FEARNA STORAGE

Fearna Pumped Storage Hydro Scheme

CAR Licence Report

Appendix A – Upper Reservoir Pollution Prevention Plan

September 2025

Quality Information

Prepared by	Checked by	Approved by
[redacted]		

Revision History

Revision	Revision Date	Details	Authorised
01	September 2025	Issue to SEPA	[redacted]

INTRODUCTION

This Outline Pollution Prevention Plan (PPP) has been drafted to support the SEPA CAR licence for the Fearna Pumped Storage Hydro Scheme (the Proposed Development).

The Proposed Development would involve the construction and operation of a new Pumped Storage Hydro (PSH) scheme with an installed capacity of up to 1800 Megawatts (MW), utilising Loch Fearna as the upper storage reservoir and Loch Quoich as the lower reservoir.

The maximum water level of Loch Fearna would be raised by constructing the Fearna and Coire Dubh dams to increase its natural storage capacity. Loch Quoich is already an established hydro reservoir and would not require modification to operate as the lower reservoir for the PSH. The reservoirs would be connected by an underground waterway system including two headrace tunnels.

Prior to construction commencing, a finalised PPP (or individual PPPs) would be required for all areas of the site. This document (or documents) would be drafted by the Principal Contractor who would also be responsible for ensuring that all works are implemented in accordance with the PPP(s). The Principal Contractor's fulfilment of commitments would be part of the overall compliance with the agreed final Construction Environmental Management Document (CEMD). Refer also to **Appendix B – Outline CEMD**.

It is expected that the areas of the Proposed Development site to be covered by separate finalised PPP chapters or documents would include but not be limited to the following:

- The Southern Access Route (SAR);
- The main site compound, SC1;
- Other access track works;
- The dams construction area including the Fearna and Coire Dubh dams, the upper control works and associated working areas, compounds and borrow pits;
- The powerhouse area and lower control works;
- The tunnelling works including adits and surge shafts; and
- The habitat compensation and enhancement works.

This outline PPP document is set out in two parts:

- Part One provides high level guidance and key considerations for the Proposed Development site; and
- Part Two includes significantly more detail on one part of the site in the form of an outline PPP specifically for the Fearna Reservoir works.

The initial Fearna Reservoir PPP provides a starting point for the Principal Contractor's final PPP on these works and sets out guidance on the minimum level of detail required for all PPPs across the site.

The PPP for the Fearna Reservoir works can only be considered as an outline plan as there is some information that would only be finalised once the Contractor's chosen working methods are known. This may include details relating to plant and machinery and the storage and handling of fuels and other hazardous substances.

SEPA's regulatory definition relating to water run-off from construction sites is as follows:

Construction sites that discharge water run-off to the water environment and:

a) cover an area greater than 4 hectares; or

b) contain a road (or track) greater than 5 kilometres in length; or

c) include any land with an area greater than 1 hectare that has a slope more than 25 degrees; or

d) include any road (or track) with a length greater than 500 metres that has a slope more than 25 degrees

will be authorised under a licence. You must apply for, and be granted a licence, before the activity can take place.

The Proposed Development also falls under the SEPA definition of “large and complex construction project” such that scale of the project would mean that a construction run-off licence would also be required from SEPA as part of the CAR licence, which would cover all aspects of the site works.

The final PPP would address all of the requirements of the licence as well as the project CAR licence covering all of the interfaces between the proposed construction and operation works and the water environment.

OUTLINE POLLUTION PREVENTION PLAN - PART ONE

Pollution incident response

The PPP will contain a site wide standard pollution incident response plan which would be designed prior to construction, and this would be adhered to should any incident occur, reducing any effects as far as practicable whilst also notifying the applicant's site team and SEPA without delay.

This document would be included in the final CEMD for the Proposed Development and cross referenced to each individual PPP document.

Good Practice Measures

Good practice measures in relation to pollution prevention would include adhering to the relevant Guidance for Pollution Prevention GPPs documents and a set of key principles:

(It is noted that SEPA PPGs Pollution Prevention Guidelines are being updated with Guidance for Pollution Prevention GPPs documents. The PPG may be referenced with a view to this being updated when the appropriate GPP reference is known).

The Principal Contractor's key principles for good practice on site would include, but not be limited to, the following:

- refuelling would take place at least 50 m from watercourses;
- foul water generated onsite would be managed in accordance with PPG4 or equivalent GPP;
- areas would be designated for production of concrete or washout of vehicles which are a minimum distance of 50 m from a watercourse;
- washout water would also be stored in the washout area before being treated and disposed of, or re-used in concrete production;
- if any water is contaminated with silt or chemicals, runoff would not enter a watercourse directly or indirectly prior to treatment;
- water would be prevented as far as possible, from entering excavations such as trenches and foundations;
- procedures would be adhered to for storage of fuels and other potentially contaminative materials in line with the Controlled Activity Regulations, to minimise the potential for accidental spillage; and
- Sediment build-up would also be monitored and when necessary, sediment would be removed for appropriate disposal in accordance with waste legislation, although this is likely to be a very infrequent requirement.

Good Practice Reference documents

The Principal Contractor would be required to adhere to the following Good Practice guidelines:

- SEPA Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Run-Off from Construction Sites September 2021;
- Scottish Environment Protection Agency (SEPA) Guidance for Pollution Prevention (GPP) and Pollution Prevention Guidance Notes (PPG) specifically: GPP 1, 2, 3, 5, 8, 13, 21 and 22, and PPG 6 and 7;
- CIRIA (2001) C532 Control of Water Pollution from Construction Sites; CIRIA (2015) C741 Environmental Good Practice on Site; CIRIA (2015) C753 The SUDS Manual. Available at: https://www.ciria.org/ ;
- SEPA (2010) Engineering in the water environment: good practice guide. Sediment Management. First edition. Available online at: https://www.sepa.org.uk/media/151049/wat-sg-26.pdf ;
- SEPA (2010) Engineering in the water environment: good practice guide. River Crossings. Second edition. Available online at: https://www.sepa.org.uk/media/151036/wat-sg-25.pdf ;
- SEPA (2009) Groundwater protection policy for Scotland. Version 3. Available online at: https://www.sepa.org.uk/media/60033/policy-19_groundwaternov09.pdf ;

- MarineScotland. (2021). Monitoring watercourses in relation to onshore wind farm developments: generic monitoring programme. [Online] Available at: https://www.gov.scot/publications/monitoring-watercourses-in-relation-to-onshore-wind-farm-developments-generic-monitoring-programme/ [Accessed in December 2023] ; *Guidance specific to large pumped storage hydro schemes does not exist and it is considered that pollution pathways would be similar to onshore wind farm development, thus the MarineScotland (2021) guidance on monitoring programmes for onshore wind farm developments is considered applicable.*
- SNH, SEPA and Scottish Renewables (2019) Guide to Hydropower Construction Good Practice. Version 3. Available online at: https://www.sepa.org.uk/media/34332/guide-to-hydropower-construction-phase-good-practice-guidance.pdf .

Potable Water & Foul Water Management

During the construction phase, site welfare facilities would be required at each of the work areas and these welfare units would require a potable water supply. This would either be brought to site by tanker or be provided by a private water supply abstraction, with prior approval from THC (and if required SEPA). The installation of a private water supply to service the works will require works in the water course which will need to be undertaken in a manner to ensure no pollution occurs either on initial construction or during the operation of the abstraction.

During the construction phase, all foul water generated from the welfare facilities would be collected and removed from site in a controlled manner onward for treatment and disposal at an appropriately licensed facility.

During the operational phase, subject to authorisation by SEPA, foul water would either be disposed via a package treatment plant, or to a septic tank or stored in a sealed tank prior to removal from site for treatment and disposal at an appropriately licensed facility. This system would likely be in operation for the closing stages of construction including the commissioning period.

It is anticipated that the final foul drainage management proposals would be agreed with consultees as part of the final CEMD.

Erosion and Sedimentation

The Proposed Development requires large earthworks operations and track construction across the site. This means that undertaking these works in accordance with good practice measures is essential to avoid erosion and subsequent sedimentation entering local water courses. As a minimum the following measures would form part of the PPP to avoid pollution through erosion and sedimentation:

- All stockpiled materials would be located outwith a 50 m buffer from watercourses,;
- Water would be prevented, as far as possible, from entering excavations such as trenches and foundations through the use of appropriate cut-off drainage;
- Where the above is not possible, water would pass through silt / sediment traps or lagoons as required to remove silt prior to discharge into the surrounding drainage system;
- Clean and dirty water onsite would be separated using settlement lagoons where appropriate, and dirty water would be filtered before entering the water environment;
- Silt fences and other Environmental Protection Measures (EPM)s would be deployed as required to reduce sediment transport;
- The amount of ground exposed, and time period during which it is exposed, would be kept to a minimum;
- Silt / sediment traps, single size aggregate, geotextiles or straw bales would be used to filter any coarse material and prevent increased levels of sediment. Further to this, activities involving the movement or use of fine sediment would avoid periods of heavy rainfall where possible; and
- The ECoW and the Principal Contractor’s environmental representatives would carry out regular visual inspections of watercourses and water sampling to check for suspended solids in watercourses downstream of work areas.

Construction Works Areas Management

The following measures are proposed to mitigate the effects of the construction of the dams, powerhouse and other major work elements with a specific focus on preventing pollution:

- Advanced planning of any necessary de-watering measures for the main works areas, where the proposed dams, powerhouse and upper & lower control works excavations have potential to intercept larger quantities of water would be undertaken. This may also be appliable to other local cofferdams or cut offs intercepting areas of high ground water. These advanced planning measures would be designed to either prevent significant groundwater inflows or manage significant amounts of water with appropriate treatment using settling ponds and other treatment if necessary, prior to discharge;
- Where smaller scale excavations for foundations encounter localised and limited quantities of groundwater or become flooded due to surface water runoff or heavy rainfall, appropriate treatment of dewatering would be instigated under direction of the site ECoW;
- No de-watering discharge would be permitted directly adjacent to watercourses;
- Unless directed otherwise by the site ECoW, dewatering discharge would drain across buffer areas of vegetation of at least 20 m width, which would provide for natural attenuation and dispersal of the flow and removal of silt;
- The dewatering discharge flow rate would be set so as not to overwhelm the areas of vegetation, with use of multiple buffer areas as required;
- Where no suitable vegetation is available for natural treatment of dewatering, the discharge would be passed through on-site settling tanks / lagoons or other treatment as necessary, prior to discharge by soakaway or to watercourse; and
- The requirement for dewatering, and subsequent pollution risk this brings, would be minimised in all locations by timely and efficient excavation of the foundation void and subsequent concrete pouring and backfilling.

All procedures for dewatering would be agreed by the Principal Contractor with SEPA, THC and NatureScot, and detailed in the CEMD.

Concrete Batching, Transport and Pouring

The Principal Contractor would develop a method statement to address the transport, transfer, handling and pouring of liquid concrete at foundation sites.

In relation to minimising the risk of a pollution incident from works involving concrete batching, transport and pouring, the following mitigation would be adopted:

- Where concrete transfers are required, measures would be adopted at the point of concrete transfer to prevent accidental spillage of liquid concrete and no transfers would be undertaken in proximity to watercourses or areas of standing water;
- There would be no wash-out of concrete carrying vehicles (except the concrete chute) with wash-out undertaken at the nearest compounds where suitably bunded / protected facilities would be provided. Chutes would be washed out to a suitable container, allowed to settle and disposed of at suitably licensed facilities or reused in concrete production;
- Excess concrete or wash-out liquid would not be discharged to drains or watercourses. Drainage from washout facilities would be collected and treated or removed to an appropriate treatment point / licensed disposal site; and
- Vehicles and plant working at foundations would be confined to the area required for safe working only to prevent compaction, rutting and habitat damage to adjacent areas of land.

PART TWO

Fearna Reservoir Draft Pollution Prevention Plan

Background

This draft plan has been prepared to set out the proposed outline pollution prevention measures for the Fearna Reservoir working area. This PPP includes the high-level proposed methodology for the construction sequencing which is important to understand when specific pollution prevention measures require to be installed in advance. This draft plan also outlines why it is considered beneficial to temporarily lower the water level in Loch Fearna during construction, to aid pollution prevention measures and to lessen potential permanent impacts to wider habitat areas out with the reservoir footprint.

The proposed Fearna and Coire Dubh dams have been designed as rock fill gravity dams. The volume of rock fill required for both dams would be in the order of 9Mm^3, which would be sourced locally adjacent to the dams from borrow pits within the footprint of the reservoir.

Whilst building the dams it is considered crucial to minimise the overall footprint of the reservoir works which in turn would minimise the potential impacts on local montane peatland and other valuable montane habitats.

It is also recognised that significant working areas need to be provided adjacent to the dams. These working areas would allow for the installation of appropriate Environmental Protection Measures (EPMs) and include areas for processing the rock from the borrow pits which would be required to supply the rockfill for the dam.

For a layout of the works proposed at the Fearna Reservoir site, refer to **Plate 1** below.

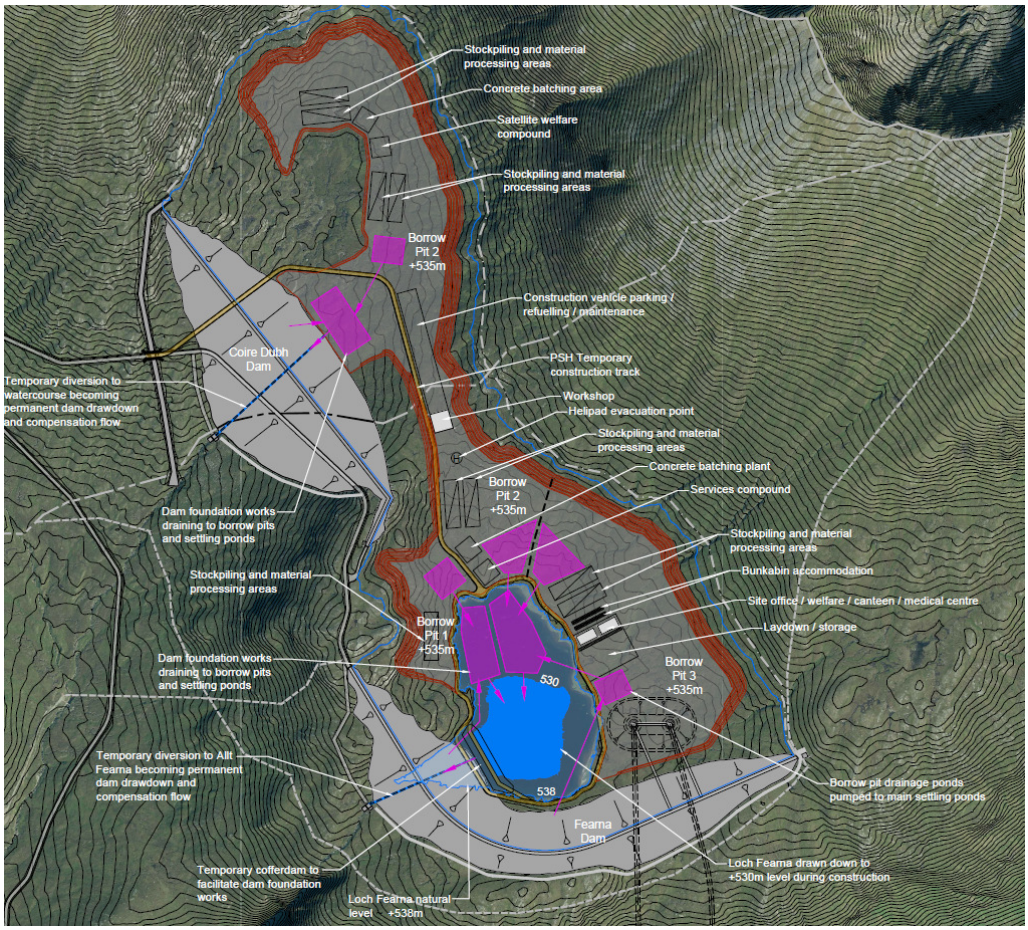

Plate 1 - Fearna Reservoir Works Area Layout

To construct the Fearna Dam, Loch Fearna would be drawn down from its natural level of approximately +538m to +530m by over pumping the water directly to the Allt Fearna. This would allow the construction of a temporary cofferdam along the toe of the dam and create areas for settlement lagoons within the current loch footprint. The over pumping would continue until the dam diversion works were completed.

During over pumping, a secondary pump system would remain on standby for redundancy and also to provide additional capacity in the event of high inflows.

The apparent ground conditions in the locality of the proposed dam drawdown and compensation facility are favourable, with exposed bedrock evident within the Allt Fearna and adjacent to it. The current dam design therefore shows a low-level stainless steel pipe cast in to the bedrock, which will provide the temporary diversion of the Allt Fearna through the dam. This pipe will then become the permanent drawdown and compensation flow facility.

The drawdown requirement of the dam will be in excess of the Fearna catchment's natural 1:1000yr flood flow, therefore the diversion pipe will be capable of passing these flows without requiring attenuation upstream.

The Coire Dubh dam follows a similar design to Fearna Dam, with a cast-in low level pipe providing the temporary diversion during construction, which would then become the permanent drawdown and compensation facility.

With no existing water body, no over pumping is required. The Allt Mheil tributary which outflows from Coire Dubh would however continue to follow its natural course until the diversion pipe was installed adjacent, after which the burn would be diverted through the pipe. Again, this pipe would have capacity in excess of the 1:1000yr flow and no attenuation would be required.

Borrow Pits

It is proposed that the rock borrow pits be located within the footprint of the proposed reservoir outline but above the existing lochan shoreline, as shown in **Plate 1** above.

Significant additional temporary works compounds and stockpiling areas would also be required in order to stockpile and process rock taken from the borrow pits and it is proposed that these are also located within the reservoir as shown on **Plate 1**. This minimises the overall footprint of the temporary and permanent works, as the temporary works are located within the permanent inundation area.

Drawing down Loch Fearna

In order to construct the Fearna dam and upper control works, it is proposed to draw down the level of the existing Loch Fearna during the construction period by approximately 13m, from 538m AOD to 525m AOD.

Drawing down the existing Loch would have several beneficial effects:

1. It would facilitate simpler access to the dam foundations and upper control works while avoiding the need for large works areas out with the reservoir footprint.
2. The working areas provided would eventually lie within the permanent reservoir footprint and would be located below minimum final water levels. This would mean that by containing the temporary working areas within the reservoir low water inundation zone the impacts in both construction stage and the longer-term impacts of the works footprint would be minimised.

The level of the loch would be reduced by around 13m, at a surface level of approximately 525m AOD.

All of the Fearna Reservoir works areas and borrow pits would be drained to settling lagoons which would then pass clean water by gravity to the lowered loch.

To maintain the drawn down level, the loch would be over-pumped into the burn discharging downstream of the loch, the Allt Fearna. The over pumping discharge would be closely monitored. Water entering the loch, even in the drawn down situation, should be pollutant free but in the case of an incident it may be that discharge requires additional treatment prior to pumping.

Some allowance would be made in the management of the loch levels, in the order of 3m of allowable local loch level rise, to allow water level rise due to rainfall run off from the reservoir catchment in wet weather. A 3m rise in the loch level would provide flood storage for the small catchment. This measure would help provide a further way to minimise the risk of pollutants entering the downstream burn.

Construction Methodology

The detailed proposals for the borrow pits and works areas and drainage measures would be contained in the finalised CEMD and preliminary proposals for all of these works associated with the Leamhain dam are discussed below in the draft construction sequence.

Measures for silt management will be fully outlined in the finalised PPP.

Primary settling lagoons would be located in each of the borrow pits, which would be isolated from the watercourses. Treated run-off would be pumped to the secondary settling lagoons prior to discharge into the loch. The loch would contain significant rainfall run off events as described above.

Draft Construction Sequence

A Draft Construction Sequence is provided below:

i. The works would commence with access track being driven from the C1144 to the upstream toe of the dam Fearna dam, as shown in **Plate 1**.
ii. Appropriate measures to mitigate impact on the aquatic ecology of the loch would be carried out.
iii. Drainage management EPM measures would be installed to prevent silty run off from entering the loch.
iv. The initial pumping set up would be established to commence lowering of the loch.
v. Initial stripping of peat topsoil and peat would be carried out with some of the material used for the settling lagoons and to line ditches for silt management measures, remaining peat would be removed for use in reinstatement and peatland restoration elsewhere within the site as detailed in the Section 36 planning application EIA report at Appendix 2.3_Mass Balance Strategy and Borrow Pit Plan[1].
vi. Overburden in the borrow pits and dam foundation areas would be removed as required and used to level the site compounds and form the settling lagoons.
vii. Once rockhead is exposed in the borrow pits, rock removal would commence and rock would be transported within the reservoir footprint for processing and selection for the dam works.
viii. Similarly, the dam foundations would be stripped with superficial materials above rock head being used to form level the site compounds and form the settling lagoons.
ix. Rockfill would then be progressively extracted / worked from the borrow pits, most likely by blasting then clearing, with stone being moved for processing and selection.
x. Spoil material from the rock processing and selection is estimated to be in the order of 10% of the total volume extracted.
xi. This spoil material would be returned to the borrow pit as backfill once the borrow pit had reached its lowest level.

The following list sets out further details of the Pollution Prevention Measures relating to the works at Fearna Reservoir site which would be developed further in the finalised PPP.

- Any fuel that would be required to be stored at the Fearna Reservoir site above ground on-site would be in bunded storage containers;
- Emergency spill response kits would be provided during the construction works;

[1] https://fearnastorage.co.uk/documents/

- A reduced speed limit would be used on the tracks to minimise the likelihood and significance of any collisions on the haul roads;
- Drip trays would be placed under all plant which could potentially leak fuel / oils;
- Any water contaminated with silt or chemicals would not be discharged directly or indirectly to any watercourse, whether the loch or the downstream burn, without prior treatment; and
- Foul water from the site compound would be collected in blind tanks for offsite disposal at an appropriately licensed facility.

Wet Weather Protocol

A wet weather protocol would be developed for the Fearna Reservoir works. This would detail the procedures to be adopted by all staff during periods of heavy rainfall.

The buffer zone in Loch Fearna for additional run off would minimise the risk that working areas might be inundated, but if there is a risk, then these areas would be restricted. The inspection and maintenance regime of the sediment and runoff control measures would be crucial during these periods of high rainfall.

In extreme cases, the above protocol would dictate that work onsite may have to be temporarily suspended until weather / ground conditions allow, with appropriate maintenance of EPMs ensured.

Monitoring

The importance of managing water quality through monitoring of the drawn down Loch Fearna before and during the construction phase has been highlighted above. Monitoring would ensure that none of the tributaries to the loch, the loch itself or the loch outflow would be carrying pollutants or suspended solids, in line with SEPA and MarineScotland guidance.

Monitoring would be carried out at a specified frequency (depending upon the construction phase) on these catchments. This would be set out by the Contractor in the finalised PPP.
Monitoring would continue throughout the construction phase, and for at least a year after construction. Monitoring would be used to allow a rapid response to any pollution incident as well as assess the impact of good practice or remedial measures. Monitoring frequency would take place at intervals no greater than one month and would increase during the construction phase if remedial measures to improve water quality were implemented. Sampling of selected parameters, e.g. pH and turbidity would occur more frequently and can be undertaken in-situ by the ECoW. Ex-situ water analysis would be undertaken by an appropriately qualified laboratory.

Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) would be adopted where possible recognising the challenging constraints of the Fearna Reservoir working area, but utilising settling ponds in each area as well as the drawn down lochan to control flow and settle out solids from any runoff. SuDS techniques aim to mimic pre-development runoff conditions and balance or throttle flows to the rate of runoff that might have been experienced prior to development. In general, good practice in relation to the management of surface water runoff rates and volumes and potential for localised fluvial flood risk would be implemented, via the finalised PPP and CEMD.