Balliemeanoch Pumped Storage Hydro

Environmental Impact Assessment Report

Volume 5: Appendices
Appendix 11.5: Outline Water Management Plan

ILI (Borders PSH) Ltd

July 2024

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Quality information

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Appendix 11.5 Outline Water Management Plan

Introduction

This Outline Water Management Plan (oWMP) sets out the water management principles and procedures to be applied throughout the construction period of the proposed Balliemeanoch Pumped Storage Hydro (PSH) (referred to herein as the 'Development') to prevent pollution and physical damage to water features and Private Water Supplies (PWS)

As an 'outline' management plan it describes the broad principles and mitigation measures that are to be implemented during the construction works to ensure that adverse impacts on water features can be avoided, minimised, or reduced, and supports the outcome of the impact assessment reported in *Chapter 11 Water Environment* (*EIAR Volume 2*). Some aspects of this plan remain high level, with the full detail to be provided in the final WMP to be prepared post planning permission by the Contractor in line with any conditions and requirements of the given consent.

Project description

The Development comprises of the construction and operation of a 1.5GW PSH scheme. The Development Site lie within the Argyll and Bute region of western Scotland, south of Portsonachan on the southern margin of Loch Awe, and Inveraray on the northwestern side of Loch Fyne. The main works are centred around National Grid Reference (NGR) NN 04524 16444. The extent of the Development Site is shown on *Figure 1.1* and *Figure 2.4* in *EIAR Volume 3.* Please also refer to *Figures 11.1 to 11.3* in *EIAR Volume 3*, which shows the components of the Development alongside the water environment receptors in a 1 km study area.

Potential impacts during construction

During the construction phase there is the potential for adverse effects on the water environment from site runoff contaminated by excessive fine sediments (including the potential wash out of fine sediment from temporary spoil storage, Embankments, and Access Tracks), which may smoother habitats and physically impact aquatic organisms, along with chemical spillages and physical changes to water features as a consequence of:

- Watercourse crossings identified in *Appendix 11.4 (EIAR Volume 5*) and in *Figure 11.3 (EIAR Volume 3*);
- Dewatering and abstraction operations around the Allt Beochlich and associated tributaries for the construction of the Embankment and Headpond;
- The loss of Lochan Airigh, Allt Beochlich and associated tributaries due to the construction of the Headpond;
- Dewatering and abstraction operations associated with the cofferdam in Loch Awe at the Tailpond inlet / outlet structure;
- Excavation and crushing of excavated materials;
- The batching of concrete at site (and cleaning out of plant and equipment);
- Vegetation / site clearance;
- Construction of temporary and permanent Access Tracks and their use by plant/vehicles;
- Excavation of tunnel portals and tunnelling of the Waterways, access and construction tunnels;
- Earthworks, construction of the Embankment and the creation of temporary material storage;
- Runoff from temporary construction compounds and management of foul waste; and
- Other general construction activities.

Mobilisation of fine sediment affecting water quality through runoff or scour

Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation. In addition, dewaters from excavations may also contain suspended solids. When excessive levels of fine sediment enter a watercourse, it may smother macrophytes, invertebrates and substrate important for fish and invertebrates (particularly fish spawning gravels). Water may also be used to dampen surfaces and avoid dust being generated.

Release of oils and / or other chemicals affecting water quality

Contamination of surface waters and soil could result from leakage and spills of fuels, oils, chemicals, and concrete during construction affecting watercourses indirectly via site runoff or directly where works are close to and within a water feature. The use of cementitious products, such as the mixing or batching of concrete, pouring of wet concrete, and washing out of plant and equipment can present a risk of polluting water features, Contamination may reduce water quality and impact aquatic fauna and flora.

Impacts to hydromorphology of watercourses

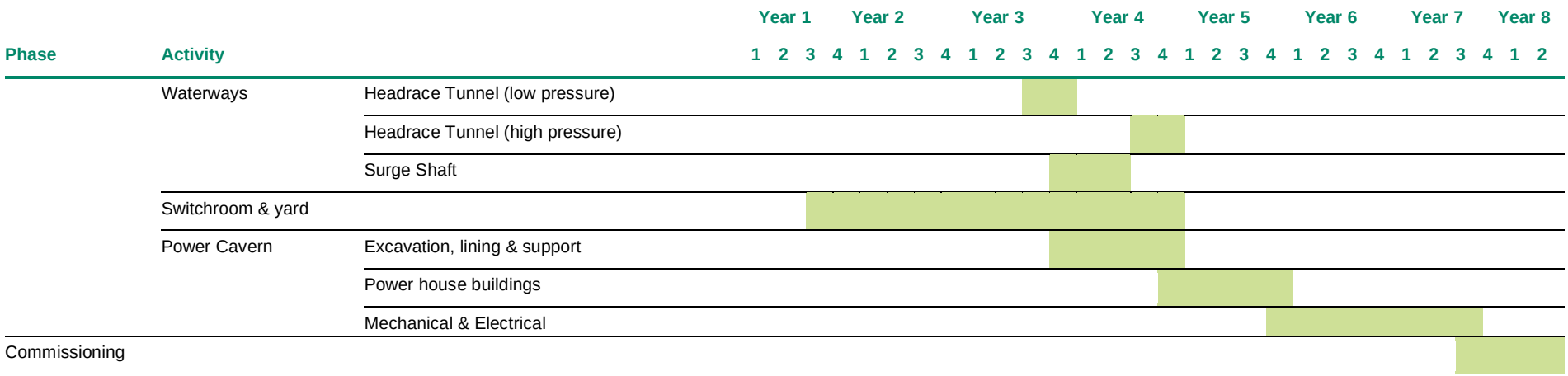
The impacts associated with the flume crossing primarily come from changes in flow dynamics and patterns of erosion. Temporary removal of the bed substrate (that will be stored separately for replacement after completion of the works), and installation of the temporary culverts can encourage material to be deposited upstream of culvert and scour of the bed and / or banks downstream where there is a material deficit (due to changes in flow).

Indicative Construction Programme

Table 1 displays the proposed construction programme.

Table 1: Indicative Construction Programme for the Development

Phase	Activity		Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8	
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Enabling Works	Existing Access Improvements																															
Pre-Construction	Safety and Security Measures																															
	Construction compound set up (permanent and temporary)																															
	Borrow pits & associated access																															
	Jetty works / pontoon																															
Construction	Access track construction																															
	Headpond	Embankment lining																														
		Embankment 1 construction																														
		Embankment 2 construction																														
		Spillway construction																														
		Headpond Inlet / Outlet works																														
	Tailpond	B840 Diversion																														
		Temporary Works (in Loch Awe)																														
		Inlet/outlet works & Gate house																														
		Rock excavation & armouring																														
		Removal of temporary works																														
	Tunnels	Access to tunnel portals																														
		Construction of tunnel portals																														
		Construction Tunnel																														
		Emergency Egress & Access Tunnel																														
		Power Tunnel																														
		Ventilation Tunnel																														


Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
Year 7
Year 8
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2
Phase
Activity
Waterways
Headrace Tunnel (low pressure)
Headrace Tunnel (high pressure)
Surge Shaft
Switchroom & yard
Power Cavern
Excavation, lining & support
Power house buildings
Mechanical & Electrical
Commissioning

The Outline Surface Water Management Plan

Purpose

A surface OWMP is a document that sets out the water management principles and procedures that will apply throughout the construction of a development. It describes the measures that will be implemented on Site to ensure that surface water features, groundwater bodies and PWS are protected from water pollution or physical damage. Water pollution may be the introduction of chemical or particulate matter either in suspension or on the bed, but also the consequences of chemical discharges such as reduced oxygen levels, increased turbidity, iridescence, effervescence, dis-colourisation, foaming, surface scum and fungus etc.

This OWMP is designed to ensure that the requirements of relevant environmental legislation, the commitments set out in the EIAR and the CEMP, and any conditions of the planning permission and future environmental secondary permissions (when known) are complied with. It shall be the responsibility of the Developer and their Contractor to ensure that the Development is executed in a manner that demonstrates its commitment to the care and protection of the water environment, taking into account aquatic habitats and any third party user and/or uses of water.

The OWMP does not provide site specific details of how the Contractor will manage construction site runoff and chemical spillage risk, works to surface water features, or works below ground, as the level of risk will constantly be changing and there are many ways in which these risks can be managed effectively. Instead, the OWMP creates the 'framework' within which the Contractor and any sub-contractors shall operate on Site for the duration of the works.

This OWMP has been prepared by AECOM on behalf of the Developer. The final WMP to be prepared post planning consent and will need to reflect any requirements of the approved DCO.

Implementation

The Contractor will implement the final WMP, which will need to be in keeping with this OWMP. In doing so the Contractor will need to ensure that:

- The OWMP is implemented in accordance with the planning permission, EIAR, and Construction Environmental Management Plan (CEMP) (for the Outline CEMP see EIAR Volume 5 Appendix 3.1).
- Construction Method Statements are prepared in line with the minimum requirements set out in the WMP and submit these to the SEPA for approval; and
- The WMP is reviewed regularly and under each of the specific circumstances set out later in this plan.

Responsibilities

The following responsibility apply:

- All personnel and sub-contractors working on the project will perform their duties in accordance with the requirements of the OWMP;
- The Environmental Manager (or other similar title) will report regularly to the Project Manager on the status and effectiveness of its implementation;
- The Environmental Manager and Environmental Clerk of Works (or other similar titles) or other suitably qualified person will be responsible for implementing the 'during works' Water Quality Monitoring Plan described later; and
- Both the Environmental Manager and Environmental Clerk of Works will have powers to stop or request a change to the method statement of any works they consider are not compliant with this OWMP or are causing or are likely to cause pollution.

Training

The Environmental Manager or other suitably qualified person(s) will provide training to all personnel on Site including sub-contractors on water pollution prevention measures. This will include works that have a higher risk of leading to a pollution incident, such as silt/ fuel/ oil storage, refuelling, cement and concrete works, working in watercourses or lochs, managing silt in runoff, pumping and over pumping, washing down plant and machinery, and spillage control on Site and emergency procedures. In addition:

- Site notice boards will display incident and emergency procedures details and protocols. These will be updated as and when circumstances dictate;
- Site inductions and toolbox talks will be carried out to highlight emergency and incident procedures to all staff working on Site;
- Flood/ evacuation drills to be carried out;
- Detailed spill drill training will be delivered to all necessary Site personnel with designated spill stations placed at high risk areas;
- Training for the transportation of fuel;
- Weekly environmental inspections will be carried out on Site by a suitably qualified person on site (e.g., Environmental Clerk of Works or Environmental Manager) to ensure all facilities are being maintained and activities are compliant with company procedures; and
- The latest pollution prevention guidance (e.g., Guidance on Pollution Prevention (GPP), Pollution Prevention Guidance (PPG), and Construction Industry Research and Information Association (CIRIA) guidance) will inform the Contractor's Site procedures so that they reflect current good practice.

Reviewing the OWMP

The WMP will remain a 'live' document that is continuously kept under review throughout the period of the construction work. In addition to this, the plan will be reviewed to ensure adequacy under the following circumstances:

- Not less than a monthly review from the date of first approval by the Local Planning Authority (LPA);
- On the granting of any relevant variation of the planning permission;
- On the granting of or any relevant variation to relevant environmental permits or consents required for the Development; and
- In light of any significant changes to proposed Works and/ or site-specific activities (including any significant pollution incidents).

Relevant changes to the planning permission, environmental permits or other consents are those where the risk to the water environment from the works may change (i.e., environmental permits or licences from the SEPA or consents from the LLFA).

The LPA will be informed in writing within seven days of the completion of a review of any changes that have been proposed or the reasons why changes are not being implemented.

Where, having considered the notice of review the LPA considers that an amendment is required, the LPA may notify the Contractor within seven working days of receipt of the notice of review.

Where the Contractor considers that a further amendment is required and/or the relevant LPA serves a notice to the Contractor that they must submit an amended plan for their written approval, this must be received by the LPA within four weeks of the date of the completion of the review (in consultation with the SEPA).

Legislation and planning policy

Legislation

This section outlines the legislation, planning policy and guidance documents relevant to the assessment of impacts of the Development on the water environment and discussed in greater depth in *Chapter 11* of the EIAR. The following national legislation is relevant to the Development and will be considered as part of this assessment:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) ('the CAR Regulations') (Ref 1);
- Water Environment Water Services ('the WEWS Act') (Scotland) Act 2003 (Ref 2);
- Environmental Liability (Scotland) Regulations 2009 (Ref 3); and
- Pollution Prevention and Control (Scotland) Regulations 2012 (PCR) (Ref 4).

Planning policy

National Planning Policy - Energy Policy

The Scottish Government published an updated Climate Change Plan (CCP) in December 2020 that reflects its new target date for net-zero emissions of all greenhouse gases by 2045 through the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 (Ref 6).

- Support investment in new PSH through collaboration;
- Secure the maximum benefits from increasing the flexibility of the electricity network; and
- Support the innovation and deployment of storage technologies and capacity.

Local Planning Policy - Argyll and Bute Local Development Plan

The draft LDP 2 includes various policy allocation changes as well as new additions that may be of relevance to the Development and will therefore be considered following its adoption.

The Argyll and Bute Local Development Plan (LDP) (Ref 7) was formally adopted on 26 March 2015 and provides the local planning framework (excluding the area covered by the Loch Lomond and Trossachs National Park. The next plan (LDP 2) (Ref 8) was submitted on the 23rd of October 2023 but cannot be fully adopted at the time of writing. LDP 2 will provide a land use framework for the next 10 years is currently under preparation for which a draft has been made available for consultation.

The LDP 2 includes various policy allocation changes as well as new additions that may be of relevance to the Development and will therefore be considered following its adoption (see Table 2).

Table 2 List of water environment related policies outlined in LPD 2

Policy Number	Description
Policy 04 – Sustainable Development	"*In preparing new development proposals, developers should seek to demonstrate the following sustainable development principles… Avoid having significant adverse impacts on land air and water environment."*
Policy 30 – The Sustainable Growth of Renewables	"*The Council will support renewable energy development where these are consistent with the principles of sustainable development, and it can be adequately demonstrated that there would be no unacceptable environmental effect… will be assessed against the following criteria… effect of hydrology, the water environment and flood risk"*
Policy 59 – Water Quality and the Environment	*Proposals for development that could affect the water environment will be assessed with regard to their potential impact on:* *a) Water quality and quantity, ecological status including morphology and hydrology (i.e. flow rate) chemical and biological status;*

Policy Number	Description

b) *Riparian habitats and wildlife;*

c) *Geomorphic processes;*

d) *Leisure and recreational facilities and users;*

e) *Economic activity.*

… Developments that may have a significant detrimental impact on the water environment will not be permitted unless it can demonstrate that the impacts can be fully mitigated"

Water Environment Baseline

Summary of key water environment receptors

Surface water features (and their attributes) within the 2 km study area and extending to Loch Awe and Loch Fyne are described in this section. Under the WFD, 'water bodies' are the basic management units, defined as all or part of a river system or aquifer. Water bodies form part of larger 'river basin districts' (RBD), for which RBMPs are used to summarise baseline conditions and set broad improvement objectives. This baseline is presented by each water body, noting that some features are present within the catchments of designated WFD water bodies rather than being designated as a WFD water body in their own right. The baseline is also organised first by those water features and WFD water bodies that are within the Loch Awe catchment, before those that are in the Loch Fyne catchment.

As not all the watercourses in the study area are named, and some of multiple tributaries, each watercourse has been given a unique reference number. These can be seen on *Figure 11.1 in EIAR Volume 3* and are referred to in the following baseline summary. Table 3 displays a summary of the water environment receptors.

Table 3: Water Body Receptors and their Importance

Water Feature	NGR	Baseline Summary	Water Quality Importance	Hydromorphology Importance
Loch Awe	NN 00437 16188	Has been classified as having a moderate WFD status. The loch has migratory fish passing through it, such as brown trout, arctic char and Atlantic salmon which are either protected species or are on Scotland Biodiversity List. There are also two other hydro Developments associated to it.	**High Importance**	**Medium Importance**
Bedrock Aquifer - Oban and Kintyre groundwater body	n/a	Essentially unproductive, with some minor fracture flow at shallow depths in the weathered zone. However, is considered a Groundwater Drinking Water Protected Area and so is still considered within this assessment.	**Low Importance**	n/a
Superficial Aquifers – Peat	n/a	Supports a number of PWS (see Appendix 11.3 Volume 5). Areas of wet heath, rushy marsh and wet woodland have also been identified on site walkovers as potential GWDTEs details of their location can be viewed in *Figure 6.5 (EIAR Volume 3*).	**High Importance**	n/a
River Array and tributaries (LF1)	NN 09003 10169	Approximately 13.4km in length sourced north of Loch Fyne around NN 08442 19859. It drains into Loch Fyne at NN 09809 09049. LF1 has approximately 13 tributaries which drain into it. LF1 has moderate WFD classification and SEPA has also identified Atlantic salmon and brown trout within the water body, therefore giving the watercourse a High Importance. LF1 conforms closely to a natural, unaltered state and exhibits well-developed and diverse geomorphic forms and processes characteristic of river type, with abundant bank side vegetation. Some reaches show deviation from natural conditions due to direct and/or indirect channel, floodplain, and/or catchment development pressures.	**High Importance**	**High Importance**
Crom Allt and tributaries (LF2)	NN 08592 07409	A small drain sourced from NN 07391 07522 with around five ditches/watercourses flowing into it. Does not have its WFD classification. Therefore, has been considered as Low Importance.	**Low Importance**	**Low Importance**
Loch Breac-liath (LA1)	NN 03446 16419	Small lochan approximately 16,000 m^2. Small watercourse drains from LA1 to LA11 in a southwestern direction. This lochan is a part of the Allt Beochlich (LA6) catchment area. The lochan does not have its own WFD status.	**Low Importance**	n/a
Allt na Cuile Riabhaiche and tributaries (LA2)	NN 06346 19768	Watercourse to the northeast of the head pond with approximately six tributaries. Drains into Loch Awe and is sourced from approximately NN 04467 17403. That does not have its own WFD status.	**Low Importance**	**Low Importance**

Water Feature	NGR	Baseline Summary	Water Quality Importance	Hydromorphology Importance
Keppochan River and tributaries (LA3)	NN 07270 19990	Watercourse to the northeast of the head pond flowing into the Archan River (LA4) at NN 08243 20949. Sourced from approximately NN 06805 18264. That does not have its own WFD status.	**Low Importance**	**Low Importance**
Archan River and tributaries (LA4)	NN 08466 20254	Sourced from NN 07567 19267 and drains into the Claddich River which then flows into Loch Awe. That does not have its own WFD status.	**Low Importance**	**Low Importance**
Allt a Chrosaid and small lochan (LA5)	NN 02937 16523	Sourced from a small lochan at NN 03543 16978 and drains into Loch Awe. The lochan does not have its own WFD status	**Low Importance**	**Low Importance**
Allt Beochlich and tributaries (LA6)	NN 03502 15714	LA6 flows from Lochan Dubh (LA10) and into Beoclich Lochan (LA8) with approximately eleven tributaries flowing into LA6 including the tributary sourced from LA8. From Beoclich Lochan (LA8), the watercourse flows into Loch Awe. Is a Moderate status classified water body and supports a small hydro Development (CAR/L/1010507). No salmon was found within the watercourse only brown trout. It also has an estimated Q95 flow of 0.09m^3/s. A relatively natural watercourse, however, modifications for a small hydro scheme has an impacted on the status.	**Medium Importance**	**Medium Importance**
Lochan Airigh (LA7)	NN 04278 16440	LA7 is a small lochan with 23,700 m2 area. On the site visit it was observed to have pebbles and cobbles on the base on the lochan and to have clear water. The lochan does not have its own WFD status	**Low Importance**	n/a
Lochan Beochlich (LA8)	NN 03030 15414	LA6 drains into LA8 at NN 03136 15420 and is dammed on the western end at NN 02926 15391 where a small hydro Development is situated. The lochan does not have its own WFD status	**Low Importance**	n/a
Lochan Romach (LA9)	NN 02811 15735	Is a relatively small water body with an area of 23,800 m^2 which is a part of the Allt Beochlich catchment. The lochan does not have its own WFD status	**Low Importance**	n/a
Allt na Fainge (LA12)	NN 04325 17712	Drains into Loch Awe. Is the convergence of two unnamed watercourses which are sourced from NN 02669 16737 and NN 01721 16753, respectively. That does not have its own WFD status.	**Low Importance**	**Low Importance**
Allt a' Ghreataidh (LA13)	NN 01216 16501	Drains in Loch Awe and is sourced from NN 01721 16753. That does not have its own WFD status.	**Low Importance**	**Low Importance**
Alt Mor (LA14)	NN 01200 16313	Drains in Loch Awe and is sourced from an unnamed loch at NN 03598 17435. Does not have a WFD status but does support an abstraction licence for the Alt Mor Hydro Development (CAR/L/1115819). A relatively natural watercourse, however, modifications for a small hydro scheme has an impacted on the status.	**Medium Importance**	**Low Importance**
Unnamed Lochans (LA15)	NN 01160 16630	Three unnamed lochs, one having the largest area of 18,000m^2. The lochans does not have its own WFD status	**Low Importance**	n/a
Claddich River/Allt an Stacain	NN 09638 22424	Heavily modified river sourced from Lochan Sron Mor and flows into Loch Awe. With a moderate WFD classification. A relatively large watercourse which is heavily modified on account of hydrological impacts related to hydropower generation.	**Medium Importance**	**Medium Importance**
PWS	See Appendix 11.3 for locations		**High Importance**	n/a

Management of pollution risks

To avoid, minimise and reduce potential adverse effects on the water environment, mitigation measures are required to be implemented on site during construction, in accordance with the residual effects predicted in *Chapter 11* of the EIAR.

Relevant guidance documents

Guidance for Pollution Prevention (GPP) provides good practice advice in Scotland for how to manage the risk from pollution risks during construction works. The following relevant GPPs are relevant:

- GPP 2: Above ground oil storage (Ref 9);
- GPP 5: Works and maintenance in or near water for construction or maintenance works near, in, or over water (Ref 10);
- GPP 8: Safe storage and disposal of used oils (Ref 11);
- GPP 13: Vehicle washing and cleaning (Ref 12);
- GPP 19: Vehicles: Service and Repair (Ref 13);
- GPP 21: Pollution Incident Response Plans (Ref 14); and
- GPP22: Dealing with Spills (Ref 15).

Where new GPPs are yet to be published, previous PPGs may still provide useful advice on the management of construction to avoid, minimise and reduce environmental impacts, although should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes as they were technically withdrawn in 2015. They are referred to in this document alongside other current guidance and in the context of the Development and site-specific mitigation measures. The following PPGs may still provide relevant information:

- General Guide to the Prevention of Pollution: PPG1 (Ref 16);
- Use and Design of Oil Separators in Surface Water Drainage Systems: PPG3 (Ref 17);
- Working at Construction and Demolition Sites: PPG6 (Ref 18);
- Control of Spillages and Fire Fighting Runoff: PPG18 (Ref 19); and
- Storage and Handling of Drums and Intermediate Bulk Containers: PPG26 (Ref 20).

Additional good practice guidance for mitigation to protect the water environment can be found in the following key CIRIA documents:

- C811 (2023) Environmental good practice on site guide (Ref 21)
- C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice (Ref 22);
- C624 (2004) Development and flood risk – Guidance for the construction industry (Ref 23);
- C753 (2015) Publication C753 SuDS manual (Ref 24);
- C523 (2001) Sustainable Urban Drainage Systems – Best practice manual for England, Scotland, Wales and Northern Ireland (Ref 25);
- C741 (2015) Environmental Good Practice on Site (Ref 26);
- C648 (2006) Control of Water Pollution from Linear Construction (Ref 27); and
- C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors (Ref 28).

The Scottish Government has published the Sewers for Scotland Manual" (3rd Edition, Scottish Water 2015) and Planning Advice Notes (PANs) to provide national guidance on various topics and SEPA has also produced a number of guidance documents covering a range of environmental issues that are relevant to this impact assessment. Those documents relevant to the water environment are listed below:

- PAN 51 - Planning, Environmental Protection and Regulation (Revised 2006) (Ref 29);

- PAN 61 - Planning and Sustainable Urban Drainage Systems (2001) (Ref 30);
- PAN 79 - Water and Drainage (2006) (Ref 31);
- SEPA Policy No. 19 - Groundwater Protection Policy for Scotland (2009) (Ref 32);
- SEPA Interim Position Statement on Planning and Flooding (2009) (Ref 33);
- SEPA Engineering Activities in The Water Environment: Good Practice Guide – River Crossings (Second edition, 2010) (Ref 34);
- SEPA Land Use Planning System SEPA Guidance Note 31, 'Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems' (2017) (Ref 35);
- SEPA Technical Flood Risk Guidance for Stakeholders (Version 10, 2018) (Ref 36); and
- Sewers for Scotland Manual" (3rd Edition, Scottish Water 2015) (Ref 37).
- SEPA has also published the following documents to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2011:
- WAT-PS-06-02: Culverting of Watercourses (2015) (Ref 38);
- WAT-PS-07-03: Engineering in Artificial Inland Surface Waters (Ref 39);
- WAT-SG-75: Sector Specific Guidance: Construction Sites (Ref 40);
- WAT-SG-78: Sediment Management Authorisation (2012) (Ref 41);
- WAT-PS-07-03: Engineering in Artificial Inland Surface Waters (2013) (Ref 42);
- WAT-RM-02: Regulation of Licence-level Engineering Activities (2017) (Ref 43);
- WAT-SG-86: Registration Rules for Exposed Sediment Removal (Ref 44);
- WAT-SG-93: Guidance for Transport Infrastructure Projects (to follow) (2016) (Ref 45);
- WAT-SG-23 Good Practice Guide – Bank Protection (2008) (Ref 46);
- WAT-SG-25: Good Practice Guide - River Crossings (2010) (Ref 47);
- WAT-SG-26: Good Practice Guide - Sediment Management (2010) (Ref 48);
- WAT-SG-28: Good Practice Guide - Intakes and Outfalls; (2008) (Ref 49);
- WAT-SG-29: Good Practice Guide – Construction Methods (2009) (Ref 50); and
- WAT-SG-44: Good Practice Guide – Riparian Vegetation Management (2009) (Ref 51).

Water quality monitoring

As part of the approach to mitigation, a programme of water quality monitoring will be undertaken throughout the entire construction phase of the authorised development. Water quality monitoring will be undertaken pre, during and post-construction on all watercourses.

Monitoring is proposed to ensure that mitigation measures operate as intended and construction works are being undertaken in accordance with any permit and licence conditions. Monitoring also allows environmental problems to be identified and responded to act as early a stage as possible. Finally, monitoring will also help the Contractor to identify and implement environmental improvements, which will contribute to the overall environmental performance of the project.

The scope of the water quality monitoring will be set out in a Water Quality Monitoring Plan (WQMP) post planning permission. However, based on other similar developments water quality monitoring is expected to consist of a combination of:

- Visual/ olfactory inspections looking for evidence of pollution;
- In situ monitoring using a hand-held water quality meter (to include turbidity, temperature, dissolved oxygen, pH and conductivity); and

- Sampling for laboratory analysis as required or in response to signs of pollution (e.g., as part of an investigation).

Routine water samples for laboratory analysis will be collected monthly from water features and undertaken by accredited laboratories under United Kingdom Accreditation Service (UKAS). It is not expected that all water features will be monitored but those considered most sensitive or indicative of larger catchment areas affected by the works. PWS will be monitored where there is a risk to the supply during the works.

Daily visual and olfactory observations, and those during specific works (e.g. as work progress in water features directly) or following periods of heavy or prolonged rainfall represent the first screen for water pollution (and in the case of any dewatering, of any potential changes in water quantity). These will consider signs of pollution such as:

- Turbid water or fine sediment deposition (compared to baseline).
- Non-natural oily sheens (iridescence).
- Water decolourisation.
- Chemical or other odours.
- Effervescence.
- Fungus growth.
- Surface foam (unnatural), scum or litter.
- Stained sediment or flora.
- Adverse impacts on aquatic organisms including fish mortality etc. perhaps as a result of low dissolved oxygen.

Finally, in situ monitoring using a hand held water quality meter can be effective at giving immediate readings on any changes in water quality where pollution is suspected but perhaps visual and olfactory observations are not obvious. In addition, certain water quality parameters like dissolved oxygen need to be recorded in-situ in the field using handheld water quality meters. At the same time, there are other parameters (i.e., pH, conductivity and turbidity) that can be analysed in the field, and it is beneficial to record these parameters in situ. A multi-parameter water quality meter can be purchased to do this.

In addition to the in-situ testing water samples taken from natural water features will be tested at an accredited laboratory for the parameters listed in Table 4 as a minimum.

Table 4: Sampling Parameters to be used for Construction and Post-construction Water Quality Monitoring excluding in-situ measurements from probes

Parameter	Units	Limit of detection	Accreditation
Conductivity @ 20C	µS/cm	10	UKAS
pH	pH Units	0.05	UKAS
Alkalinity to pH 4.5 as CaC03	mg/l	5	UKAS
Dissolved Organic Carbon	mg/l	0.2	UKAS
Turbidity	FTU	1	UKAS
Total Suspended Solids @ 105C	mg/l	3	UKAS
Total and dissolved metals	mg/l and µg/l	Various	UKAS
Chemical oxygen demand (COD)	mg/l	10	UKAS
Biochemical oxygen demand (BOD) 5 Day ATU	mg/l	1	UKAS
Speciated Polycyclic Aromatic Hydrocarbons (US EPA 16)	µg/l	0.01	UKAS
Extractable / volatile aliphatic & aromatic hydrocarbons (speciated)	mg/l	Various	UKAS
Total Petroleum Hydrocarbons (TPH)	µg/l	100	UKAS
Nitrate	mg/l	0.02	UKAS
Nitrite	mg/l	0.2	UKAS

Parameter	Units	Limit of detection	Accreditation
Orthophosphate (as P)	mg/l	0.03	UKAS
Total phosphorus	ug/l	0.7	UKAS
Total Organic Carbon (TOC)	mg/l	2	UKAS

Management of construction site runoff

The management of construction site runoff and spillages to water bodies will be carefully managed across the whole Development to avoid adverse environmental impacts by preventing pollution. There may also be other environmental impacts to take into account in the approach at any one time (e.g., ecological interests in watercourses or the risk of excessive dust generation from exposed earth stockpiles).

Potential adverse impacts may be acute (i.e., very high concentrations of a polluting substance persisting for a short time measured in hours) or chronic (lower concentrations of a polluting substance but still above background and persisting over longer periods of time such as days, weeks and even months etc.).

Management of spillage risk

To prevent chemicals, fuels / oils and other such substances from entering the water environment, measures to control the storage, handling and disposal of these substances would be put in place prior to and during construction. The CEMP and oWMP provide detailed information relating to the control of spillages and leaks, and these are not repeated here. However, in summary they include:

- Spill kits will be available on the site in watertight containers (e.g. works near watercourses) and carried on all mobile plant. They would be regularly checked and topped up, especially after use. Appropriate training would be given to all construction workers in their use.
- Storage of fuel and chemicals would be in accordance with GPP 8: Safe storage and disposal of used oils (Ref 11).
- Surface water drains on local roads or within the Development compound area will be identified by the contractor and where there is a risk that fine particulates or spillages could enter them, they would be protected (e.g. covers or sandbags).
- Any containers/tanks of contaminating substances (e.g. fuel) onsite would be leak-proof and kept in a safe and secure building or compound from which they cannot leak, spill or be open to vandalism. The containers would be protected by temporary impermeable bunds (or drip trays for small containers) with a capacity of 110% of the maximum stored volume. Areas for transfer of contaminating substances (including refuelling areas) would be similarly protected.
- Any permanent oil storage tanks and temporary storage of 201 litres or more of oil in drums and mobile bowsers, and ancillary pipe work, valve, filters, sight gauges and equipment requiring secondary containment, e.g. bunding or drip trays.
- No oil would be stored within 20m of a watercourse and potentially further if ground is angled towards a water body except for fixed/large plant associated with the construction of new bridges/culverts or hand tools.
- Where possible re-fuelling will be undertaken in designated areas within main compounds or satellite compounds. It is possible that refuelling of mobile plant may be required by mobile fuel bowser. This will not be undertaken within 20m of a water feature, and only on flat land (or otherwise a greater distance and other measures may be required subject to an on-site risk assessment) and with a drip tray/plant nappy. Certain semi-mobile very large plant (e.g. crane) may need to be located close to watercourses and potentially within 20m. Due to the difficulties in moving plant such as this they may need to be refuelled in situ. Again, a site-specific risk assessment will need to be undertaken by the contractor.
- Biodegradable hydraulic oils would be used where possible in all plant and only in equipment working in or over watercourses.

- Any plant, machinery or vehicles would be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place offsite if possible or only at designated areas in the site compound.
- All fixed plant used on the Development Site to be self-bunded.
- Mobile plant to be in good working order, kept clean and fitted with plant 'nappies' at all times.
- An Emergency Response Plan or similar titled plan would be prepared and included in the CEMP.
- Spill kits and oil absorbent material to be carried by mobile plant and located at high-risk locations across the Development Site and regularly topped up.
- All construction workers would receive spill response training.
- The Development Site is to be secure to prevent any vandalism that could lead to a pollution incident.
- Construction waste/ debris are to be prevented from entering any surface water drainage or water feature.
- Any site welfare facilities would be appropriately managed, and all foul waste disposed of by an appropriate contractor to a suitably licensed facility. The main compound will have accommodation and welfare facilities. It is expected that a suitably sized storage tank will be provided that would be periodically pumped out by a specialist contractor so that the water could be disposed of at a suitably licensed waste facility.

Management of works in, over, under or adjacent to water features

As a minimum the Principal Contractor will adhere to the following measures:

- Works in, over, under or adjacent to water features will be avoided, but if this is not possible dry working areas will be created using the least intrusive techniques with downstream measures to prevent any silt and chemical spillages propagating.
- It is assumed that where there are diversions or other works to watercourses that they would need to be either flumed, over-pumped, or otherwise diverted around dry working areas in water features (e.g. using sand bags for small areas of work or otherwise coffer dams or other similar ways to create a dry working environment).
- Where the flow in watercourses is over-pumped, spare pumps must be maintained on site. Temporary barriers to flow must be partially removed at the end of shifts once pumps/equipment and any debris/materials have been removed from the channel.
- Temporary works to watercourses will be fully reinstated as found. Where riparian vegetation is cleared adequate protection of soils will be provided (e.g. using a biodegradable geotextile staked into the ground using wooden pegs) until vegetation re-establishes.
- The above would need to be done in accordance with authorisation from the CAR Act and their amendments. Registration and authorisation of works is undertaken by SEPA.

Management of dewatering and groundwater risks

The Contractor will aim to stem any uncontrolled water/ ingress into Waterways, the power cavern and access tunnels using a combination of sprayed concrete and/or other forms of lining as appropriate. A significant amount of the construction will be at great depth, where the amount of fracturing will reduce, and therefore inflow will also reduce.

The amount of interaction with the underlying groundwater body will be minimal. Although no springs have been found in this area, if during construction water ingress to the Headpond is discovered, the possible installation of a granular fill beneath the lining may be required.

Secondary consents

The construction of the Development will be undertaken in accordance with good practice as detailed below. It is assumed that all temporary works will be carried out under the necessary consents/permits (e.g. CAR licences as required under the Water Environment (Controlled Activities) Regulations 2011, (Ref 1), and that the contractor will comply with any conditions imposed by any relevant permission. The contractor will ensure that all permits/consents are obtained in advance of any relevant works in, over, under or near watercourses.

Mitigation measures

In Table 5 measures have been set out that provide an appropriate level of protection and risk management, although it would be for the Contractor to decide how best to manage construction site runoff and different measures or approaches may be most suitable in different locations and activities across the Site (for example, the measures to manage works in the channel would be different to works that are close to but only adjacent to the channel).

It is important to note that the effectiveness of measures implemented to treat fine sediment in runoff will also reduce with use unless they are maintained (e.g., trapped silt removed). It is therefore important that the Contractor continually monitors the measures they put in place to manage fine sediment in runoff and that they have a pallet of options to select from (Appendix A).

Furthermore, the construction works are not a static operation and will need to evolve and adapt to changing circumstances during the preliminary and main construction phases. These might include changes to the nature of the works being undertaken or the prevailing weather conditions.

Mitigation requirements related to the management of construction run off, construction site spillage risk and working above or adjacent to water are detailed in Table 5.

Table 5: Summary of potential mitigation measures during construction works

Potential Impacts	Management of Impacts
Site Runoff	
Excessive fine sediment in runoff, either in suspension or deposited directly, can adversely impact the environment and water uses and these are described below: <u>Fish/ Aquatic Fauna</u> Physiological and behaviour effects on fish and other aquatic fauna; Direct mortality (although complex); Reduced reproduction and growth through the degradation of spawning habitat/ redds and smothering of eggs and yolk-sac fry; Gill irritation / trauma / altered blood physiology; Impeded fish movement, altered foraging behaviour and reduced territory; and Lead to trophic effects on fish through changes in invertebrate communities in response to high and persistent sediment loads and effects on food sources. <u>Macrophytes and Invertebrates</u> Smother macrophytes, invertebrates and substrate important for fish/ invertebrates (particularly fish spawning gravels); Reduce water clarity and increase turbidity, exerting a negative effect upon primary production; and Depress oxygen levels by reducing the potential for plants to photosynthesise and exerting a Sediment Oxygen Demand; and have aesthetic effects that discourage or prevent local recreational uses of watercourses or require the temporary, partial or full postponement of water sports events held on the lake. <u>Water Supply</u> Reduce quality and aesthetics of water abstracted for Private Water Supplies, as well as reduce the	Topsoil stripping should be undertaken outside of the winter period (October to March inclusive) where possible during which wetter weather is more likely. Topsoil and subsoil will not be stored directly adjacent to the watercourse but will be stored a minimum of 20m from the watercourse, with additional mitigation such as silt fences installed if there is a risk of sediment entering the watercourse. No topsoil or subsoil will be stored within a fluvial or surface water flood zone (flood zone 2 and 3) unless supported by a risk assessment (i.e., consideration of weather forecast and duration of storage) and additional mitigation (i.e., drainage bypass channel for overland flow). Where site constraints mean that it is not possible to maintain a 20m buffer from a water body, additional mitigation measures will be implemented to provide an adequate barrier between the potential source of contaminated runoff and the receptor. Smaller stockpiles could be created, reducing the pile height. Short term periods of wet weather will be avoided when undertaking earth moving works, if possible, to minimise the risk of generating runoff contaminated with fine particulates. If there is forecast more than 15 millimetres (mm) of rain over 24hr period then topsoil stripping should cease until the soil is dry or 24 hours has passed, whichever is the sooner or otherwise additional action taken to dry out the working area. This is to avoid working in waterlogged conditions. Where unavoidable, the adequacy of standard mitigation measures should be continuously reviewed. Vegetation clearance and topsoil strip should be limited as much as practicable. Where possible, vegetation clearance across the Development will be phased to minimise the areas of exposed ground and reduce the potential risk for runoff. The Contractor will prepare a temporary works drainage strategy prior to construction works. This will set out appropriate measures to manage runoff rates and be prepared in accordance with the pollution prevention measures set out in this OWMP. The temporary works drainage strategy will define the installation of pre-construction drainage measures to intercept run-off and ensure that discharge and runoff rates are controlled in quality and volume, in turn causing no degradation to water quality. This may include specific measures to be used in high-risk areas (for example construction along or across steep gradients and water course crossings). A phased approach may be taken to the development of the temporary works drainage strategy to reflect the phasing of the construction programme. Depending on ground conditions and weather conditions a geotextile membrane and stone surface and/or bog-mats may be used in selected areas. The geotextile will

Potential Impacts	Management of Impacts
performance of any treatment processes (e.g., UV filters), making it unsuitable as a potable supply. Flood management There is a risk the sediment washed from the works could enter and become deposited in the open channels, decreasing channel capacity and increasing flood risk.	need to be regularly monitored and any excessive build-up of fine sediment removed. Please refer to Appendix A for examples of measures that can be used (including Installation of cut off trenches/ catchment drains, drain covers, sand bags, earth bunds and lagoons, geotextile silt fences/matting, straw bales, or proprietary treatment (e.g., lamella clarifiers)). In addition: Turfs removed to be retained for lining haul road drainage; Early provision of permanent drainage works (e.g., swales); 'Dirty' site water/ 'clean' site water to be kept separate; and Operate a permit to pump system. The location and condition of existing land drainage will be established, and a record compiled. A specialist drainage contractor in most instances will carry out the work. Subject to landowner/occupier agreement, existing drains should be restored, or new drains established to help prevent damage to soil structure, maintain work areas in a dry condition and to enable current drainage systems to continue to operate through the construction period. Flumes for haul road crossings will be sized to maintain the current land drainage regime and the existing flow, following a study to understand the hydrology of the watercourse being crossed in order to assess the range of flows likely during the temporary works Watercourse crossing locations will be micro-sited to make the crossing as close to perpendicular to the watercourse as reasonably practicable, ensuring the crossing is as short as possible and for open cut / temporary access crossings reducing the risk of localised scour at the structures. They will also be designed to maintain downstream flows and to allow continued and unobstructed passage for aquatic organisms and mammals (e.g., otter and water vole) using river corridors. For water features that are being flumed, a phased approach of flume removal should be undertaken Where temporary crossings and open-cut crossings of drains connect to chalk streams downstream, the sediment management approach should also include an additional measure due to the high sensitivity of chalk rivers to fine sediments (e.g., in-channel straw bales, silt matts, bubble curtains) (Appendix A). The effectiveness of fine sediment control measures must be continually monitored, managed and adapted to the Site-specific needs at any given time (e.g., build-up of silt in temporary construction SuDS or against fabric silt fences, or the decomposition of straw bales). Appropriately sized runoff storage areas for the settlement of excessive fine particulates in runoff will be provided. The Contractor will need to monitor the build-up of fine sediment in temporary construction SuDS and when they become ineffective either remove sediment or provide replacement measures. Mud deposits will be controlled at entry and exits to the Site using wheel washing facilities and/ or road sweepers operating during earthworks or other times as considered necessary. The wash down of construction vehicles and equipment should take place in designated washdown areas within construction compounds. Waste wash water should be prevented from passing untreated into watercourses or groundwater. Appropriate measures will include use of sediment traps. Tools and heavy plant to be washed down and cleaned in designated areas on Site only. At all wash down locations, the wash down water will be collected for treatment before discharge to surface water drainage under appropriate consent and/ or agreement with SEPA and/ or Scottish Water, or otherwise removed from Site for appropriate disposal at a licenced waste facility. Debris and other material will be prevented from entering temporary surface water drainage, through maintenance of a clean and tidy Site, provision of clearly labelled waste receptacles, grid covers and the presence of Site security fencing. Any material imported to site, such as for supporting foundations, will be natural quarried stone or, if recycled, the material will undergo chemical testing. The suite of contaminants and site use criteria will be agreed with regulatory authorities, in order to demonstrate that the material is suitable for use on site and does not pose a risk to construction workers or the environment. Water quality monitoring regime to be established and recorded. Daily inspections/ watching brief to be carried out, and especially during and after wet weather as detailed in Section 4 above. Works will be stopped immediately and reviewed if silt plumes are identified within the watercourse/ water body as a result of operations involved with the works.

Potential Impacts	Management of Impacts
	Soil handling operations will be undertaken in line with the Soil Management Plan and appropriately supervised to ensure that they are suitable for re-use within the Project. Stockpiles will be placed away from watercourse to avoid runoff. Stockpile will be no nearer than 20m from any watercourse and will be either covered, fenced or seeded with grass to prevent wind whipping or runoff from them becoming contaminated with excess fine sediment. Earthworks and exposed areas / soil stockpile should be re-vegetated as soon as practicable to stabilise surface.
Chemicals	
Chemicals such as fuels, oils and cementitious products can have a severe impact on water quality, fish and aquatic wildlife as well as humans. These substances may affect several organism functions like respiration, feeding, and thermo-regulation. At the same time, the entire ecosystem can change temporarily because of the chemical components and elements that are toxic to the environment. These substances may also affect impact abstraction for agriculture and / or private / public water supplies making them unsuitable for use/ consumption. As such measures to control the storage, use and disposal of these substances would need to be put in place prior to and during construction. During Preliminary Works chemicals stored on Site could range from Line marking spray paint, shutter oil, blackjack, paint, sealants, cement etc. All such materials will be stored in suitable COSHH stores within the Site compounds well away from sensitive areas and a minimum of 10m from controlled waters/ downstream drains. Fuel will be stored in a bunded tank (preferably with integral bunding) such as the one below – capacity 4,500ltrs. During preliminary work this type of tank is likely to be situated within the three Site compounds.  t 4,500ltr integrally bunded tank, compliant with OFS T200 standard Water from wheel washing areas can contain oil and diesel, as well as high levels of silt, therefore it is important that water from wheel washing facilities and wash down areas is contained and not allowed to soak into surrounding ground or runoff into surface water bodies.	Spill kits will be available on the Site in watertight containers at key locations (such as at compounds, especially next to oil storage or refuelling locations) and locations where there is a risk to a water feature) and carried on all mobile plant. The Environmental Emergency Response Plan will identify these key locations. The SHE Manager/ Advisor is responsible for ensuring that spill kits are checked at least weekly and kept fully stocked and in good repair. Appropriate training will be given to all construction workers in their use. Storage of fuel / chemicals will be in accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001 & Guidance for Pollution Prevention (GPP) 8: Safe storage and disposal of used oils. SEPA guidance on oil storage regulations for business and preventing groundwater pollution from underground fuel storage tanks will be complied with. Within the construction compounds specific areas will be designated for the storage of chemicals, waste oils and fuel and refuelling activities and will be placed on secondary containment e.g., double walled tanks or bunded areas with a capacity of 110% of the maximum stored volume. Surface water drains on local roads or within compound areas will be identified and where there is a risk that fine particulates or spillages could enter them, they will be protected (e.g., covers or sand bags). Alternative road drainage measures may be required. Sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. Storage and Handling: Oil/ diesel storage (including fixed tanks, IBCs, mobile bowsers and generators) will be placed be at least 10m from any watercourse (including drains) and 50 m from any borehole/ well or within a Source Protection Zone (SPZ) 1 (nominal minimum 50 m provided around all licensed abstractions). Drip trays will be checked and emptied daily and will retain at least 10% of the volume being handled. Daily inspections will be undertaken of plant using hydraulic oils. Storage containers will be correctly labelled. Storage areas will be kept secure to prevent acts of vandalism which may result in leaks/ spills. Appropriate measures will be implemented to ensure that any spillage cannot drain to a nearby water body directly or indirectly. Where practicable, plant to be filled with biodegradable oil, in line with the plant manufacturer's instruction, to reduce the potential for pollution to watercourses in the event of a hydraulic oil pipe failure. Refuelling on the pipeline spread will be undertaken using plant nappies and be at least 20 m away from watercourses and vehicles and plant will not be left unattended during refuelling. All plant will have thorough plant examination certificates. Trained and designated refuelling personnel will be appointed for the project. Refuelling will be observed by a banksman, and with a drip tray or plant nappy placed under the refuelling connections. Vehicles and plant will not be left unattended during refuelling. Refuelling will be undertaken in line with project specific procedures. All chemicals are to be stored in lockable containers which are double bunded. A designated COSHH co-ordinator will be appointed for the project. A COSHH risk assessment register will be completed before any COSHH is used on Site. Only construction equipment and vehicles free of oil/ fuel leaks which could cause material contamination will be permitted on Site. Drip trays will be placed below static mechanical plant. Any plant, machinery or vehicles will be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place off site if possible or only at designated areas in the compounds. A Remediation Strategy will be devised and discussed with the regulatory authorities (including relevant local authorities and the SEPA) prior to any remedial works. Contaminated material that is considered to pose a risk would be remediated in line with the remediation strategy or disposed of appropriately. Earthworks and excavations in areas where ground contamination is known or suspected will be carried out in accordance with the Remediation Strategy.

Potential Impacts	Management of Impacts
	A Pollution Incident Response Plan will be implemented. All construction workers will receive spill response training. See Section 7 for further details.
	The Site is to be secure to prevent any vandalism that could lead to a pollution incident.
	Construction waste/ debris are to be prevented from entering any surface water drainage or water body.
	All wash down of vehicles (including wheel washing) and equipment will take place in designated areas, and wash water will be prevented from passing untreated into watercourses (directly or indirectly via drains) and groundwater. It will be adequately contained, prevented from entering any drain, and disposed of off-site at a suitably licenced waste facility using an accredited waste disposal company. It may also be disposed of to the foul sewer only with prior, written consent from the local sewerage undertaker.
	Where practicable, utility supplies will be taken from main supply utility connections, however where this is not possible, utilities will be provided from temporary facilities such as water bowsers, local waste water storage and transport of waste and wastewater to an approved off-site disposal point. Provision of potable water, emptying of effluent and the removal of any waste would be undertaken by a registered contractor on a regular basis.
	Adequately protect the Project area from vandalism, theft and fly-tipping by fencing and locking access gates to discourage unauthorised access. Any occurrence of tipping on the site will be reported to the site management who will then inform the local environmental authority and the police if necessary. Loose materials will be removed/ stored correctly from within the work areas to prevent them being thrown into the watercourse. No plant will be left within the work areas unless within a secure locked steel container and/ or it is fitted with an isolator switch that is lockable. Any plant stored at a works location with risk of flooding will be stored at the highest point possible close to the works area.
Working above/adjacent to Water	
Working above water or adjacent to water poses similar risks to the water environment as outlined in Site Runoff and Spillage Risk sections within this table. However, there is also the added risks of direct physical damage to waterbodies and the mobilisation of sediments already present in those waterbodies (that may contain nutrients and chemical substances) that if mobilised could lead to adverse impacts (e.g., toxic effects and reduced dissolved oxygen).	Create dry working areas using the least intrusive techniques with measures to prevent any silt and chemical spillages propagating downstream. If required, channel flows to be temporarily flumed or over-pumped. Deploy oil booms as required.
	Dewatering of the working area will be done in an appropriate way that avoids any risk of erosion of the receiving watercourse (e.g., discharging to ground, baffles on the discharge).
	Adequate pumps will be used with spares kept available on Site if additional pumping capacity needed.
	Establish and maintain contact with relevant regulators and other 3rd parties, keeping them regularly informed of the progress and pollution control measures used.
	If the construction requires flow along an existing watercourse to be over-pumped (but there are no major earth works to the channel), some flow should be allowed through the working area on completion of the works each day if possible (and following removal of any equipment and materials).
	Ideally, flow should ideally only be allowed back along disturbed channels once banks have been stabilised by vegetation (which typically takes approx. 12 months). This is unlikely to be possible when removing flumes, which will allow the flow along the channel that has been disturbed from open cut. The open-cut watercourse crossings should be stabilised by vegetation as far as possible prior to removal of the flume, if the area is not revegetated then the channel may need to be protected by the use of various sustainable products (e.g., coir matting/ rolls) where deemed necessary. Regular inspections of the open-cut channels will be carried out by the Contractor until 12 months have passed following flume removal. Protection measures are needed where there is a risk of excessive sediment erosion/mobilisation.
	Any works above watercourses will require measures to prevent materials or equipment falling into the channel. Should material fall into the channel, this should be retrieved (whilst complying with any regulatory requirements).

Potential Impacts	Management of Impacts
	Works to be carried out under all consents and permissions. Times/tasks to coincide with suitable weather periods noting the construction phase flood risk management measures described in the FRA.
	Where fish may be present, the timing of the works should avoid sensitive periods for fish migration or spawning. Any dewatering should be undertaken only after a fish rescue has been completed by a suitably trained ecologist and complying with any requirements of the SEPA. Screens may also be required on the pump inlet.
	Carry out works in accordance with the FRA (e.g., flood warning alerts set up with SEPA).
	All equipment to be removed from culvert/ brook/ ditch/ pond etc. when works are not being carried out (i.e., end of shift).
Flood Risk	
Should a large fluvial flood event occur during the construction period, out of bank flows may erode bare surfaces that have been stripped of vegetation or earth and other material stockpiles and potentially carry this material back into the watercourse as the flood water recedes. This material may then be re-deposited further downstream within the channel, which may result in an adverse impact. In addition, it is also possible that flood waters will enter excavations and will become trapped and thus will need to be pumped out and discharged with appropriate pollution management measures. Flood risks during Main Works have been considered in detail in the FRA. This WMP considers the additional measures that the Contractor may need to implement during a large fluvial flood event affecting the site in order to minimise the risk of water pollution. During a flood event, flows within the channel and those that spill out on to the floodplain will typically have a lower water quality than under normal flow conditions. In particular, it would be expected that flood waters will contain higher total suspended solids washed in from the catchment from both natural and unnatural sources. In addition, given that construction works invariably require the removal of vegetation that helps to bind and protect soils, as well as excavations, construction of Embankments, stockpiles of earth and other materials, and given the potentially widespread nature of flooding in some locations of the site, it is not possible to entirely eliminate the risk that material may be washed downstream during a significant flood event. Nevertheless, it is still important that the works minimise the risk of increasing the suspended solid load being washed downstream by undertaking appropriate measures, and these are considered in this table to the right. To manage the water pollution risks during the Main Works measures to avoid, and measures to manage, the risk of impacts is required. Avoidance measures include planning works accordingly to avoid wetter periods of the year where possible and when flooding is perhaps more likely to occur, as well as minimising the need for clearance of vegetation and locating earth stockpiles in a location that has as low a flood risk as possible. Management measures may include as appropriate regularly monitoring weather reports and flood risk alerts and planning activities accordingly, ensuring a Pollution Incident Response Plan is in place, protecting the surfaces of exposed soils/ stockpiles by seeding them with grass or using biodegradable matting or a geotextile, protecting the base of stockpiles to	Earth moving works and excavations should, where possible, be undertaken during the drier months of the year (typically spring to early autumn). Areas of vegetation clearance and top-soil strip should be limited as much as practicable. Where possible, vegetation clearance across the Development will be phased to minimise the areas of exposed ground and reduce the potential risk for runoff. The location of earth of other material stockpiles or other potentially higher risk activities (e.g., compounds etc.) are to be located in as low a flood risk area as is possible by the site and works constraints. A Pollution Incident Response Plan will be implemented, and further details are provided in Section 7. All works are to be carried out in accordance with the FRA (e.g., flood warning alerts set up with SEPA). Safety of site workers is to take precedence over implementation of pollution prevention measures should a significant flood event occur. Flumes will be sized to maintain the current land drainage regime and the existing flow, following a study to understand the hydrology of the watercourse being crossed in order to assess the range of flows likely during the temporary works.

Potential Impacts	Management of Impacts
erosion from flood water, and where possible and appropriate to do so, slowing the flow of flood water from the site to enable fine sediment to either settle out naturally or for the water to be pumped out with treatment by a measure proposed by the Contractor.	
Dewatering – Flood Risk	
Dewatering activities during heavy rainfall may increase flood risk as the peak pumped flow rate must be disposed of at the time when surface water bodies and surface water drainage infrastructure are already at high flows. In addition, soils are likely to be fully saturated, further increasing flood risk. To manage the water pollution risks and potential flood risk during the Main Works measures to avoid, and measures to manage, the risk of impacts is required. Avoidance measures include planning works accordingly to cease dewatering during periods of heavy rainfall and when flooding is perhaps more likely to occur. Management measures include regularly monitoring weather reports and flood risk alerts.	Dewatering will not take place during heavy rainfall and/ or high flows and will cease until heavy rainfall has stopped. All dewatering activities will only occur once the appropriate permissions have been obtained from the SEPA.

Incidents and emergencies

The Applicant is to ensure that protection measures to control the risk of pollution are included within the final WMP which will be prepared by the Contractor ahead of any on site works taking place.

All environmental incidents shall be reported and investigated and follow the Contractor's procedure, will be included in the Environmental Emergency Response Plan.

Pollution Incident Response Plan

The PIRP presented in the Environmental Emergency Response Plan produced by the Contractor will be agreed in advance with the SEPA and will set out the appropriate actions in the event of an incident and/ or that monitoring identifies unusual or anomalous results. It will be prepared in accordance with advice from the SEPA.

- Reporting of any potential or actual significant pollution incidents during construction will include as a minimum:
- A description of the pollution incident, including its location and Ordnance Survey (OS) grid reference, the type and quantity of contaminant and the likely receptor(s);
- Details of monitoring undertaken;
- Details of contributory causes;
- Details of any adverse effects that have occurred as a result of the pollution incident;
- A description of the measures implemented to mitigate adverse effects; and
- Any recommendations to reduce the risk of similar events occurring in future on the Site.

The PIRP(s) sets out actions in the event that monitoring identifies anomalous or unusual results when compared to the baseline data and/ or Environmental Quality Standards (Ref 53). The PIRP(s) will also describe the actions to be followed depending on the level of risk triggered.

References

Ref 1. Scottish Parliament, 2011. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) ('the CAR Regulations'). Available online: https://www.legislation.gov.uk/ssi/2011/209/contents/made.

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Appendix A Silt Management Options