

R9	V ditches	Surface water runoff	water courses groundwater	Increased sediment load in runoff	Certain	High	High	Ditches present on the side of the haul road	<p>Utilise the ditches to slow the flow of the water runoff and initiate treatment of the sediment load as it leaves the haul road.</p> <p>Ensure ditches enter the interception area for water storage and infiltration to ground.</p>	A9 A17	Low
R10	Working near water Working on floodplain	Direct access on the water course banks and flowing water	water courses	Deterioration in water quality (silt/oil)	Certain	High	High	<p>The annual average rainfall at Llanberis (adjacent to the Red Line Boundary) is 1578 mm (Climate-Data.org, 2021). The highest average monthly rainfall is 180 mm, occurring in December. The lowest average monthly rainfall (96 mm) occurs in April.</p>	<p>As far as possible, no raised structures (such as access tracks, working areas and associated topsoil stockpiles) will be located within the floodplain (Flood Zone C2), minimising the effect on overland flows and flow conveyance.</p> <p>Approaches to bridges and culverts in Flood Zone C2 will minimise ramping up to the bridge deck so as not to impede flood flow conveyance.</p> <p>Access tracks that are shown to intersect areas of surface water flooding (exc. those coincident with watercourse crossings) will not provide a topographic barrier to the flow path.</p> <p>Temporary trackway (i.e. interlocking panels) at existing ground surface levels will be used in areas of Flood Zone C2 wherever practicable.</p> <p>Stockpiles will be present for the</p>	A3 A4 A5 A11 A17 A18	Med

								<p>shortest practicable timeframe, with stockpiled material being reinstated as the construction works progress.</p> <p>Soil stockpiles will be located in DAM Zone A where possible to minimise reductions in floodplain storage/conveyance, and in areas that do not coincide with mapped areas of surface water flood risk.</p> <p>Sufficient gaps will be left in stockpiles so as to not impede flood flow pathways. Stockpile gaps will be located at topographic low points to preserve existing flow paths. Where stockpiles are placed on either side of access tracks, the gaps should coincide.</p>		
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R11	Road drainage – gulley’s	Drainage and runoff	water courses	Deterioration in water quality (silt/oil)	Certain	High	High	<p>Road gully’s are present on A4086 &amp; A4244 that connect to surface water ditches.</p>	<p>Use the 4-way traffic lights to restrict movement on A4086 &amp; A4244 (to allow access to gulley’s)</p> <p>Use gulley protection; geotextile-type interceptors beneath the guard to trap solids. Regularly maintain.</p> <p>Use a road sweeper to maintain a clean road surface.</p>	A17 A18	Low
R12	Watercourses	Drainage and runoff	water courses	Deterioration in water quality (silt/oil)	Certain	High	High	<p>Approximately 40 watercourse crossings have been identified as being required for the proposed cabling route and are detailed within the 16875-MSI-0608-XX-SH-C-100034 Combined Constraints Schedule</p>	<p>In line with CIRIA C648 guidance, where plant or vehicles have to make repeated crossings of a watercourse, a temporary bridge or culverted crossing can be installed; culverted crossings are most appropriate for streams and ditches whilst more robust crossings should be established for crossing of larger watercourses. Horizontal Directional Drilling (HDD) is proposed as the preferred technique for crossing Main Rivers to reduce the impacts on</p>	A17 A18	Low

## Dinorwig – Pentir 400 kV - Water Management Plan

									<p>watercourses. The following best practice is to be adhered to:</p> <ul style="list-style-type: none"> <li>• Crossings will be timed, where possible, to coincide with periods of low flow.</li> <li>• Banks of watercourses will be reinstated following construction – soft revetment materials will be used wherever possible to stabilise banks, where necessary.</li> <li>• Regular visual inspections will be undertaken at the temporary crossings when works are occurring in the area. The visual inspections will check that the water levels on both the upstream and downstream faces of the temporary crossings remain similar throughout the duration of the crossing.</li> </ul>		
R13	Field Ditches	Connection to controlled water	water courses	Silt pollution	Certain	High	High	Site Compound drainage attenuation pond connects to Field ditch outfall.	Orifice plate will be fitted to the outlet flow pipe limiting flow from the attenuation pond to the field ditch. Land drainage consent to be sought from LLFA.	A17 A18	Low

Risk	Source	Pathway	Receptor	Impact of	Risk Assessment		Rationale	Control Measures	Action	Residual Risk
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No				pollution	Likelihood  Negligible Unlikely Likely Certain	Severity  Low Moderate High	Risk Significance  Low Medium High			Number	(Significance)
R14	Existing Land Drains	Connection to controlled water	water courses	Silt pollution	Certain	High	High	Land drains are present on A4086 & A4244 that connect to surface water ditches.	Where the haul road route crosses any low-lying areas or land drains, the location is to be marked and recorded and appropriately sized pipes are to be placed under the haul road to ensure overland flow is not blocked. A typical construction detail will be provided for this at the appropriate stage of design.	A17 A18	Low
R15	Standing water and excavations	Pumping	water courses	Silt and oil pollution	Certain	High	High	Excess water may collect on site in trenching operations and require pumping to facilitate the work.	Place all pumps on bunds, check before use and only pump with a permit in place. Specific areas along the scheme may be subject to conditions set out in the environmental permit for discharging activities.  Pump water to fields where grass remains with landowner and Environmental Advisor agreement. Pump water into the haul road V ditch to provide primary treatment before attenuation in the interceptor.  Use specific measures to reduce the transfer of heavy silt when pumping.	A10 A17 A18	Low

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R16	Attenuation (Interception tanks, lagoons and basins)	Infiltration, pumping, overtopping	water courses groundwater	Deterioration in water quality (silt/oil)	Certain	High	High	Attenuation features will be necessary to contain excess water for treatment / soak away. Site Compound drainage attenuation pond connects to Field ditch outfall.	Create attenuation early in the project to contain surface water runoff and provide treatment as necessary.  Suction out the interceptors to remove sludge from the bed and maintain capacity if or when required.  Orifice plate will be fitted to the outlet flow pipe limiting flow from the attenuation pond to the field ditch. Land drainage consent to be sought from LLFA.	A11 A17 A18	Low
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Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Action Number	Residual Risk (Significance)
					Likelihood	Severity	Risk Significance				
					Negligible Unlikely Likely Certain	Low Moderate High	Low Medium High				

R17	Discharge from attenuation	Infiltration or pumped	water courses groundwater	Deterioration in water quality (silt, oil)	High	High	High	Water will be released from open excavations within the highway (A4086 & A4244).	Emergency tank to be made available on call out or permanent hire to pump out the interceptors, providing extra attenuation  Develop a plan to release clean water from the attenuation ponds into the road drainage  Obtain an environmental permit from the regulator  Monitor the surface water being released into the drainage at the point of discharge	A20 A21 A17 A18	Low
R18	Groundwater	Intrusion into excavations and interceptors	water courses	Deterioration in water quality	Certain	High	High	Reduced storage capacity following sustained rainfall, more water to pump from excavations	Emergency tank to be made available on call out or permanent hire to pump out the interceptors, providing extra attenuation  Consider following further emergency measures and closing haul road if local flooding is likely or water treatment can't be maintained as a result in increased volume	A18	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Action Number	Residual Risk (Significance )
					Likelihood	Severity	Risk Significance				
					Negligible Unlikely Likely Certain	Low Moderate High	Low Medium High				

## Dinorwig – Pentir 400 kV - Water Management Plan

R19	Directional drilling using bentonite	Break out through natural fissures	groundwater water course	Deterioration in water quality	Certain	High	High	Bentonite or similar substance break-out	Check for and contain break outs  Remove excess bentonite slurry from site	A5	Low
R20	Liming	infiltration runoff	water course groundwater	Alkaline water and silt pollution	NA	NA	NA	There is no use of lime to stabilise the ground			N/A
R21	Concrete wash water	Drainage and infiltration (soil)	Water course groundwater	Deterioration in water quality (high pH)	Certain	High	High	Concrete pouring will be required for the haul road	Do not allow wash water to enter surface waters or groundwater. Only pour in dry conditions  Ask the concrete providers to utilise an away wash unit to remove the need for any concrete wash out on site. Should this not be feasible utilise a concrete wash out that has been established on another part of the site where there is less risk of pollution.  Separate the solids and dispose on the concrete crush pile and treat high pH water.	A8	Low

Risk	Source	Pathway	Receptor	Impact of	Risk Assessment		Rationale	Control Measures	Action	Residual Risk
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No				pollution	Likelihood  Negligible Unlikely Likely Certain	Severity  Low Moderate High	Risk Significance  Low Medium High			Number	(Significance)
R22	Dust: dry weather, cutting and cleaning operations	Wind Roads	water courses	Deterioration in water quality (silt)	Certain	Low	Medium	The fine particles sizes mean that dust would quickly form in dry conditions	If dusty, wet down surfaces or vegetate to bind surface.  Shield cutting, drilling operations, manage the water runoff from the activities to ensure it is collected and treated.	A12	Low
R23	Vehicle and equipment leakage	Infiltration (soil) and drainage systems	Watercourses, groundwater and Soils.	Oil pollution	Unlikely	Moderate	High	Plant machinery on site have hydraulic hoses including all static equipment.	Regular maintenance on all vehicles and equipment. Daily check for oil leaks. Plant nappies and bunds on Spill response working remote plan.	A13	Low
R24	Oil and diesel fuel storage	Infiltration (soil) and drainage systems	water courses groundwater soil	Oil pollution	Certain	High	High	Oil storage is limited on site to bowsters and few small bottles of specific engine oil.	Locked fuel bowsters, spill mats refuelling protocol. Spill response plan.	A13	Low
R25	Refuelling activities	Infiltration (soil) and drainage systems	water courses groundwater soil	Oil pollution	Certain	High	High	Refuelling away from the site compound will be a requirement and there will be a limited number of plant on site	Avoid refuelling on the steep haul road. Refuelling protocol via bowser on site to be followed. No fuelling to take place near watercourses. Fuel bowser to be checked daily for damage and kept locked unless in use.	A13	Low

Risk	Source	Pathway	Receptor	Impact of	Risk Assessment	Rationale	Control Measures	Action	Residual Risk
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## Dinorwig – Pentir 400 kV - Water Management Plan

No				pollution	Likelihood  Negligible Unlikely Likely Certain	Severity  Low Moderate High	Risk Significance  Low Medium High			Number	(Significance)
R26	Chemical storage	Infiltration (soil) and drainage systems	water courses groundwater soil	Chemical pollution	NA	NA	NA	No chemicals will be stored along the highway A4244 & A4086	Chemical storage, containment, and inspection guidance to be followed. Inventory of chemicals and COSHH to be maintained. Spill response plan.	A13	Low
R27	Road sweeping and vehicle wash down	Site drainage	water courses groundwater	Oil and silt pollution	Certain	High	High	Road sweeper and vehicle washing in operation in this area	Road sweeper and wheel wash units used on part-time basis as required. All dirty water collected and removed from site for disposal. No wash waters will be released directly into surface water drains or ponds.	A14	Low
R28	Waste management	Wind, rainfall	water courses groundwater soil	Oil, chemical or silt pollution	Unlikely	Moderate	Medium	waste generated on site will be sent off site for recycling / re-processing.	Waste management hierarchy and best practice. Identification (EWC), separation, storage and disposal for each waste stream listed. Waste carriers and final disposal site to be confirmed and checked. Waste transfer & consignment notes completed and retained on site.	A15	Low
R29	Biosecurity	Surface water, soil transfer, vehicle movement	water courses groundwater soil	Transfer of disease, plants and animals	Unlikely	Low	Low	Surveys undertaken by TEP in 2020 recorded a number of	Follow site biosecurity procedure measures, including the protocol for cleaning equipment and PPE.  Do not enter any watercourses with	A16	Low

								<p>notable species or invasive plant species through species-specific surveys or as incidental records. Biosecurity procedure in place due to proximity of livestock farms along route.</p> <p>Aquatic environment remains high risk. Import of plants and topsoil presents a risk</p>	<p>machinery or pumps, if this has to happen ensure that all equipment is cleaned.</p> <p>Ensure that any plants sourced for the site have come from a reputable UK supplier. Request evidence that they have been grown from seed/cutting in the UK and that the nursery undertakes biosecurity checks or that they have been quarantined as they enter the country for a minimum of 6 weeks and checked by professional establishment.</p> <p>Reuse soil from on site, should any additional need to be sourced; use a reputable supplier who can guarantee that it does not contain any invasive plants.</p>		
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## Dinorwig – Pentir 400 kV - Water Management Plan

### Appendix B: ISO 14001:2015 Certification

**bsi.**

# Certificate of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2015

This is to certify that:

Morgan Sindall Infrastructure  
a division of Morgan Sindall  
Construction & Infrastructure Ltd  
Corporation Street  
Rugby  
Warwickshire  
CV21 2DW  
United Kingdom

Holds Certificate Number: EMS 69509

and operates an Environmental Management System which complies with the requirements of ISO 14001:2015 for the following scope:

**The design and delivery of civil engineering projects within the following six key industry sectors of nuclear, energy, water, highways, rail and aviation.**

For and on behalf of BSI:

  
Andrew Launn, EMEA Systems Certification Director

Original Registration Date: 2002-09-06  
Latest Revision Date: 2020-02-12

Effective Date: 2019-08-12  
Expiry Date: 2022-08-11

Page: 1 of 4


  

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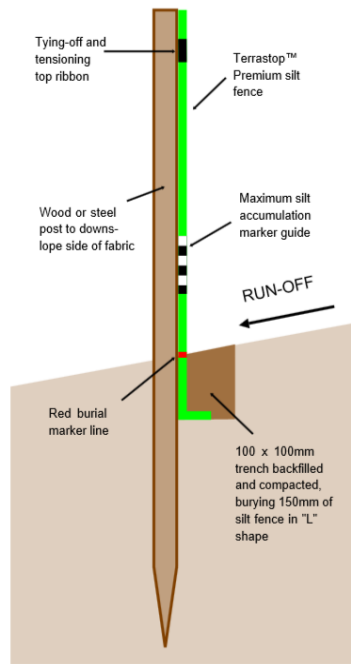
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## Appendix C: Silt Control – Pollution Prevention

<b>What:</b>	
<ul style="list-style-type: none"> <li>Silt is the term used for very fine particles of soil</li> <li>Silt mixed with water in the form of mud, can be washed off construction sites into nearby watercourses and drains</li> <li>The biggest cause of pollution incidents is construction operations</li> <li>Pollution by silt can be caused by: <ul style="list-style-type: none"> <li>Rainwater runoff from uncovered areas of the topsoil stripped site</li> <li>Pumping out and dewatering of excavations</li> <li>Tunnelling operations and cleaning of ditches and drains.</li> </ul> </li> </ul>	
<b>Why:</b>	
<ul style="list-style-type: none"> <li><b>Avoid environmental harm:</b> high levels of silt suspended in water can suffocate fish by blocking their gills, can remove essential oxygen from the water, can kill plants, animals and insects living in the water by stopping sunlight reaching them</li> <li><b>Avoid environmental harm:</b> silt often combines with other contaminants such as oils and chemicals potentially causing greater pollution than silt alone</li> <li><b>Avoid prosecution:</b> because of the potential for harm, it is illegal to allow silt to enter a watercourse or drain. Silt pollution is easily traceable to the site from where it originated. In the past it has been a major cause of prosecution.</li> </ul>	
<b>Do:</b>	
<ul style="list-style-type: none"> <li>✓ Only discharge silty water into designated settlement systems</li> <li>✓ Check the site drainage and settlement systems are working <ul style="list-style-type: none"> <li>○ Discolouration may indicate high pollution loading</li> </ul> </li> <li>✓ Stop pumping and contact a line manager if there is a problem arising</li> <li>✓ Ensure that all hard standings are kept clean - notify a line manager if an area is silty or is covered in mud</li> <li>✓ Notify a line manager immediately if silty water is seen entering a watercourse or drain. Do try to stop it or divert it away by, for example, using sand bags</li> <li>✓ Consider installing cut-off trenches or silt fences to prevent silty surface runoff</li> <li>✓ Monitor weather forecasts and plan work accordingly</li> <li>✓ Regularly check watercourses that could be affected by dewatering operations or rainwater runoff</li> <li>✓ Ensure drain cleaning operations have systems in place to intercept polluted water.</li> </ul>	
<b>Don't:</b>	
<ul style="list-style-type: none"> <li>✗ Dewater any excavation without getting permission from a line manager</li> <li>✗ Pump silty water directly into rivers, ditches or surface water drains</li> <li>✗ Strip land of vegetation unless it is absolutely necessary - vegetation reduces silt runoff</li> <li>✗ Store soil, stone or similar materials within 10m of watercourses or drains</li> <li>✗ Dig a grip to release ponded water to a watercourse or drain.</li> </ul>	
<b>Question time:</b>	
<p>Q Where are the suitable discharge locations at this site?</p> <p>Q Where does surface discharge on this site go to?</p> <p>Q What activities on this project could generate silt, dust or mud?</p>	
<b>Have you got any questions?</b>	
Please record your questions on the attendance sheet and speak with your local environmental advisor.	

## Dinorwig – Pentir 400 kV - Water Management Plan

### Appendix D: Installation of Silt Fencing – Pollution Prevention

What:	
<ul style="list-style-type: none"> <li><b>Installation &amp; Maintenance:</b> Silt fences can be bought as a specific branded product (e.g. Terrastop Premium from Hy-Tex) or can be made from a geotextile material such as terram.</li> </ul>	
Why:	
<p><b>Advantages:</b></p> <ul style="list-style-type: none"> <li>Acts both as a barrier to slow flows and allow settlement and as a filtration system to remove particles.</li> </ul> <p><b>Disadvantages:</b></p> <ul style="list-style-type: none"> <li>Require significant maintenance to repair and remove silt following heavy rainfall events.</li> </ul>	
Do:	
<ul style="list-style-type: none"> <li>✓ The fence needs to be supported on stakes and the bottom edge trenched into the soil to prevent water from undermining it.</li> <li>✓ The removal of the turf is to enable the bottom edge of the fence to be trenched into the ground to prevent water from undermining; a minimum of 150mm of the fabric must be installed below ground in an L shape as shown here.</li> <li>✓ The fabric will then be secured to the fence posts using suitable fixings (large diameter nail heads or staples). Depending on the formation of the demarcation fence additional fence posts may be required.</li> <li>✓ A permit to dig will be issued and a drawing of any associated services. A guide hole will be made using an insulated bar by hand. Posts will be placed in the guide hole and driven in using a post knocker by hand. The competent operative installing the posts will ensure that the posts are in the line required and in a level position. The process of installing the fabric will then be repeated.</li> <li>✓ The silt fencing can be installed in a curved formation to intercept the flow of water and provide an area for it to pool behind, or in a straight line alongside a watercourse or drainage ditch as a last line of defence.</li> <li>✓ The fabric will gradually become blocked up with particles and require either disturbing to dislodge the fines or replacement with new fabric.</li> <li>✓ High flow rates may also cause the fences to be undermined or bypassed, so regular inspection and maintenance is required.</li> <li>✓ Straw Bales will be available on site as a last resort as and when required.</li> <li>✓ <b>Inform Morgan Sindall immediately for any pollution incidents or failing of silt mitigation measures.</b></li> </ul>	
Don't:	
<ul style="list-style-type: none"> <li>✗ Allow silt run off within 10m of a watercourse or drain.</li> <li>✗ Continue dewatering activities if field capacity is breached.</li> <li>✗ Be afraid to speak up if you see silt pollution entering a sensitive receptor.</li> </ul>	

<b>Question time:</b>
<ul style="list-style-type: none"><li>Q Why is Llyn Padarn so important?</li><li>Q Why is it important to stop silt entering the watercourse?</li><li>Q What activities could generate silt?</li><li>Q How far down should the fabric be in the trench?</li></ul> <p>Do you have any questions?</p>
<b>Have you got any questions?</b>
Please ask with your local environmental advisor.

