

CAR Licence Supporting Documentation

Balliemeanoch Pumped Storage Hydro

ILI (Borders PSH) Ltd

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Quality information

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Abbreviations

AEP	Annual Exceedance Probability
AIL	Abnormal Indivisible Loads
AIS	Air insulated switchyard
AOD	Above Ordnance Datum
BoCC	Birds of Conservation Concern
BRS	Bat Roost Suitability
BWL	Bottom Water Level
CEMP	Construction Environmental Management Plan
CFRD	Concrete Faced Rockfill Dam
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DMRB	Design Manual for Roads and Bridges
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
FRA	Flood Risk Assessment
GDL	Gardens and Designed Landscape
GHG	Greenhouse gas
GVA	Gross Value Added
GW	Gigawatt
GWDTE	Groundwater Dependent Terrestrial Ecosystems
GWh	Gigawatt hours
ha	Hectares
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HEP	Hydro-electric power
HV	High Voltage
HWLDP	Highland Wide Local Development Plan
ILI	Intelligent Land Investment
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
km	Kilometre
kV	Kilovolt
l / s	Litres per second
L&V	Landscape and Visual
LBAP	Local Biodiversity Action Plan
LCT	Landscape Character Type
LDP	Local Development Plan

LEMP	Landscape Ecological Management Plan
LLA	Local Landscape Area
LVIA	Landscape and Visual Impact Assessment
m	Metre
m / s	Metres per second
m ³ /s	Cubic metres per second
MARPOL	International Convention for the Prevention of Pollution from Ships
MIV	Main Inlet Valve
mm	Millimetre
MOL	Minimum Operation Level
MPA	Marine Protected Areas
MW	Megawatts
MWh	Megawatt hours
N/A	Not applicable
NGR	National Grid reference
NPF4	National Planning Framework 4
oCEMP	Outline Construction Environmental Management Plan
PC	Permanent Compound
PM	Project Manager
PMF	Probable Maximum Flood
PMF	Priority Marine Feature
PSH	Pumped Storage Hydro
PWS	Private Water Supply
Qmed	Median annual maxima flood
RBMP	River Basin Management Plans
RLB	Red Line Boundary
SAC	Special Areas of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environment Protection Agency (SEPA)
SPA	Special Protection Area
SSE	Scottish and Southern Electric
SSEN	Scottish and Southern Electricity Networks
SuDS	Sustainable drainage systems
TC	Temporary Compound
TWh	Terawatt-hour
TWL	Top Water Level
UK	United Kingdom
WCA	Wildlife and Countryside Act

WFD	Water Framework Directive
WMP	Water Management Plan
WMP	Water Management Plan
ZVT	Zone of Theoretical Visibility

1. Introduction

1.1 Background Information

ILI (Borders PSH) Ltd (hereafter referred to as 'the Authorised Person') is proposing to construct and operate a Pumped Storage Hydro (PSH) scheme, to be known as the Balliemanoach PSH scheme (referred to throughout as the 'Proposed Development'), located within Argyll & Bute Council administration region as shown in Figure 1 - Location Plan. A Water Environment (Controlled Activities) (Scotland) Regulations 2011 Licence (or CAR Licence) is being sought by the Authorised Person for the Proposed Development.

The application for a CAR Licence is being prepared on behalf of the Authorised Person by AECOM Ltd, (hereafter referred to as 'the Applicant').

Consent under Section 36 of the Electricity Act 1989 has also been sought by the Authorised Person and the documents associated with this application are available here:

[Scottish Government - Energy Consents Unit - Application Details](#)

1.2 The Authorised Person

The Authorised Person is a clean energy developer who has been developing renewable energy projects for over 15 years. This has included onshore wind, solar and run river hydro schemes, with their focus now on energy storage.

1.3 The Need for the Project

Through the provision of energy storage, PSH can play a crucial role in creating a flexible electricity system. PSH operates by utilising two water reservoirs: the Tailpond and the Headpond. During periods of low electricity demand, when the cost of electricity is reduced, water is pumped from the Tailpond to the Headpond. Then, when demand is high and electricity is required, water is released from the Headpond back to the Tailpond. This water passes through turbines, generating electricity.

Although not a renewable energy technology itself, PSH can complement renewables and mitigate potential issues related to variability in renewable energy sources (Scottish Renewables, 2023). As renewables such as wind turbines and solar arrays operate based on environmental conditions (e.g. wind speed or daylight), the timing of their electricity generation may not always align with periods of high network demand. PSH helps address this imbalance, contributing to a more flexible and resilient energy system.

The Proposed Development will have a storage capacity of approximately 10,800 megawatt hours (MWh) subject to final configuration of the Headpond, with approximately 900 megawatts (MW) of installed electrical generating capacity and up to 900 MW of installed electrical pumping capacity (both subject to final turbine selection), with an average gross head (vertical distance between Headpond and Tailpond) of approximately 365 m. The Proposed Development is categorised as one of the eighteen National Developments identified in the Scottish Government's National Planning Framework 4 (NPF4) as it is a PSH scheme. These developments are prioritised due to their role in transitioning from fossil fuels towards a net zero economy and supporting the strategy and spatial principles of NPF4.

1.4 Policy and Planning

A number of energy legislation and policy documents provide the context for the development of PSH, including:

- Climate Change (Scotland) Act 2009 and Climate Change (Emissions Reduction Targets) (Scotland) Act 2019;
- The Climate Change (Scotland) Act 2009 (Interim Target) Amendment Regulations 2023;
- Scottish Emissions Targets - First Five-yearly Review & Progress in Reducing Emissions in Scotland – 2022 Report to Parliament (2022);

- Equality, Opportunity, Community - Our Programme for Government September 2023 (2023);
- Update to the Climate Change Plan 2018 - 2032: Securing a Green Recovery on a Path to Net Zero (2020); and
- Scottish Energy Strategy (2017) and Draft Energy Strategy & Just Transition Plan (2023).
- The Energy Security Act 2023;
- Climate Change Act 2008 (as amended);
- Climate Change Committee – Progress in Reducing Emissions – 2023 Progress Report to Parliament;
- British Energy Security Strategy – Secure, Clean and Affordable British Energy for the Long Term;
- Argyll and Bute Local Development Plan 2 (2024);
- Committee on Climate Change – The Sixth Carbon Budget, the UK’s path to Net Zero; and
- National Planning Framework 4 (NPF4).

1.5 Structure of CAR Licence Submission

The Proposed Development has a number of Controlled Activities. Detail of the Proposed Development and the activities can be found in Section 3.

The following information sets out the structure of the CAR Licence submission:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 Licence Application Form A
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 Licence Application Form D

CAR Licence Supporting Documentation Report:

Chapter	Title
Chapter 1	Introduction
Chapter 2	Methodology
Chapter 3	Evolution of Design and Alternatives
Chapter 4	The Proposed Development
Chapter 5	Water Management
Chapter 6	Effects on Biodiversity - Aquatic
Chapter 7	Effects on Biodiversity - Marine
Chapter 8	Effects on Biodiversity - Land
Chapter 9	Effects on Economy
Chapter 10	Effects on Health and Safety
Chapter 11	Effects on Recreation
Chapter 12	Effects on Visual Amenity and Landscapes
Chapter 13	Effects of Economic Opportunities for Disadvantaged Groups
Chapter 14	Effects on Climate Change
Chapter 15	Summary of Positive and Negative Impacts
Appendix A	Figures
Appendix B	Water Resource Assessment
Appendix C	Outline Construction Environmental Management Plan
Appendix D	Outline Water Management Plan

2. Methodology

2.1 Overview

The key topics that will be assessed by the Scottish Environment Protection Agency (SEPA) as part of a CAR Licence application have been assessed in accordance with the SEPA Supporting Guidance (WAT-SG-67).

This guidance (WAT-SG-67), according to SEPA, is to be followed when determining whether a controlled activity should be authorised. Social, Economic and Environmental considerations are to be reviewed, following the guidance, and the significance of both positive and negative impacts are to be determined.

The following report has been drafted based on the chapters within the guidance document so to address the areas of concern SEPA have highlighted and to ensure this is all available within one supporting document.

The Applicant has also made reference throughout the report to the Section 36 Environmental Impact Assessment report (EIAR).

3. Evolution of Design and Alternatives

3.1 Introduction

This chapter sets out the alternatives considered by the Applicant and the evolution of the design that has led to the Proposed Development as it is described in Chapter 4: The Proposed Development.

Under Schedule 4, Paragraph 2 of the Electricity Works (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2017 (the “EIA Regulations”), *developers are required to provide “a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”*

3.2 Alternative Location

The Proposed Development was identified as part of a Scotland wide review of potential PSH locations conducted by the Applicant. There is a precedent for renewable energy generation in the Argyll and Bute region and specifically for PSH. The topography and geology of Loch Awe provide suitable conditions for PSH in this location.

Consideration was given to the option to increase capacity of existing schemes as part of a review of alternatives. However, the Applicant is not the owner of any existing assets that could be expanded upon. The nearby Cruachan scheme was already being investigated, and no other suitable PSH sites were identified that would fit with both the project and Applicant’s needs or ability to develop due to ownership.

The potential of the Proposed Development Site for PSH was determined by the Site having the following characteristics:

- Significant topographical variation: A substantial height difference over a relatively short horizontal distance is needed to allow for effective energy storage and release. The Proposed Development Site benefits from a height differential of approximately 365 m between the proposed upper and lower reservoirs, which enables efficient generation using less water.
- Proximity to a large water body: At least one suitable existing water body is typically required to minimise construction complexity and environmental impact. The Proposed Development utilises Loch Awe as its Tailpond, which provides a naturally suitable lower reservoir without requiring the creation of an entirely new loch or reservoir.
- Grid connection potential: The Proposed Development Site lies close to existing grid infrastructure, approximately 4.00 km north-east of the Site.

Section 3.4 Design Evolution provides further details on the on-site location alternatives of the Proposed Development components and how the spatial orientation of these have progressed through design evolution.

3.3 Alternative Technology

There are few, if any, energy storage technologies which can provide the grid scale services of Pumped Storage Hydro. Alternative storage technologies are either too small (batteries) to provide the necessary long durations required, or largely unproven (compressed air) and in the case of ancillary grid services such as fast response, more carbon intense (open cycle gas).

PSH schemes provide benefits by balancing the electricity supply and demand. Recharge occurs at periods of low demand and stores excess energy generated by baseload and intermittent power stations so that this energy can be re-released at peak times. This is especially beneficial in Scotland where an increasing percentage of electricity is coming from wind power, the delivery of which is intermittent and therefore PSH schemes support renewable energy generators by providing greater stability to the grid, reducing constraints on wind and solar generation in particular. PSH can also provide ancillary services to the grid.

The Proposed Development will have a storage capacity of approximately 10,800 megawatt hours subject to final configuration of the Headpond, with approximately 900 megawatts of installed electrical generating capacity with an average gross head (vertical distance between Headpond and Tailpond) of approximately 365 m.

3.4 Design Evolution

The Proposed Development has evolved through an iterative design process where the design has been progressed in parallel with the EIA process through consideration of engineering feasibility, environmental constraints and consultation responses. This has resulted in the submitted design, and where possible, mitigation has been integrated into the design to reduce any potential significant effects from the Proposed Development on identified receptors. Consultation responses, stakeholder feedback, public consultation and collation of baseline survey results have also all influenced the final submitted design for the Proposed Development. The design has evolved through consideration of engineering feasibility, environmental constraints and overall operational output.

Iteration I: The initial design iteration had the following key features: the Headpond had one embankment, access followed existing forestry tracks off of the A819, secondary access followed the Blarghour Wind Farm access, and the requirement for a Marine Facility was identified. Traffic studies indicated access of the A83 to A819 through Inveraray Castle and access from the Marine Facility along the Upper Avenue was required to relieve the impact on the local network.

Iteration II: The second design iteration incorporated two new embankments to increase the capacity of the scheme, and a high-level environmental assessment was undertaken. Embankment 1 was reduced from the initial 110 m to 92 m elevation to reduce landscape and visual (L&V) effects, two possible switching station locations identified, eight construction compounds avoiding key sensitive receptors identified, and the location of the intake tower within the Headpond identified.

Iteration III: Feedback from consultees and discipline specialists, bathymetric surveys, and topographic surveys influenced the third iteration, which included: removing Embankment 3 and the intake tower to reduce the L&V impacts, temporarily diverting the B840 to accommodate the Tailpond inlet / outlet structure, moving compounds and Tunnel Portals, and realigning Access Tracks.

Iteration IV: The results of public consultations led to the fourth iteration, which contains the following updates: redesigning the jetty within the Marine Facility and additionally making it temporary to reduce L&V impacts, changing the location, layout and purpose of particular construction compounds, and making the Access Tracks more palatable for the public by incorporating benches and signage to accommodate recreational use.

Iteration V: The fifth iteration, following design workshops, involved: realigning Access Tracks for L&V purposes and to avoid ecological receptors and areas of deep peat, refining the Marine Facility jetty, relocating, repurposing, and / or reorientating compounds for L&V purposes and the impact on ecological receptors, integrating landscape and habitat restoration proposals to strengthen the landscape fabric and screening of the Site, and including a borrow pit in the Headpond.

Iteration VI: Prior to the submission of the Section 36 Consent application, minor design changes to the Access Tracks were undertaken.

Iteration VII: After receiving comments from a number on consultees regarding water levels and flows within Loch Awe during operation of the Development, the design was re-evaluated to manage water levels within a more appropriate range. This resulted in a reduction to the size of the Headpond, staying within the footprint / envelope of the design submitted with the original s36 application, and a resulting reduction of the size of both Embankments. The borrow pit location has also been moved.

3.5 Detailed Design and Optimisation

The engineering design process resulting in the Section 36 Application design has been undertaken in accordance with set design principles and engineering standards, therefore safety is inherent within the design of the Proposed Development. For instance, the design, construction and operation of the embankments will be in accordance with the requirements of the Reservoirs (Scotland) Act 2011.

There will be elements of the Proposed Development that will be subject to detailed design informed by further site investigation works, confirmed operational requirements and the working practices and methodology of the Construction Contractor. At this stage the construction materials and methods will be finalised.

During detailed design there is also the potential for engineering improvements and optimisation, such as a smaller, split or relocated Power Cavern Complex.

The Proposed Development has the potential to generate both more or less unsuitable / excess material than is anticipated. Post consent, once further site investigation works have been undertaken, the detailed design will be undertaken which will look to balance the materials in the same way the preliminary design has done. There may be potential to develop the design of the Headpond as required as a result of insufficient or excess material and this would be the primary method of maintaining a materials balance.

3.6 Embedded Mitigation

Mitigation which is included in the design of the Proposed Development, such as the measures described in **Section 3.4 Design Evolution** of this chapter, and mitigation implemented through standard control measures routinely used, such as working within good practice guidance during construction (management measures), are known as embedded mitigation.

This embedded mitigation has been assumed to be in place from the outset, as it is mitigation which the Proposed Development would employ in any event and without which the Proposed Development would be unlikely to be granted consent or allowed to commence.

A comprehensive list of the embedded mitigation assumed within the assessments reported across the Proposed Development is set out the Mitigation Register appendix in the EIAR.

Construction Environmental Management Plan

An Outline Construction Environmental Management Plan (oCEMP) has been prepared as part of the Section 36 Application and is available in **Appendix C Outline Construction Environmental Management Plan**.

The oCEMP sets out the environmental management framework to be adopted during the Pre-Construction and Enabling and Construction phases, and measures to be implemented to minimise construction environmental impacts. The oCEMP covers:

- Construction noise;
- Emergency response and flood risk management plan;
- Waste management plan;
- Dust management;
- Ecological management plan;
- Biosecurity measures;
- Pollution prevention; and
- Tree protection during construction.

The standard good practice measures for the above topics, set out within the oCEMP, are considered to be embedded mitigation and assumed to be in place within the construction effects assessments contained within **Chapters 6-18 of the EIAR**. Where applicable, specific measures may also have been identified within the EIAR topic chapters and included in the oCEMP as additional mitigation.

The oCEMP will be updated post-consent on the appointment of the Construction Contractor and in consultation with Argyll & Bute Council, NatureScot, SEPA and other relevant consultees, where appropriate, to produce a Construction Environmental Management Plan (CEMP). Throughout the Pre-Construction and Enabling and Construction Phase of the Proposed Development, the CEMP will remain a live document which is updated as circumstances, policies and best working practices change.

4. The Proposed Development

4.1 Introduction

This chapter provides a description of the Proposed Development Site, the Proposed Development and its surrounding environment, including the Controlled Activities under the CAR Licence application. It also provides an overview of the likely construction methods, an indicative construction programme, including the Pre-Construction and Enabling Phase, and an overview of the Operational and Decommissioning Phases of the Proposed Development.

4.2 Site Description

The Balliemeanoch PSH Scheme is located in the Argyll and Bute local authority area of Scotland, approximately 4.4 km to the south of the village of Portsonachan and 9km northwest of Inveraray and covers an area of approximately 3,105 ha. The scheme lies within the community council areas of Glenorchy & Innishail for the main Proposed Development Site and Inveraray for the associated enabling works, and the location is shown in **Figure 1 – Site Location**. The Proposed Development Site is generally characterised by upland moorland plateau grazing land. The Headpond location sits at approximately 360 m above ordnance datum (AOD) and 3 km to the east of Balliemeanoch Farm Steading, with Loch Awe acting as the Tailpond.

The Proposed Development is predominantly located within the catchment of the Allt Beochlich watercourse. The catchment consists of a number of small streams, which ultimately flow into Loch Awe, these originate from smaller lochs (Airigh, Dubh and Romach).

4.3 Details of Development

The Proposed Development will provide a storage capacity of around 10,800 MWh, subject to the final Headpond configuration. It will have approximately 900 MW of installed generating capacity and up to 900 MW of pumping capacity, dependent on the final turbine selection. The scheme will operate with an average gross head — the vertical distance between the Headpond and Tailpond — of approximately 365 metres.

The proposed Headpond is located to the north of Lochan Airigh, which sits in the valley between Cruach na Gearr-Choise to the east and an unnamed summit (circa 470 m AOD) to the west. The Headpond will be constructed using existing topography and two artificial embankments, and will hold approximately 15.0M m³ of water. Of this 14.68M m³, will be the working volume for the scheme.

The Headpond also includes an Emergency Spillway, the Upper Gate House, and the Headpond Inlet / Outlet structure, all described below. A Borrow Pit is also located within the Headpond to provide material for embankment construction and will be underwater when the Headpond is full (described below).

The Proposed Development has been progressed alongside broader engagement on the potential for effects on water levels in Loch Awe, and mitigation has been proposed whereby operational conditions will ensure that water levels in Loch Awe remain within the historic range.

The construction and operation of the Proposed Development will require a number of Control Activities including both Primary and Secondary Activities. The Primary Activities form the primary elements of the Proposed Development and consist of the Impoundment Licence of the Headpond and the Abstraction Licence for the operation of the Proposed Development and the transfer of water between the Tailpond and Headpond.

Secondary licence includes surface water drainage from any new hardstanding of heavily compacted area, water course crossings, any discharges from foul drainage system or any other engineering works within watercourse or waterbodies.

This document focuses on the Primary Licence and further applications will be submitted as the Proposed Development progresses through detail design for the Secondary Licences. Where possible elements relating to the Secondary Licences will be designed to comply with General Binding Rules

Not all details of the Proposed Development have been described in this section, just those relating to the Controlled Activities taking place.

The following section should be read in conjunction with the Proposed Development figures provided in **Appendix A**. The Appendix includes the following figures:

- Figure 1 – Site Location
- Figure 2a-e – Surface Water and Groundwater Receptors Wider Context
- Figure 3a-b – Above Ground Infrastructure
- Figure 4 – Development Cross Section
- Figure 5 - Outline Access Management Plan
- Figure 6 - Headpond Inlet / Outlet Structure
- Figure 7 – Headpond Arrangement Plan
- Figure 8 – Headpond Cross Section
- Figure 9 – Headpond Embankment Typical Detail
- Figure 10 – Tailpond Inlet/Outlet Structure Plan
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- Figure 13 – Power Tunnel - Plan and Section
- Figure 14 – Waterways – Plan and Sections
- Figure 15a-d – General Arrangement – Access Routes

Headpond

Headpond Waterbody

The Headpond is designed to have a working volume of 14.68M m³.

The working bottom water level (BWL) will be 374 m AOD, and the working top water level (TWL) will be 420 m AOD giving a maximum operational drawdown of 46 m.

Details of the embankments can be seen in **Figures 7 and 8 in Appendix A**.

Embankments and Spillway

Two retaining structures will retain the Headpond waterbody, as follows:

- Embankment 1 – the larger of the two water-holding embankments will be located on the western side of the proposed waterbody, and is approximately 1,052 m long, 228 m wide and up to 63 m high, with an estimated volume of 4M m³.
- Embankment 2 – the smaller of the embankments will be located on the northwestern side of the proposed waterbody, and is approximately, 242 m long, 42 m wide and 9.4 m high, with an estimated volume of 34,000 m³.

The two embankments will be Concrete Faced Rockfill Dams (CFRD). The external slopes (dry side) of both embankments will be finished with soil and turf, with Embankment 1 having horizontal benching. The inner slopes (wet side) will be lined with concrete. However, the rest of the Headpond (existing ground surface) will not be lined. Details of the embankments can be seen in **Figure 9 in Appendix A**.

The Emergency Spillway is an overtopping weir constructed within Embankment 1 and is to be only used in emergency scenarios where TWL limit is breached. Water would overtop Embankment 1 and drain into an unnamed tributary of Allt Beochlich.

Borrow Pit

The Headpond will include one Borrow Pit Search Area within its footprint. This is an area designated for the acquisition of material to be used in the Construction Phase of the Proposed Development for the embankments and compounds. The Borrow Pit is expected to yield approximately 4.5 Mm³ (unbulked) of stone. The borrow pit floor measures approximately 365 m x 346 m and has a maximum cut height of 58 m.

The Borrow Pit Search Area will not be infilled on completion of Construction and will be inundated once the Headpond is filled with water.

Headpond Inlet / Outlet Structure

The Headpond Inlet / Outlet structure is where the Waterways will connect with the Headpond. The structure will predominantly sit within an excavated inlet trench near the base of the Embankment 1. A plan and section for the Headpond Inlet / Outlet Structure can be seen in **Figure 6 in Appendix A**.

This structure will incorporate the Inlet / Outlet for the low-pressure headrace tunnel and will predominately sit below the bottom water level of the Headpond, with the top of the structure accessible when the Headpond is drained to BWL of 374m AOD. However, the headrace tunnel will remain approximately 10m below the bottom water level to prevent air from getting entrapped and/or turbulence to form in the Waterway.

The structure will comprise a trashrack (debris screen), stoplog (to allow Waterway maintenance), and a deck area with a parapet wall around the deck with an access point. The structure will be approximately 90 m in length, 20 m in height and 30 m wide, at its widest point. Rock armour will be located either side of the trashrack behind the deck.

Tailpond

Tailpond Waterbody

The Tailpond for the PSH scheme will be Loch Awe, which is a 38.5 square kilometre freshwater loch, with a volume estimated at 1,200M m³.

Tailpond Inlet / Outlet Structure

The Waterways will terminate at the Tailpond Inlet / Outlet Structure situated on the eastern bank of Loch Awe.

The Inlet / Outlet Structure will be approximately 18.2 m deep (within the bank of Loch Awe) and extends approximately 80 m into Loch Awe from the lower gatehouse. The majority of the structure is either sub-surface within the bank of Loch Awe or beneath the water level of the Loch. The Inlet / Outlet Structure consists of screens, a stoplog and rock armour. As with the Headpond Inlet / Outlet Structure, the Tailpond Inlet / Outlet Structure will remain below the BWL of Loch Awe at all times.

The screens will be approximately 74 m wide and 19 m high. To avoid fish and debris entrainment, the screens have been designed according to SEPA best practice guidance to maintain discharge and approach velocities to less than 0.15 m/s. The screen also acts as an energy dissipation measure to reduce the velocity of the water discharging from the Proposed Development. The screen is protected on each side by rock armour and is covered for its entire width by the roof of the Tailpond Inlet / Outlet Structure, so is not visible. There will be a removable safety handrail on the edge of the Inlet / Outlet Structure at Loch Awe's water's edge.

Areas of permanent landscaped hardstanding and planting are incorporated into the design of the Tailpond Inlet / Outlet Structure area, and lighting during Construction and Operation Phases will likely be required. The B840 existing road will be temporarily diverted during construction to allow for the construction of the Tailpond Inlet / Outlet structure which will sit below the road once reinstated. The detailed design of the Structure will be finalised at detailed design stage.

Gatehouses

There are two gatehouses along with a permanent plant and equipment storage area, car parking and permanent office and welfare facilities, which will be surrounded by security fencing to the east of the Inlet / Outlet Structure. The gatehouses will contain the mechanical equipment for operating the gate within the low-pressure tailrace tunnel.

Temporary Cofferdam

A temporary Cofferdam will be built out into Loch Awe up approximately 170 m from the shoreline and 270 m in width around the location of the Tailpond Inlet / Outlet Structure to allow for construction in dry conditions. A silt curtain or equivalent will be installed prior to the installation of the cofferdam in order to reduce the potential for sediment mobilisation and dispersal during construction.

Waterways

The Waterways connect the Headpond and Tailpond, comprising the Headrace and Tailrace Tunnels. The Waterways are not Controlled Activities and do not require any licencing. They however connect the Abstraction to the Impoundment and are therefore described in this report for context for the Proposed Development.

The following sections provide a general description of the Waterways. However, the option, final length and routing of the Waterways tunnels discussed below will be determined in the final design along with the lining requirements; the specification of which will depend on the underlying geology.

Refer to **Figure 4** and **Figure 14** in **Appendix A** for details.

Headrace Tunnels

The Headpond is connected to the Headrace with a low-pressure section, vertical Pressure Shaft, and a high-pressure section. All tunnels and shafts in the Headrace have a 9.4 m internal diameter. The low-pressure section of the Headrace Tunnel is approximately 322 m in length and runs to the Pressure Shaft. There are 2 additional shafts along the low-pressure section – the Gate Shaft (approximately 90 m in length), and the upper surge shaft (approximately 100 m in length). The Pressure Shaft allows the water to be connected approximately 320 m down to where it joins the high-pressure section of the Headrace. The high-pressure section of the Headrace Tunnel is approximately 220 m in length.

At this point, the tunnels bifurcate into three shafts and enter the Powerhouse, where they will drive the turbines.

Tailrace Tunnels

After the Powerhouse, bifurcations allow the pump-turbine draft tubes to rejoin to form the Tailrace Tunnel which connects the Power Cavern Complex to the Tailpond at Loch Awe.

The Tailrace Tunnel has a 10 m internal diameter, and is approximately 2815 m in length. The Lower Surge Shaft with an internal diameter of 24 m sits on the Tailrace tunnel, approximately 100 m along from the Transformer Cavern, and rises approximately 95 m in length.

Power Cavern Complex

The Power Cavern Complex is the main underground component of the Proposed Development, split into three sections:

1. Main Inlet Valve (MIV) Cavern (contains the MIV), connected by galleries,
2. Powerhouse (contains the combined pump / turbines), and
3. Transformer Cavern (contains the Transformers).

The MIV Cavern is the first component of the Powerhouse the high-pressure Waterways will enter following their bifurcation. The structure will be approximately 170 m long, 15 m wide and 30 m tall and will house the inlet valves that allow water flow into the turbines.

The Powerhouse Cavern itself will be approximately 170 m long, 25 m wide and 50 m tall and houses: the pump-turbines, the generators, draft tube, draft tube gates, overhead gantry crane and the various ancillary systems as well as the local control system. Building services providing ventilation, drainage and firefighting will also be included.

The Powerhouse Cavern is connected to the Transformer Cavern by a series of galleries which will house some of the necessary electrical equipment such as the power conversion electronics for the variable speed pump-

turbine units. The 170 m long, 20 m wide and 35 m tall Transformer Cavern will contain the transformers and associated switchgear, which will step up the voltage of the electricity generated from 18 kilovolt (kV) to 275 kV before it is transferred through the power tunnel to the switching station.

Access, Emergency, and Power Tunnels

Three main tunnels will provide a level of access to the powerhouse, these are the Access Tunnel, the Construction / Emergency Tunnel and the Power Tunnel, these can be seen on **Figures 12 and 13 in Appendix A** respectively. In addition to these three tunnels, it is probable that additional ventilation tunnels will be excavated to allow for sufficient airflow within the belowground infrastructure. This will depend, to some extent, on construction methodology and may vary when the civil contractor's proposals are known.

The Power Tunnel will carry the High Voltage (HV) power cables from the Powerhouse to the Switching Station. Due to the proximity of the switching station to the A819, the Power Tunnel has been deemed as the most viable option for the delivery of Abnormal Indivisible Loads (AILs) to the Powerhouse. This has resulted in the Power Tunnel being oversized to accommodate for these deliveries. This does, however, offer the opportunity to provide ventilation by this route.

The tunnels will be accessed through tunnel portals located at Permanent Compound (PC) 5, PC 6 and PC 14 for the Emergency, Access, and Power Tunnels respectively. Meanwhile the ventilation tunnels will surface in compounds PC 19, 20 and 21.

Access

Site access is proposed off the A819 which links the strategic trunk roads A85 to the north at Dalmally and A83 to the south at Inveraray. It is anticipated the general construction access will come from the north and south along the A819. Construction access from the south will bypass Inveraray via a section of unclassified existing track (to be upgraded) north of Inveraray Castle which will connect the A83 to the A819. Larger construction traffic, such as AILs, will be delivered by barge to the proposed Jetty, where they would be offloaded and transported to the site via the A819.

Refer to **Figures 15 a, b, c and d in Appendix A** for details of the Proposed Development access tracks respectively.

Temporary Access Tracks

Across the site, 4.3 km of temporary access tracks will be constructed.

- Approximately 1.1 km of this temporary access track will be located along the north bank of the Headpond, providing access to PC 17, PC 18 and PC 19, prior to the construction of Embankment 1 (along with the access road on the crest of the embankment).
- 0.7 km will provide access to Temporary Compound (TC) 16 within the Headpond.
- 0.5 km will connect the B840 to the existing access track that is to be upgraded prior to the construction of the B840 Diversion.
- The remaining 0.5 km will provide a connection between the temporary jetty to an upgraded access track to allow for vehicles to bypass the historic town of Inveraray. There are proposed upgrades to the existing unclassified road "Upper Avenue" at Inveraray and a new track linking this to the A83 at the proposed Jetty location.

Permanent Access Tracks

It is expected that a total of 23.25 km of permanent access track will be either constructed or upgraded.

- 12 km of this permanent access track will be upgrades to existing tracks.
- 11.25 km will be new access track, with 5.9 km of this as excavated, 4.7 km as floating, and 0.65 km as floating transition access tracks.

In summary, of the total Permanent access tracks, approximately 48% will be new construction and consist of excavated and floating access tracks. Of this 48%, approximately 42% will be floating access tracks. Floating access tracks have been used in areas of peat greater than 1.0 m as per SEPA guidance.

B840 Diversion

The B840 existing road will be required to be temporarily diverted during construction to allow for the construction of the Inlet/Outlet Structure which will sit below the road once reinstated.

This realignment will be approximately 1.5 km, with 0.75 km being temporary. The remaining 0.75 km will remain in place even after the B840 reopens and will tie in the other permanent access tracks on the site. The 0.75 km of temporary diversion will be returned to its original condition post construction.

Supporting Infrastructure

Switching Station

There will be a high-voltage air insulated (AIS) Switching Station within the Proposed Development located within the footprint of PC15. This will be approximately 225 m in length and 100 m in width and will have equipment up to 14 m in height. The Switching Station is a switchyard that is partly the responsibility of the grid operator (Scottish and Southern Electricity Networks (SSEN) Transmission) and partly the responsibility of the scheme developer and so the switchyard is divided into two sections of roughly equal area separated by a common boundary. The two parties own and operate their respective sections of the switchyard (with associated equipment), separately from the other party. The two areas will be fenced off from one another and have separate and private accesses.

In addition to the switchgear, there will be parking, welfare and offices located on both sides of the Switching Station.

Inveraray Temporary Marine Facility

A Temporary Marine Facility will be required within Loch Fyne to allow for the delivery of AILs. The marine facility will take approximately 12 months to construct and will be comprised of a floating deck attached to 72 No. 600 mm diameter vibro-driven piles placed at 5 x 5 m spacings. A 600 mm deep prefabricated steel bridge deck 180 m long and 10 m wide will span between the piles.

The marine facility has been designed to accommodate specified vessel types, is designed as temporary, and will be removed after delivery of the last AIL. At the end of construction, the marine facility will be removed, however the piles will remain in situ. The piles will remain in place should the pier be required for replacement components during the Scheme's lifetime.

4.4 Construction Programme and Working Hours

The lifespan of the Proposed Development has been broken into four distinct phases:

- Pre-Construction and Enabling Phase – initial works that enable the construction of the Proposed Development;
- Construction Phase – the building and commissioning of the Proposed Development;
- Operational Phase – the period when the Proposed Development is active and has the potential to use and generate electricity; and,
- Decommissioning Phase– the end of operational use and the removal and/ or making safe of the Proposed Development.

Construction is expected to last up to 7 years, with 6 months of commissioning after. The construction work is anticipated to peak within years 2 and 3 as the tunnelling construction and the Headpond construction are the two largest operations, and they are likely to be sequenced in parallel. It is expected that the tunnelling work will be a 24-hour operation. **Table 4-1** below shows an indicative programme of the Construction Phase for the main components, reflecting a reasonable "worst case" duration. **Table 4-1** below shows an indicative programme of the Construction Phase for the main components, reflecting a reasonable "worst case" duration.



4.5 Construction Environmental Management

The management of construction measures to be taken to mitigate and protect the environment will be managed under the Construction Environmental Management Plan. An outline CEMP has been produced, copy in Appendix C to provide information on how potential environmental impacts will be avoided, managed and/ or minimised.

The objective of the oCEMP is to provide initial information on how potential construction stage environmental impacts are to be minimised. The document provides minimum requirements and measures to be implemented rather than construction detail, as the Construction Contractor has not yet been appointed. The oCEMP will be updated post-consent on the appointment of the Construction Contractor and in consultation with Argyll & Bute Council, NatureScot, SEPA and other relevant consultees, where appropriate. Throughout the Pre-Construction and Enabling and Construction Phase of the Proposed Development, the CEMP will remain a live document which is updated as circumstances, policies and best working practices change.

The oCEMP sets out the environmental management framework to be adopted during the Pre-Construction and Enabling and Construction phases, and measures to be implemented to minimise construction environmental impacts. The oCEMP covers:

- Pollution prevention;
- Construction noise;
- Emergency response and flood risk management plan;
- Waste management plan;
- Ecological management plan;
- Biosecurity measures;
- Dust management; and
- Tree protection during construction.

The standard good practice measures for the above topics, set out within the oCEMP, are considered to be embedded mitigation and assumed to be in place within the construction effects assessments contained within Chapters 5-20 of the EIAR. Where applicable, specific measures may also have been identified within the EIAR topic chapters and included in the oCEMP as additional mitigation.

The finalised CEMP will be designed to ensure compliance with environmental legislation, committed construction stage mitigation as reported in the EIAR, mitigation developed within the topic-specific management plans and the Construction Contractors own environmental policies.

All personnel and sub-contractors working on the Proposed Development will perform their duties in accordance with the requirements of the CEMP. The Environmental Manager will report regularly to the Project Manager (PM) on the status and effectiveness of its implementation.

4.6 Operation and Maintenance

Operational Lifetime and Workforce

It is expected that the civil works (embankments, dry tunnels, shafts, Caverns and Inlet / Outlets structures) will, with periodic maintenance and repair, have an operational life of approximately 100 years. However, throughout this period it is expected that the electrical plant will require refurbishment or major overhaul every 25 years.

After the initial construction of the Proposed Development, it is expected that there will be approximately 5 - 10 on-site jobs created as a result of the operation of the Proposed Development plus external contractors from time to time.

Maintenance and Management Requirements

The Proposed Development will be subject to an Environmental Policy / Environmental Management System (EMS) that will require regular monitoring and auditing.

Once commissioned, PSH schemes typically require very little maintenance. However, there will be regular inspections to ensure the safety of the Headpond. Under the Reservoirs (Scotland) Act 2011, the operator of a reservoir must appoint a Supervising Engineer from a 'panel' of engineers pre-approved by the Scottish Government. The Supervising Engineer will monitor the Headpond, supervise operations and conduct visual inspections. Inspection must also be conducted with a minimum frequency of every two years by an Inspecting Engineer who is an independent, panel engineer. Further details on the expected maintenance requirements and inspections of the Proposed Development are set out in **Table 4-2** below.

Table 4-2. Likely Maintenance Requirements

Component	Objectives	Inspections Carried out by:	Frequency
Headpond (Embankment)	Examine the critical safety features including, Embankment structure, spillway, screens and scour arrangements, the condition of the major elements and the operating records.	A qualified third-party Panel Engineer, Supervising Engineer and / or the Operator	Routine and Surveillance (Operator) – Minimum once or twice weekly. Inspection (Supervising Engineer) – Annually. Inspection (Inspecting Engineer) – at a minimum of every 2 years.
Access Tunnels	Tunnel inspection, maintenance, and performance	Operator	10 years
Pump / Turbines and Generators	Reliable operation of equipment in the service environment – achieved through planned, periodic inspection and checking of components and systems, together with replacement or rectification of parts wherever required. Maximum availability of equipment and a minimum of unplanned shut-downs by using planned / periodic shutdowns to inspect all equipment	Operator / turbine supplier	As recommended by the manufacturer, likely to be daily, weekly, monthly and quarterly checks as per the maintenance schedules, with major refurbishment works not expected more frequently than five year intervals.
Tailpond Inlet / Outlet Structure Screen	Maintain operation of inlet / outlet structure. Cleaning screen. Inspecting structure. Replacing screen.	Operator	Routine cleaning of the screen – Maximum daily. Inspection – 10 years. Replacing Screen – 20 years.
Access Tracks	General maintenance, ensure fit for purpose and replacing	Operator	General Maintenance - Annually
Switching Station	General maintenance, servicing, replacing	Operator / DNO	Routine and Surveillance (Operator) – Minimum once or twice weekly. Inspection – Annually. Major Service – 20 years.

4.7 Decommissioning

Hydropower assets are very durable and, consequently, it is very rare for large-scale hydro projects to be decommissioned. Rather, they may be refurbished or adapted. However, if decommissioning became necessary, then it is envisaged that at the end of its operational life (120 years), the Proposed Development can be decommissioned as follows:

- Water would be drained from the Headpond and released at an agreed rate and timescale through the appropriate licencing regime into Loch Awe;
- The pump turbines and associated mechanical and electrical plant will be removed;

- The Power Cavern Complex will be stripped of equipment and the entrances blocked off;
- The Waterways and Tunnel Portal entrances will be blocked off with local spoil;
- The Tailpond Inlet / Outlet structure will be permanently blocked and the Smolt Screen removed;
- The GIS Switchyard will be removed and the compound reinstated;
- To prevent any incident with the Headpond filling up, the scour valves will remain open and the Spillway will remain in place;
- The Headpond Inlet / Outlet structure will be blocked with local spoil material; and,
- Access tracks will remain in place.

Under the Reservoirs (Scotland) Act 2011, the Headpond does not need to be fully drained, as long as ongoing maintenance is undertaken.

Decommissioning effects would be those which would occur as a result of the dismantling and draining of the Proposed Development at the end of its operational life (as outlined above) and would typically be similar to those assessed for construction. The Proposed Development has a design life of 100 years; however, it is anticipated that rather than be decommissioned, components of the Proposed Development would be replaced to extend the Proposed Development's operational life. Given the lifespan of the Proposed Development, with the effects of decommissioning being similar to that of construction, and the requirement for a decommissioning plan at the end of its lifespan, decommissioning effects have been scoped out of assessment. Notwithstanding, where information is deemed appropriate to be included this has been outlined within the relevant specialist assessment chapter.

5. Water Management

5.1 Introduction

This Section presents a summary of the baseline hydrological conditions and a review of the water management strategy for the Proposed Development. Details of the Proposed Development including plans and detailed drawings are included in the Figures referenced within **Section 4**.

The operational regime of the Proposed Development, i.e. how and when the scheme generates or pumps, is governed by both water resource availability and the electricity market. This assessment considers the effect of the proposed operational regime on water resources and the impact of this effect on receptors in the study area.

It is recognised that controls are required to minimise the impact of discharging large quantities of water into Loch Awe during periods of flood and from abstracting large quantities during periods of drought. Hands-off levels are therefore proposed for both pumping and generating based on known constraints at Loch Awe and further downstream. Further details are provided on these in **Section 5.7** of this chapter.

5.2 Surface Water Features

Loch Awe Catchment

Within the study area and the Loch Awe catchment there are the following water features, shown in **Table 5-1** and **Figures 2d and 2e in Appendix A**.

Table 5-1. Summary of Catchment

Sub Catchment	Water Features	Description	Direction and distance to the Proposed Development
Loch Awe	Loch Awe	A loch water body within the River Awe with an area of 38 km ² .	All water features within the Main Area drain into Loch Awe. There is a Tailpond inlet / outlet where water will be abstracted and discharged.
	Allt na Cuile Riabhaiche and tributaries (LA2)	Watercourse to the northeast of the Headpond with approx. six tributaries. Drains into Loch Awe.	Tributaries cross the Upper Sonachan / Keppochan Forest track that will be used for access.
	Allt a Chrosaid and small (unnamed) lochan (LA5)	Sourced from a small lochan and drains into Loch Awe.	PC21 is situated 29.1 m south of LA5. Upgrade to the existing B840 crossing.
	Allt na Dail Ferna (LA11)	Drains into Loch Awe with approx. five tributaries.	200 m downgradient of PC13.
	Allt na Fainge (LA12)	Drains into Loch Awe and is the convergence of two unnamed watercourses.	Upgrade to the existing B840 crossing.
	Allt a' Ghreataidh (LA13)	Drains to Loch Awe.	Upgrade to the existing B840 crossing.
	Allt Blarghour and tributaries (LA16)	Approx. 8.5 km in length. Sourced from the south of Cruach Mhor and flows into Loch Awe near Blarghour.	The proposed Blarghour Wind Farm extension access route, which may be used for the Proposed Development
Allt Beochlich and tributaries (LA6)	Allt Beochlich and tributaries (LA6)	Flows from LA10 and into LA8 with approx. 11 tributaries flowing into LA6 including the tributary sourced from LA8. From LA8, the watercourse flows into Loch Awe.	Situated within the Red Line Boundary (RLB). Tributaries cross the proposed Access Track and temporary works area. LA6 and tributaries are within the proposed Headpond, and Embankment locations so will be lost to the Proposed Development. Compensation

			flow will be provided downstream of Headpond.
	Loch Breac-liath (LA1)	Small lochan approx. 16,000 m ² . Small watercourse drains from LA1 to LA11 in a southwestern direction.	200 m upgradient of proposed Embankment and 270 m, 300 m and 400 m downgradient of PC17, PC18 and PC19.
	Lochan Airigh (LA7)	A small lochan with 23,700 m ² area.	Located to the south of the Headpond.
	Beochlich Lochan (LA8)	LA6 drains into LA8 and is dammed on the western end where a small hydropower scheme is situated.	TC07 will be located 33.2 m upgradient of LA8. PC09 is situated upstream of lochan. Construction of the Headpond and associated activities are within the catchment.
	Lochan Dubh (LA9)	Situated north of the Headpond area, LA6 is sourced from the lochan (LA9). Has an area of approx. 70,000 m ² .	Situated 1300 m upstream of Headpond area.
	Lochan Romach (LA10)	Small lochan with an area of 23,800 m ² .	PC20 and Access Track crossing situated 100 m upstream of LA10.
Alt Mor and tributaries (LA14)	Alt Mor and tributaries (LA14)	Drains to Loch Awe and is sourced from an unnamed loch.	Upgrade to the existing B840 crossing.
	Unnamed Lochs (LA15)	Three unnamed lochs, one having the largest area of 18,000 m ² .	LA15 270 m downgradient of PC19.
Cladich River (LA17)	Cladich River (LA17)	Heavily modified river sourced from Lochan Sron Mor and flows into Loch Awe.	600 m downstream of Sonachan / Keppochan Forest track that may be used for access. But may be affected by any impacts to LA3 and LA4 as they are hydraulically linked.
	Keppochan River and tributaries (LA3)	Watercourse to the northeast of the Headpond flowing into the Archan River (LA4).	Crosses the Upper Sonachan / Keppochan Forest track that may be used for access.
	Archan River and tributaries (LA4)	Drains into the Cladich River which then flows into Loch Awe.	Crosses the Upper Sonachan / Keppochan Forest track that may be used for access.
Other	Unnamed Water course (LA18)	Small stream that flows into Loch Awe.	Upgrade to the existing B840 crossing.

Loch Awe

Loch Awe is a freshwater loch with an area of 38.5 km². The outflow from the loch is down the River Awe, flowing into Loch Etive near Taynuilt. Loch Awe is dammed by the Awe Barrage which is located on the River Awe northeast of the Loch, operated by Scottish and Southern Electric (SSE). See **Section 5.3** for more details on the Awe Barrage.

Loch Awe reaches to a maximum depth of around 94 m in the southwest of the Loch southwest of Eredine (southern basin). A second smaller distinct basin is located between Cladich and Loch Awe in the northeast and has a maximum depth of around 75 m (i.e. the northern basin). Between the southern and northern basins, and for more than half the Loch's total length, the Loch bed is undulating but typically does not exceed around 50 m depth.

Loch Awe is isothermal from late autumn to spring each year, thereafter there is development of stratified conditions until the following autumn, classifying it as a monomictic loch. The depth of the upper limit of thermocline is around 11 m and its maximum development is around June and July.

The loch has a very low conductivity and chemical concentrations, suggesting it is an oligotrophic loch. However, Loch Awe has still had a history of algal blooms.

The overall status of the water body has remained as Moderate Ecological Potential between 2015 to 2022, as not all mitigation/improvement measures have been implemented. However, the overall ecological status is currently Poor, and has been since 2011. The chemical status of Loch Awe is Good (since 2014). The hydromorphology of Loch Awe is also classed as Poor, with the overall hydrology of the water body being classed as Poor.

SEPA gauging stations cover approximately 50% of the Loch Awe catchment. For further information, refer to Appendix 12.1 to the EIAR.

5.3 Existing Infrastructure

Awe Barrage

The River Awe is impounded by the Loch Awe Barrage, which generates electricity off the compensation flow at the Barrage (NN04520 28689) and diverts water downstream to the Inverawe Power Station (25 MW). Operations at the Loch Awe Barrage aim to maintain water levels within a seasonal range (see **Table 5-2**). The Barrage contains a Borland fish pass, a freshet gate and two radial gates for passing flood flows. The operation of these gates and the compensation flow system is variable and information on operations and corresponding outflows from Loch Awe were not available for this assessment.

Table 5-2. Target water levels

Period	Target minimum (mAOD)	Target maximum (mAOD)
April-November (Summer)	36.27	37.06
December-March (Winter)	35.96	36.57

Hydro-electric power developments

There are two existing hydro-electric power (HEP) developments operating on Loch Awe. SSE operate the 25-megawatt Inverawe Power Station, which abstracts water from the River Awe Barrage. The other development is the Cruachan Power Station, a 440 MW pumped storage scheme operated by Drax and located at the centre of the east and west arms of the northern basin, generally operating on a daily cycle. In 2023 a Section 36 of the Electricity Act 1989 application was granted for a second power station at Loch Awe ('Cruachan Expansion') which would add a further 600 MW generating capacity.

Small hydro schemes

Four small hydro schemes also operate using water from Loch Awe tributaries; Allt Beochlich, Allt Blarghour, River Avich and Loch Nant.

Other uses of Loch Awe

A review of online aerial photography has identified a fish farm approximately 10 km southwest of the proposed abstraction and discharge point of the Proposed Development into Loch Awe just south of Balliemeanoch. This fish farm is Braevallich Fish Farm, operated by MOWI. Elevated phosphorus levels from freshwater fish farming have been identified by SEPA as a pressure on this water body, although measures have been put in place to resolve this by 2024.

Loch Awe is also an important water body for tourism and recreation, including scenic views and heritage. Boats, kayaks and canoes can be hired, and although it is not a designated bathing water, it is known to be popular for wild swimming. Migrating salmon also pass through the Loch, and it is an important location for trout fishing with the season running from the 15th of March to the 6th of October each year.

Existing Water Resources Regimes

There are a number of CAR abstraction licences situated within the 1 km Study Area (noting that Cruachan power station (CAR/L/1012107) is outside of this distance). They are summarised in **Table 5-3** and can be viewed in **Figure 2b in Appendix A** within the EIAR (note unique reference number in **Table 5-3**).

Table 5-3. SEPA CAR Abstraction Licences

Ref. (see Figure 11.2a)	Authorisation Number	Site	Authorisation Status Date	Site NGR
C1	CAR/L/1010507	Beochlich Hydro, Balliemeanoch, Dalmally, PA33 1BW	April 1, 2006	NN 01183 16536
C2	CAR/L/1115819	Allt Mor Hydro, Balliemeanoch	December 23, 2013	NN 01260 16820
C3	CAR/L/1115821	Allt a'Chrosaid Hydro, Balliemeanoch	December 23, 2013	NN 01190 16110

5.4 Hydrology

Hydrological and Water Resource Assessments

An assessment of the impact of the proposed scheme has been undertaken based on a water balance assessment of the water bodies. The assessment has been based on a combination of numerical analysis based on desk studies together with the use of gauged data.

The assessment considers the effects during the phases of the Proposed Development lifespan. The phases include: enabling and pre-construction, construction, operation and decommissioning.

The assessment considers; the proposed run-of-river hydro scheme, at the four stages mentioned above in relation to Flood risk and Water Resource. For limitations and assumptions of the assessments and models detailed below, see **Water Resource Report Appendix**

Flood Risk Assessment

The Flood Risk Assessment (FRA) (*Appendix 12.2 Flood Risk Assessment (Volume 5: Appendices)*) was undertaken to assess the impact of flooding on the proposed site during construction and operation. **Section 5 of EIAR Appendix 12.2 Flood Risk Assessment** summarises the work undertaken to assess the flood risk to the site and downstream of the Awe Barrage. The FRA considers the peak level in the Loch Awe and peak flow at the Loch Awe Barrage within the fluvial model to assess the risk of the Proposed Development during construction and operation.

A Hydrologic Engineering Center's River Analysis System (HEC-RAS) model along a 4km arm between Loch Awe and River Awe was built to assess the fluvial flood risk to the Proposed Development itself and downstream of the Proposed Development, by calculating the peak water level in Loch Awe and peak flow at the Loch Awe Barrage. Additionally, sensitivity analysis was conducted on the model. Other sources of flood risk were assessed by SEPA flood risk maps and site observations/reports. Details on the model and assessment results can be found in **EIAR Appendix 12.2 Flood Risk Assessment**.

Water Resources Assessment

The Water Resource Assessment (*Balliemeanoch Water Resource Assessment - Appendices*) reviews the current water resource usage within Loch Awe and the working parameters or key receptors. It develops the potential impact on water resources as a result of the Proposed Development and addresses appropriate mitigation measures to reduce the impact of the Proposed Development including outlining the operational rules.

To assess the current water resource usage within Loch Awe an understanding of the water levels (inflow and outflow), dependent on the Awe Barrage was assessed to determine the impact of the Proposed Development. A water balance model was used to understand the statistical relationship between the level and the outflow dependent on the seasonality.

To assess the impact of the Proposed Development to the water levels and activity of the Awe Barrage, an operation profile was added, either abstraction or generation. These results were compared to the baseline with operation input.

The proposed development will result in an impoundment of a tributary of the Buinne Dhuh watercourse. An assessment of the flows has been carried out based on Low Flows numerical modelling. Upon completion of the flow monitoring, and in advance of any impoundment of the Headpond the flow monitoring results will be submitted to SEPA together with any update to the compensation flows to allow the CAR licence values to be confirmed or adjusted accordingly. The values in this report should therefore be regarded as provisional values and form the general principle of the licence. with a view to confirming or adjusting any provisional CAR licence values.

Baseline Conditions

Water Resources

The Proposed Development Site is situated between Loch Awe and Loch Shira water environment areas, and impacts a number of water resources.

Loch Awe spans from Ford to Stronmilchan. The Loch discharges through the existing barrage constructed for the Loch Awe power station spilling west into the River Awe at the upstream end of the Loch. The barrage effectively controls the Loch Awe and subsequently Loch Etive. River Awe flows west through Balure into Loch Etive discharging to Ardmuckingnish Bay a small coastal embayment, southwest of the Proposed Development. All surface water features (and their attributes) within the 2 km study area and extending to Loch Awe and Loch Fyne are described in **Appendix 11.5 Surface Water Management Plan of the EIAR**.

During drought conditions, SSE is required to release water from upstream catchments and reservoirs to provide minimum 'compensation'. A minimum pass forward flow must be maintained to the River Awe over the Awe Barrage with a minimum water level maintained.

Minimum environmental flows must be maintained in the River Awe at all times. This is achieved through the opening of radial gates on the Awe Barrage. This is undertaken by SSE based on water levels in the loch.

Loch Awe and River Awe are water resources for the existing Cruachan Power station, located roughly 66 km away from the Proposed Development, in Dalmally. The Cruachan Hydro Power Scheme, 440 MW scheme, extracts water from Loch Awe, generally operating on a daily cycle. A daily water level dataset measured at the Cruachan intake was acquired from Drax from 2013 till 2021. The daily water level data is shown within **Figure 5-1** shows that the target water level range is from 35.95 mAOD to 37.15 mAOD. From further assessment of these water levels, the winter operating range is exceeded 25% of the time and during summer operation water levels drop below the range approximately 30% of the time.

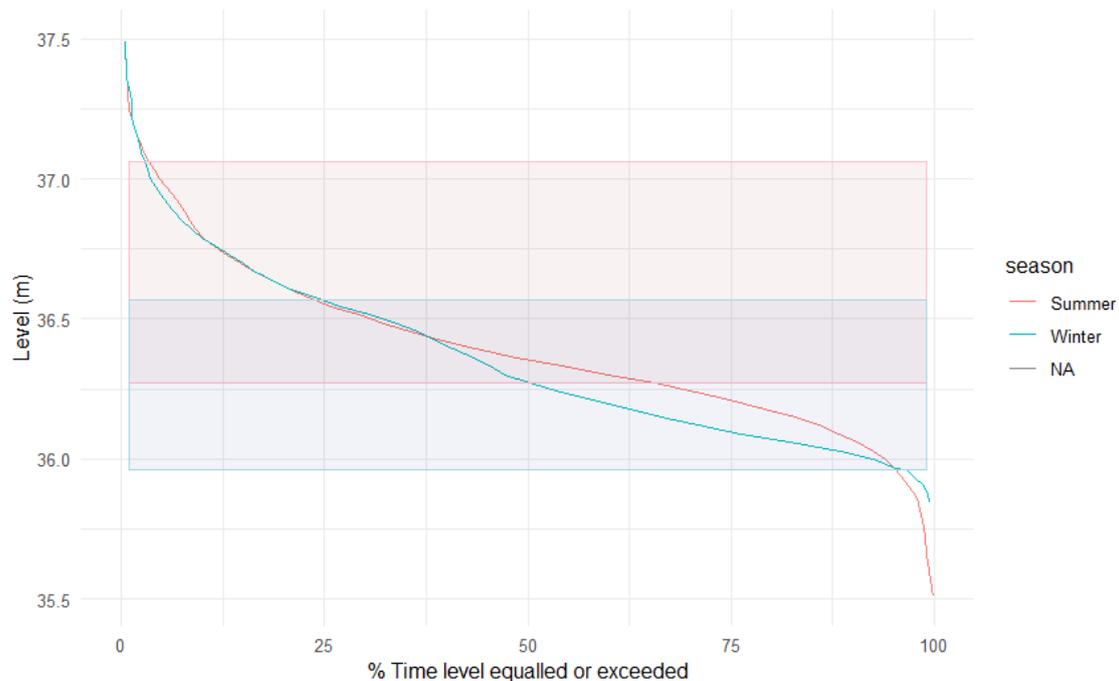


Figure 5-1. Water levels in Loch Awe (1/1/2013 - 31/12/2021)

Direct Flood Risk to the Proposed Development

SEPA flood maps were reviewed for fluvial, pluvial, coastal, and groundwater flooding. They identified fluvial, pluvial, and coastal flood risks to the site, though as strategic maps, they lack the detail needed for site-specific assessments.

The Proposed Development site is to be protected against a 0.5% annual exceedance probability (AEP) + 59% climate change uplift, in line with SEPA guidance. Fluvial flood risk maps showed the greatest risk from the Allt Beochlich, tributary to Loch Awe, but did not capture smaller nearby watercourses. Key at-risk components include the Tailpond Inlet / Outlet and Headpond access route including the B840, with existing infrastructure such as the B840 and a gatehouse at moderate flood risk during such events.

Direct Pluvial Flood Risk to the Proposed Development

SEPA flood maps indicate high pluvial flood risk around the Allt Beochlich and along the A815 to Loch Awe. During construction, mitigation should address surface water flood risks and prevent contaminated run-off.

The nature of the Proposed Development will increase the number of steep, semi-impermeable surfaces within the area, likely raising run-off and flood risk to nearby infrastructure and receptors.

Direct Coastal / Tidal Flood Risk to the Proposed Development

SEPA flood maps show coastal flooding is contained within Loch Awe and surrounding water bodies. The site's minimum elevation is 35.5 mAOD, and nearby watercourses are not tidally influenced.

Direct Groundwater Flood Risk to the Proposed Development

No records or SEPA mapping indicate groundwater flood risk at the site, due to steep slopes and drainage to Loch Awe. Local groundwater may affect below-ground infrastructure like the Power Cavern and Tunnels. A pumped system is proposed for mitigation, with regular monitoring needed to manage risk during potential pump failure.

Climate Change

SEPA guidance projects a 46% increase in rainfall intensity by 2080. As the Proposed Development has a 100-year lifespan, drainage infrastructure must account for this to manage surface water flood risk. Mitigation

measures, detailed in the Mitigation and Monitoring section, are based on future Loch Awe levels and climate change projections to manage flood risk over the Proposed Development's lifetime.

Fluvial modelling to the year 2100 applied a 59% climate change uplift for the Argyll River basin, based on SEPA guidance and UKCIP2018 data.

Sensitivity of Receptors

To assess environmental impacts in line with Design Manual for Roads and Bridges (DMRB) HD45/09, the sensitivity of flood risk receptors was defined.

Offsite properties, residential and non-residential infrastructure are vulnerable to any adverse change, and are classed as **High** sensitivity due to potential financial, emotional, and service disruption impacts in line with SEPA guidance categorising residential properties as Category 2 – Highly Vulnerable Uses regarding flood risk.

Site workers and on-site equipment are considered **Low** sensitivity, as the site is classed as Category 6 – Water Compatible Uses in line with SEPA guidance. Risks to workers can be managed through operational controls, such as restricting usage of the site during periods of severe weather. Changes to flood risk could cause damage to equipment and pollution incident, however equipment located in flood prone areas would be replaceable and is likely to be able to withstand some flooding.

Loch Awe and the River Awe, both vital for national infrastructure such as Cruachan, are **High** sensitivity receptors as they are sensitive to changes in water levels during prolonged periods of dry spells and the supply of water is essential. Both waterbodies form part of the operational parameters of the wider catchment. The ability to work within and not compromise the ability of others to work within those operational parameters is crucial. Provisions must therefore maintain environmental flows and operational water levels to avoid affecting the wider catchment.

Table 5-4. Sensitivity of Flood Risk and Water Resource

Receptor	Features	Overall Sensitivity
Offsite properties and infrastructure	Health and wellbeing implications of flooding, disruption, and financial cost.	High
Proposed site users	Health and safety	Low
Development infrastructure	Financial cost	Low
Loch Awe, River Awe, and operation of Loch Awe Barrage	Operation of Barrage and Loch Awe water level for the wider water environment	High

5.5 Geomorphology and hydrogeology

The bedrock hydrogeological information is relatively limited but seems to show that the Dalradian rocks are generally without groundwater except at shallow depths (British Geological Survey (BGS), n.d.). MacDonald (2005) lists the bedrock aquifer productivity of Dalradian rocks as being in the low category (in some cases very low category). For these categories, low is defined as 0.1 to 1 litres per second (l/s) and very low as <0.1 l/s. These quantities would only be suitable for supplying private resources and even then, resources may tend to be variable. The presence of fracture zones in a locality may enhance the yields from any wells, but locating these zones can be difficult. Although hydraulic property information is very difficult to obtain in these areas, it can be assumed that the permeabilities of the bedrock are likely to be low.

The superficial deposits (although limited in extent) and peat are likely to contain groundwater at shallow depths. Flow would likely follow the topography of the surface and underlying bedrock. It is likely that this shallow groundwater is supporting Groundwater Dependent Terrestrial Ecosystems (GWDTE) including local watercourses, and maybe in hydrological connectivity with still water features (e.g. Lochan Airigh).

The whole study area is underlain by the Oban and Kintyre Water Framework Directive (WFD) groundwater body (SEPA, n.d.) (ID: 150698) designated under the river basin management plans (RBMP) for Scotland (SEPA,

2021). This WFD groundwater body covers an area of approximately 2,663 km² and is currently classed as Good (2022, Cycle 3).

5.6 Details of Controlled Activity – Construction

No washing out of concrete and cement delivery vehicles will take place on-site without suitable provision for the washing out water and provision of a suitable location that is lined with a geotextile to prevent infiltration to ground. Such washing would not be allowed to flow into any drain and the CEMP would contain a methodology for dealing with any washing out water, or wheel wash. Wash water would be adequately contained, prevented from entering any drain, and removed from the Proposed Development Site for appropriate disposal at a suitably licenced waste facility.

All fuels shall be stored in integral bunded fuel bowsers, designed to hold at least 110% of the contents of the tank. All connections shall be situated within the bund. Fuel shall be stored at least 20 m away from any watercourse, where reasonably practicable. Refuelling within the construction areas shall be undertaken at least 20 m from any watercourses. An impermeable bunded area for the storage of drums shall be constructed in accordance with SEPA guidelines.

Oils and lubricants used within the construction areas will also be stored in temporary impermeable bunded areas or sealed bunded tanks designed to hold 110% of the container volumes. No oil or fuel shall be stored within 50 m of a watercourse.

Construction waste / debris are to be prevented from entering any surface water drainage or water body.

Construction of the Headpond Impoundment

Drainage and water management measures will be implemented and could include, but are not limited to, SuDS ponds/ settlement lagoons, temporary ditches, silt fences, silt busters, dewatering/ sediment bags, silt curtains, and designated bunded fuelling area. During the construction period the control of water on site is a very important operation that needs managed correctly. It is anticipated that one part of the drainage and water management measures will be the implementation of a series of large settlement lagoons to the north-west side of the HP area where the landscape embankment works are planned to be. Surface water ditches and/or pumps will discharge into these settlement lagoons away from any existing watercourses.

Works in the Headpond area will be supervised by the Ecological Clerk of Works (ECoW) to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the runoff of silt-laden water to adjacent watercourses and waterbodies.

Diversion

No permanent channel diversions are proposed as part of the Proposed Development. Limited diversions of channel will be carried out to allow the Valve House/low level outlet at the Headpond to be constructed in the dry. The watercourse in the permanent solution will be diverted through the lower outlet and compensation flow pipe and will form part of the impoundment works.

Unnamed tributary will be diverted to provide compensation flow during construction to Buinne Dhubh and the watercourses further downstream. Upon construction, the unnamed tributary will become part of the impounded catchment leading into the Headpond, and the compensation flow will be provided by other means.

Construction Activities

Headpond

Borrow Pits

A Borrow Pit will be created for a dual purpose of increasing the Headpond volume, and for fill within the embankments. Doing so will minimise the requirement to import material at the start of Construction. Material from the Borrow Pits is anticipated to be used for the construction of the Headpond embankments, and Construction Compounds. Access to the Borrow Pit Search Area will be via the Access Road and other

permanent access roads around the Headpond. Exact location of entry to the Borrow Pit Search Area will be determined during the detailed design stage.

Construction sequencing

The material available from excavations required to construct the Headpond Inlet/Outlet structure and underground works is insufficient to meet overall requirements for the embankments and it is therefore expected that the Borrow Pits at the Headpond site will be used to balance earthworks sequencing requirements.

Embankments

A CFRD design has been selected as the preferred dam type for Embankment 1 and Embankment 2. There are principal elements relating to the construction of the embankments as follows: the preparation of the embankment foundation; the placing of the embankment rockfill material and the construction of the concrete face. These are expanded in the following section.

To minimise the risk of chemical spillages, a cut off drain will be installed at the toe of the new embankments to collect water run-off during construction and prevent it, and any chemicals that may have been spilled, propagating from the Proposed Development Site without treatment.

The typical sequence of works to construct the embankment is as follows:

- Provide access ways for construction;
- Strip superficial deposits from the footprint of the embankment and working area;
- Installation of drainage blankets and cut off drains;
- Excavate foundation for toe plinth;
- Profiling works, slush grouting and concrete to formation level of plinth;
- Construction of toe plinth;
- Grouting works to toe plinth;
- Placement of fill to the embankment. This will commence in at the lowest point and be brought up in horizontal layers across the entire cross section until crest elevation is reached;
- Construct upstream face lining; and,
- Crest works and wave wall.

Once the embankment is completed and impoundment is ready to commence the upstream entrance of the culvert will be plugged and converted to a low-level outlet by the provision of internal pipework which will be utilised during the operation of the embankment to drain the reservoir and aid in removal of sediments.

To minimise the risk of chemical spillages, a cut off drain will be installed at the toe of the new embankments to collect water run-off during construction and prevent it, and any chemicals that may have been spilled, propagating from the Proposed Development Site without treatment.

Spillway

At the top of Embankment 1, the spillway is used to drain any excess water from the Headpond. The spillway is approximately 80 m long and drains into an unnamed river that drains into Buinne Dhubh.

In order to restrict discharge due to flooding in accordance with SEPA guidance, the level of the Spillway has been set to be above that of the 1 in 200 plus climate change flood. The Spillway has therefore been set to a level of 420.6m AOD.

Excavation Works

Under the footprint of each embankment there is a requirement to excavate any compressible layer of peat to expose the underlying rock. An overall average 1.2 m thickness of peat is assumed, based on results of the available peat probing. The proposed geophysical survey shall provide a greater understanding of peat thickness and also that of any extremely weathered rock. The bedrock across the site is dominated by Metabasaltic rock of

the Tayvallich Volcanic formation. This will typically provide a competent foundation, but weathered and brecciated material may need to be removed.

The toe plinth is ideally to be founded on hard, non-erodible sound rock which can be grouted. It is possible for the toe plinth to be founded on less competent deposits and exact details will be dependent upon further ground investigation. The aim is to eliminate the possibility of erosion in the foundation. Careful excavation is required to minimise fracturing of the rock surface on which the toe plinth is placed.

The excavated peat and any other material not suitable for incorporation into the embankments will be stockpiled and used to form landscaped areas. The design of the Headpond means that the excavations in the Headpond and the construction of the embankments can be sequenced together. Where possible, material excavated from the Headpond will be used to construct the embankments. Due to the size of the excavation and the material anticipated to be handled, the Headpond works will be constructed under the Quarries Regulations 1999 and Explosives Regulations 2014 (as amended).

Toe Plinth

It is important that the plinth is not subjected to abrupt changes in level or direction and, in isolated areas, where the foundation is low, backfill concrete will be placed to achieve a uniform foundation surface profile for the plinth.

The stability of the plinth is essential, and the plinth will be designed to be stable against sliding and overturning. Ground anchors may be required to pin the concrete to the rock, assuring good contact with the foundation and not to resist any given uplift loads.

Face Slab

The Main Access water barrier of the CFRD consists of a concrete face slab cast in situ on the underlying rockfill of the embankment. The face slab is fully supported by the underlying rockfill.

The face slabs are supported by well compacted and well graded layers of crushed rock that provides continuous support under reservoir loading.

As the construction of the embankments progresses, the shoulders of the embankments will be dressed off with topsoil that was generated during excavation.

Material that is unable to be used in the Headpond embankments construction will be transported to compounds to be used for reinstatement, dressing and bunding of compounds, or for the AIS Switchyard construction.

Headpond Inlet / Outlet structure

The Inlet / Outlet diffusers are designed to manage the flow of water entering the Headrace Tunnels in the generating mode and diverging the flow into the upper reservoir in the pumping mode. To ensure optimal hydraulic performance, it is standard practice to incorporate a vaned diffuser. These vanes not only enhance hydraulic efficiency but also provide structural support to the roof of the diffuser and the coarse screens positioned at the diffuser's Inlet / Outlet.

This structure will incorporate the Inlet/Outlet for the low-pressure headrace tunnel and will predominately sit below the bottom water level of the Headpond, with the top of the structure accessible when the Headpond is drained to BWL of 374m AOD.

The structure will comprise a trashrack (debris screen), stoplog (to allow Waterway maintenance), and a deck area with a parapet wall around the deck with an access point. The structure will be approximately 90 m in length, 20 m in height and 30 m wide, at its widest point. Rock armour will be located either side of the trashrack behind the deck.

Tailpond

Tailpond Inlet / Outlet Structure

The Inlet/Outlet Structure will be approximately 18.2m deep (within the bank of Loch Awe) and extends approximately 80 m into Loch Awe from the lower gatehouse. The majority of the structure is either sub-surface within the bank of Loch Awe or beneath the water level of the Loch. The Inlet / Outlet Structure consists of

screens, a stoplog and rock armour. As with the Headpond Inlet / Outlet Structure, the Tailrace Inlet / Outlet Structure will remain below the BWL of Loch Awe at all times.

Construction Sequencing

Works at the Tailpond will be initiated with the installation of the temporary infrastructure. This includes a temporary silt curtain and the temporary cofferdam. The silt curtain will be installed prior to works commencing on the cofferdam.

Irrespective of the type of cofferdam selected by the Construction Contractor, construction will require sheet piles and / or rock armour. A piling rig may be required for installing sheet piles which is likely to take the form of a jack-up barge, manoeuvred into place by a tugboat.

The method of supporting the cofferdam will be dependent on the type of cofferdam selected. However, it is considered likely that it will require bracing or infilling. These works will involve further activity of vessels, such as tugs and barges on the loch as well as activity on the shoreline to transfer materials from TC02 to the cofferdam.

The area within the completed cofferdam will be dewatered to facilitate drill and blast activities for the construction of the low-pressure tunnel. Any water collected from precipitation will be pumped out of the area while the cofferdam is in place.

The Tailpond Inlet / Outlet structure will commence once tunnelling of the tailrace has reached the Headpond. This is to enable excavated material to continue to be delivered to the Tailpond Inlet / Outlet structure and transported to the Headpond via dump trucks. The Inlet / Outlet is likely to be a piled structure, supporting a structured steel frame, within which the screen is installed. Rock armour will be placed either side of the frame. The shoreline around the Tailpond Inlet / Outlet structure will be landscaped and the loch bed on the approach will be re-profiled. Once there is no access requirement for the tailrace tunnel portal, the roof of the Tailpond Inlet / Outlet structure will be installed.

Once the works at the Tailpond are complete, the cofferdam will be removed. The same plant and equipment that was used during the cofferdam installation will be used during the removal works. Some localised dredging and further demobilisation work may be required following removal of the cofferdam to remove any material that has built up around the piles.

The final arrangement is subject to detailed design, but the following outlined construction sequence could be used for the inlet / Outlet structure:

- Build the appropriate B840 Diversion
- Install silt curtain or equivalent
- Build cofferdam piles and supports
- Dewater cofferdam area and set up associated dirty water pumping arrangement
- Excavate launching pit / shaft for TBM
- Construct the Inlet / Outlet structure
- Add rock armour and other structures as detailed design specifies.

Filling of the Headpond

Due to the nature of the topography and catchment area, it is likely that some impoundment of water will occur during construction of the Headpond, particularly upon completion of Embankment 1. Prior to operation of the machines, the Headpond will be required to fill to a Minimum Operation Level (MOL), which can be achieved in two ways:

- Naturally through impounding of the catchment, tributary of Buinne Dhubh and precipitation
- Direct pumping from the Tailpond (Loch Awe) or other water sources to the Headpond
- At this stage of design, the MOL has not been defined, so it is not possible to estimate the volume of water required at initial operation. This volume is also dependent on the initial testing and commissioning strategy of the

machines. It may be possible to commence testing and commissioning in pump mode, which would enable the use of the machines to fill the Headpond.

Should there be a need to directly pump from Loch Awe to the Headpond, the pump rate would be no greater than those set out in the Abstraction licence and would be carried out gradually over a prolonged period. The initial filling would be based on utilising the Proposed Development arrangements.

The filling process would only commence once construction of the Embankment 1 is completed and approved for filling by the Construction Engineer in accordance with the Reservoirs (Scotland) Act 2011. Note, initial filling of the Headpond can commence prior to completion of Embankment 2.

Prior to any filling, an agreement would be reached with the operator of micro hydro run of river station at Allt Beochlich, to continue to provide the necessary flow to this station.

5.7 Details of the Controlled Activity – During Operation

Upon completion of the impoundment and the creation of the Headpond the Proposed Development will move to an operational phase. During this stage the key Controlled Activity is the abstraction from Loch Awe as part of the ongoing operation of the Pump Storage Hydro Scheme. This will involve abstracting water from Loch Awe and pumping to the Headpond. The rate and volume of abstraction will be based on market conditions and based on the water levels in Loch Awe.

Storage Volumes and Stop Levels

The overall volume of attenuation in the Headpond is 15.0M m³, 14.68M m³ of which is actively used storage for generation purpose.

To mitigate the impact of level changes on fish passage, an operating limit based on the historical variation of Loch Awe is proposed and is 35.56 mAOD for pumping / abstraction.

Proposed Abstraction and Discharge Rates and Volumes

Once the Proposed Development is fully commissioned, the working water volume will be able to pass between the Headpond and Loch Awe in order to store electricity when it is available and generate electricity when it is required. It will also provide other services that the grid may require from time to time.

Monitoring arrangement and control procedures will be installed at the Tailpond inlet / outlet structure on Loch Awe to measure the water level, and if necessary, stop the abstraction of water if below the level limit, set out by the operation rules.

The outflow during generation at the Tailpond Inlet / Outlet will be up to 316 cubic metres per second (m³ / s) with a velocity of approximately 0.15 metres per second (m / s) at the Smolt Screen. The inflow during pumping will be up to 316 with a velocity of less than 0.15 m/s, at the Tailpond Smolt Screen. It should be noted that a PSH scheme will operate on full or part cycles that are dictated by the energy market so both the duration and quantity of water discharge and abstraction will vary over both the very short and very long term.

The Proposed Development would both abstract from or discharge water to the upper and lower reservoirs dependent upon operating mode. These flow rates and daily volume are shown in **Table 5-5** and **Table 5-6**.

The abstraction from Loch Awe is dependent on the release of water from the Headpond back to Loch Awe, and the overall volume that can be taken from Loch Awe in single abstraction activity is limited by the available volume in the Headpond. Before any additional abstraction can take place, water will need to be released back into Loch Awe. The maximum potential net volume of abstraction at any time is therefore 14.68M m³ and once the Headpond has been filled the net volume over a prolonged period will be zero.

Table 5-5. Proposed Abstraction and Discharge Flows

Location	Maximum Discharge Rate (m ³ / s)	Maximum Abstraction Rate (m ³ / s)
Loch Awe	316	316

Table 5-6. Proposed Abstraction and Discharge Volumes

Location	Maximum Discharge Volume (m ³ / day)	Maximum Abstraction Volume (m ³ / day)
Loch Awe	14,680,000	14,680,000

Based on receptors and constraint within Loch Awe operating regimes have been set in place with regard to minimum water levels for Abstraction and maximum water levels for discharge. These are summarised in **Table 5-7**.

Table 5-7. Proposed Minimum Water Levels for Abstraction and Maximum Water Levels for Discharge

Location	No Discharge (Generation) Level in Loch Awe	No Abstraction (Pumping) Level in Loch Awe
Loch Awe	37.20 mAOD	35.56 mAOD

Drawdown

The maximum volume of water that would be transferred from the Headpond to the Tailpond by the operation of the Proposed Development is 14.68M m³.

Based upon an installed generation capacity of up to 900 MW and a maximum discharge of 316 m³ / s, it would take approximately 12.9 hours continuous electricity production at maximum output to transfer 14.68M m³ of water from the Headpond to the Tailpond.

When the Proposed Development is generating at 900MW at a maximum flow rate of 316 m³ / s, the rate of rise in the Loch Awe would be 0.027 m per hour, with a maximum water level change of 0.4 m over a complete discharge cycle.

The pumping operation typically involves a lower flow of water than generation mode, although the rate of abstraction while pumping is currently unknown, it can be assumed to be slightly longer than 12.9 hours. If the Proposed Development is pumping at maximum capacity this would draw down Loch Awe at a rate of approximately 0.027 m per hour.

Once the Proposed Development is operational, the fluctuations in reservoir levels will be a function of the UK electricity supply and demand and this may vary significantly from day to day. However, it is considered that a continuous full generating cycle (or full pumping cycle) will be a relatively rare event.

In the event of an emergency the primary drawdown arrangement for the Headpond is the Waterways between the Headpond and the Tailpond. This would allow a drawdown of the working volume in the Headpond in 13 hours.

A further Low Level Outlet arrangement and Valve House are located at Embankment 1. This would allow the Headpond to be drawdown in the event of the Waterways being obstructed in any way, or if further drawdown past the working volume was required. The Low Level Outlet would discharge into the Allt Beochlich allowing the Headpond to be drawn down.

In line with guidance as set out in the 'Guide to drawdown capacity for reservoir safety and emergency planning' the basic recommended standard for a Category A dam is the ability to draw down the water level by 1 m per day.

In the very unlikely event of an emergency and the need to drawdown the reservoir, localised flooding from the scour flows would be better than the far greater consequences of dam failure which may occur if the drawdown rate is restricted. The flood risk from other discharges from the Headpond are negligible. is proposed to allow emergency drawdown. Further information is provided in the Reservoir Safety section.

Proposed Compensation Flows

Impounding of the Headpond results in a reduction in the catchment of the Allt Beochlich and hence the catchment for Loch Awe. This will result in a reduction in flows within the water course from its upper catchment.

The compensation flow into the Allt Beochlich will be provided via a low level outlet on Embankment 1. The Applicant proposes that the compensation be based on a varying monthly low flow from Allt Beochlich. Provisional compensation flows based on Low Flow numerical assessment are summarised in Table 5.8. The final value will be confirmed on completion of detailed design and subject to a minimum of 12 months of flow gauging.

Table 5-8. Monthly Average Compensation Flows

Month	Annual	Jan	Feb	March	April	May	June
Q mean (l/s)	0.078	0.121	0.103	0.097	0.049	0.034	0.036
Month	Annual	July	Aug	Sept	Oct	Nov	Dec
Q mean (l/s)	0.041	0.054	0.081	0.101	0.1	0.116	0.041

Reservoir Safety

Flood risk associated with the reservoirs will be dealt with in accordance with the Reservoirs (Scotland) Act 2011.

The Headpond is designed with a spillway for reservoir safety reasons, the small catchment and the large water transfer capability makes it extremely unlikely that the upper reservoir would reach spillway level. The residual flow regime downstream of the embankments would therefore ordinarily be unaffected by spill events from the embankments.

The Proposed Development would be designed with fail-safe control systems which would prevent pumping once the upper reservoir is full (the stop pumping level has been reached). The spillways would therefore be designed to pass the naturally occurring extreme flood event (which would have occurred with or without the Proposed Development being present) required for reservoir safety reasons to ensure the safety of the embankment structure.

The spillway would be design for Probable Maximum Flood (PMF) with minimal damage, based on the catchment area characteristics. The design would also assume that the Headpond is full when a PMF occurs, a scenario that is considered unlikely.

In addition to the drawdown of the Headpond through the operation of the Proposed Development through a generation cycle a secondary drawdown arrangement has been included based on the Lower Level Outlet arrangement. This will allow the scheme to be drawdown in the case of an emergency when the tunnel is not available.

In line with guidance as set out in the 'Guide to drawdown capacity for reservoir safety and emergency planning' the basic recommended standard for a Category A dam is the ability to draw down the water level by 1 m per day. This equates to a discharge of 0.58 Mm³ over a 24-hour period based on an outflow of 6.7 m³ / s.

SummaryThe Proposed Development is to build and operate a new PSH with an installed capacity of up to 900 Megawatts (MW) utilising Loch Awe as the Tailpond and constructing a new raised reservoir at as the Headpond. The maximum energy storage of the Proposed Development would be up to 10.8 GWh, which corresponds to a useable water storage volume of 14.68M m³ in the reservoir system. The overall impounded volume is 15M m³.

The construction of the new Headpond will result in the loss of catchment area feeding the Allt Beochlich. The flows into the Allt Beochlich are to be compensated by the release of compensation flow from the Headpond. The compensation flow will be set based on seasonal varying monthly averages. This will ensure that the volume of water entering the system is not impacted and that seasonal variation in flows is maintained.

The operation of the Proposed Development will result in large volumes of water being transferred between the Headpond and Tailpond. The Proposed Development would only operate between agreed minimum and maximum levels in Loch Awe in order not to impact on water levels at key receptors in Loch Awe and the surrounding area during both flood and low water level conditions.

6. Effects on Biodiversity – Aquatic

6.1 Introduction

This chapter addresses the potential impacts and effects of Pre-Construction and Enabling, Construction and Operational phases (including maintenance) of the Proposed Development on aquatic ecology features for the purposes of Controlled Activity Regulations.

The controlled activities considered in this chapter include engineering works within and around lochs and rivers and abstractions of surface water which is likely to impact upon aquatic habitats and the water environment.

This chapter concerns freshwater and ecological features, including waterbodies, watercourses, designated nature conservation sites, habitats, assemblages, and species, where a direct impact is likely to occur during the operation of the Proposed Development as a result of the controlled activity. Committed mitigation has been considered and predicted impacts are considered post mitigation.

Scope of Assessment

The assessment considers the effects during the four phases of the Proposed Development lifespan: pre-construction, construction, operation, and decommissioning.

For the purposes of the desk study, field survey and assessment described in this chapter, 'important' aquatic ecological features were considered to include:

- The qualifying features of designated sites within the zone of influence (or further where connectivity exists) of the Proposed Development;
- Species listed on Annex II of the Habitats Directive;
- All species listed on Schedule 1 of the Wildlife and Countryside Act (WCA);
- Species listed on the Scottish Biodiversity List (SBL);
- All species on the Argyll and Bute Local Biodiversity Action Plan (LBAP);
- Species or species assemblages shown to indicate Good habitat conditions, for example in relation to Good Ecological Status or better in relation to the WFD;
- Species or habitats raised through consultation as being at risk, or of particular local significance or concern.
- Other habitats or species that may be rare, scarce or otherwise important were also included, where deemed appropriate through available information and/or professional judgement.
- Based on the results of initial desk study and the feedback provided on the Scoping Report, the scope of the aquatic ecology assessment for the Proposed Development included the following ecological features:
- Statutory and non-statutory designated nature conservation sites;
- Aquatic Invasive Non-Native Species (INNS);
- Catchment-wide and cross-catchment desk study to establish records of protected / notable species and INNS in the study area;
- Freshwater pearl mussel habitats;
- Aquatic macrophytes;
- Aquatic macroinvertebrates;
- Fish and fish habitats.

Information about the water environment receptors within the aquatic ecology study area that were deemed likely to be affected by the Controlled Activity and thus are considered in this assessment are found within **Table 6-1** below.

Table 6-1. Receptors (waterbodies, watercourses, habitats, species, and assemblages) within the aquatic ecology study area that were deemed likely to be affected by the Controlled Activity.

Receptor	Ecological Status /Level of Importance	Factor Type	Scale of the area and impact of the controlled activity
Loch Awe (ID 100585)	High (National) Importance	Waterbody	Entirety of the Loch
Loch Fyne (ID 200334)	Medium (Regional) Importance	Waterbody	Short term localised impact directly associated with jetty location
Allt na Cuile Riabhaiche and tributaries (LA2)	Low (Local) Importance	Watercourse	Localised areas where the Upper Sonachan / Keppochan Forest track crosses the watercourse
Keppochan River and tributaries (LA3)	Low Importance	Watercourse	Localised areas where the Upper Sonachan / Keppochan Forest track crosses the watercourse
Archan River and tributaries (LA4)	Low Importance	Watercourse	Localised areas where the Upper Sonachan / Keppochan Forest track crosses the watercourse
Allt a Chrosaid and small lochan (LA5)	Low Importance	Watercourse	Localised areas near PC21 and at the existing B840 crossing.
Allt Beochlich and tributaries (LA6)	Medium Importance	Watercourse	Large downstream sections
Lochan Airigh (LA7)	Medium (Regional) Importance	Waterbody	Lochan will be located to the south-west of the Proposed Development .
Lochan Beochlich (LA8)	Low Importance	Waterbody	Mouth of Allt Beochlich at the Lochan, and localised areas near TC07 and PC09
Lochan Romach (LA10)	Low Importance	Waterbody	Localised areas near PC21 and at the existing B840 crossing
Allt na Fainge (LA12)	Low Importance	Watercourse	Localised areas near B840 upgrades
Allt a' Ghreataidh (LA13)	Low Importance	Watercourse	Localised areas near B840 upgrades
Allt Mor (LA14)	Medium Importance	Watercourse	Localised areas near B840 upgrades
Cladich River/Allt an Stacain (LA17)	Medium Importance	Watercourse	Potential sections where hydraulically linked to Keppochan and Archan rivers
River Aray and tributaries (LF1)	Medium (Regional) Importance	Watercourse	Localised areas near Access Track upgrades
Crom Allt and tributaries (LF2)	Low Importance	Watercourse	Localised areas near Access Track upgrades and jetty construction
Unnamed watercourse (LA18)	Low Importance	Watercourse	Localised areas near B840 upgrades
Atlantic salmon	International importance	Fish species	Loch Awe and Allt Criche
Brown trout	Regional importance	Fish species	Loch Awe, Lochan Airigh and Allt Beochlich
Arctic char	Regional importance	Fish species	Loch Awe
European eel	Regional Importance	Fish species	Loch Awe
Lamprey species	Regional importance	Fish species	Loch Awe
Aquatic macrophytes	Local importance	Macrophyte species	All affected watercourses and waterbodies
Macroinvertebrates	Local importance	Macroinvertebrate species	All affected waterbodies and watercourses
Other fish	Local importance	Fish species	All affected waterbodies and watercourses

6.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b) Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- SEPA (2017a) WAT-RM-34: Derogation Determination – Adverse Impacts on the Water Environment;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 7 Aquatic Ecology;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 8 Marine Ecology;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 7.1 – Aquatic Ecology Baseline Report;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 11 – Water Environment.
- AECOM. (2025) Balliemanoch Pumped Storage Hydro Further Environmental Information Report.

6.3 Consultation

The assessment of impacts on aquatic ecology features has been informed by consultation held with several statutory and non-statutory consultees listed below.

- NatureScot
- Argyll District Salmon Fishery Board
- Marine Scotland Science
- Fisheries Management Scotland
- SEPA
- Argyll & Bute Council
- Peel Port Group

Further comments were received subsequent to the submission of the scoping report from MOWI Scotland and Dawnfresh Fish Farming (which is a wholly owned subsidiary of MOWI Scotland).

6.4 Embedded Mitigation

Embedded mitigation measures are incorporated into the design of a development and aim to avoid or reduce adverse effects, including those on ecological features. Embedded mitigation can be considered at the impact assessment stage, whereas specific mitigation measures which are not part of the design and are developed after the initial impact assessment, are assessed in the Additional Mitigation section below.

Infrastructure Design

The Proposed Development has sought to avoid impacts on the relevant ecological features as far as possible by several infrastructure refinements embedded into the design, as set out below:

1. The implementation of sustainable drainage systems (SuDS) features and attenuation features will control runoff into watercourses and lochs and avoid contamination of these water bodies;

2. The design is for a completely 'closed-loop' system, whereby water will be drawn from Loch Awe to the Headpond and returned to Loch Awe via the tunnels. Therefore, the risk of water spilling into adjacent water bodies will be negligible.
3. The risk of cross-catchment contamination during construction, for example by the spread of INNS between Loch Fyne, Loch Awe, and other catchments, will be minimised by measures set out in the CEMP, and the incorporation of temporary SuDs and attenuation features in the intervening land.
4. Dust screens will be installed along Access Tracks to prevent contamination of the surroundings with dust and fine sediments during construction.
5. Where culverts are installed at watercourse crossings, i.e., for the installation of new watercourse crossings or the upgrade of existing crossings, the culvert invert will be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage through the culvert. Such culverts will be designed and installed according to SEPA best practice guidance².
6. Watercourse crossings (new or upgraded) where appropriate will be designed as bottomless arch watercourse crossings, which will maintain natural bed material to ensure continued longitudinal connectivity and fish passage.
7. Where possible, a 50m buffer from watercourses will be maintained to avoid the need for mitigation such as temporary silt fencing.
8. Pipeline and tunnel infrastructure will be installed by drill and blast avoiding impacts to surface habitats, including watercourses.
9. Screening requirements at the inlet / outlet on Loch Awe will be finalised through discussion with SEPA / NatureScot for the CAR Licence to prevent the entrapment and/or impingement of fish, and to minimise the transfer of INNS. More information on Proposed Development operation (e.g., turbine design & associated pressure changes), and liaison with SEPA would be required should deviation from best-practice screening be considered appropriate, for example in the presence of additional mitigation such as bubble curtains to deter fish from the inlet / outlet structure.
10. The maximum inlet velocity from Loch Awe is predicted to be 0.15 m/s given the size of the inlet structure and screen.

Additional Mitigation

A Construction Environmental Management Plan (CEMP) will be developed alongside the Construction Methodology report and will set out the methods and procedures that will be implemented by the Construction Contractor to minimise the environmental impact, including potential effects on aquatic habitats due to water quality, pollution, and runoff (refer also to EIA *Chapter 11: Water Environment*), and due to the potential spread of INNS. An Outline CEMP can be found in Appendix C. This would be expanded upon by the appointed contractor and considered a live document.

Cofferdam construction on Loch Awe: A silt curtain (or equivalent) will be installed before cofferdam works to limit sediment dispersal. Post-removal, localised dredging may be needed to clear material around piles, using a dredger and silt curtain. All works will be supervised by the Aquatic ECoW to manage risks to fish and control INNS.

Watercourse Crossings: Culverts for temporary access tracks will follow SEPA guidelines and the project Design Statement. The construction of watercourse crossings will avoid the migration and spawning seasons of resident brown trout and migratory Atlantic salmon, where those species are present (Atlantic salmon in Allt Criche (tributary of Erralich Water): BL-01; Brown/sea trout in four watercourses: Allt Criche (tributary of Erralich Water): BL-01; Erralich Water: BL02; River Aray: BL-22; Unnamed tributary of River Aray: BL-23). The seasons are January to March for brown trout spawning, and November to February for Atlantic salmon upstream migration and spawning.

Headpond & Embankments: Drainage and water management during these works will follow measures in the Design Statement and CEMP.

Spoil Management & Transport: Spoil management, including stockpiling and transport, will be managed per the Design Statement and CEMP, with measures to minimise runoff, dust, and contamination. A 50 m buffer to aquatic habitats will be maintained where possible, with silt fencing used as needed, overseen by the ECoW.

INNS: Measures to control the spread of INNS from Loch Awe, Loch Fyne, and transported materials are included in the project design and Outline CEMP.

A five-step balancing test is used to identify likely effects and their significance and is based on the methodology outlined in “Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1)’. This is detailed in the following sections.

6.5 Identifying Likely Effects

All effects are considered post mitigation and compensatory measures are not considered.

Negative Effects

Negative effects include those benefits which are likely to be foregone as a result of a proposal's impact on the water environment, and include:

- The benefits that are likely to be foregone by the affected water environment in cases where a proposal would result in deterioration of the water environment; and
- The benefits that would result if a waterbody was restored to its target objective in cases where a proposed development would prevent restoration.

Negative effects include direct effects of controlled activities (the Proposed Development) on the condition of the water environment and any consequent negative effects likely to result from the direct effects on the water environment.

Considerations are only given to negative effects resulting from changes to the water environment caused by the controlled activity. Any other potentially negative effects of other aspects of a development e.g. necessary infrastructure such as access roads are not considered within this assessment and should be taken into account by the relevant local authority.

The loss of benefits of improving the water environment are accounted for by assessing the negative effects of a proposed development as if the affected waterbody was achieving its target restoration objective.

Positive Effects

Positive effects include direct social, economic or environmental benefits which result from the Proposed Development and the indirect benefits which are likely to follow on from those direct benefits.

Only positive effects which are connected with, and resulting from, the controlled activity may be considered.

The following may not be considered as benefits of a controlled activity:

- Any benefit that is not directly dependent on the controlled activity and could be delivered.
- Benefits resulting from the way in which a developer might decide or propose to use the financial resources available to them e.g. “planning gain” type benefits.

Likely Effects

Table 6-2 below summarises likely effects resulting from the controlled activity.

The likely effects involving watercourse crossings for Temporary Access Tracks and temporary site compounds including diversion and culverting of watercourses, and temporary site drainage, including SuDs, settlement ponds, temporary ditches, and other drainage features are not included in the assessment as specified in the methodology.

Table 6-2. The likely effects of the controlled activity on relevant water environment receptors

Likely Effect	Area affected	Receptor affected	Effect Type (Positive or Negative)	Description of effect
Construction of the cofferdam on the shoreline of Loch Awe, including piling, de-watering, and substrate removal	Waterbody	Loch Awe habitat Atlantic salmon Brown/sea trout Arctic charr European eel Lamprey species Macrophytes Macroinvertebrate	Negative	<p>Noise from piling is expected to have a negative effect on fish during the construction of the Cofferdam on Loch Awe. To minimise the effects of noise from piling on fish, there should be a 'soft start' to piling works to deter fish from the immediate area where physical injury may occur. Mason and Collett (2011) suggest a soft start to piling using a blow energy of 150 kJ and show that using a soft start will have a lower impact on the salmon initially. Alternatively, vibro-driven piles will be used to minimise the effects of underwater noise and vibration on fish, including Atlantic salmon.</p> <p>Works in Loch Awe should be carried out under the supervision of an Aquatic ECoW. Blasting in the vicinity of Loch Awe to avoid the smolt migration season, to be determined.</p> <p>Avoidance of salmon smolt (downstream) migration seasons (April to June inclusive) – it is considered that the proposed mitigation below will be sufficient to deter adult salmon from the Tailpond Intake / Outlet during their upstream migration and therefore mitigate adverse effects.</p> <p>The installation of a silt curtain/bubble screen to deter fish from the works area, positioned a minimum 30 m distance from the location of piling.</p> <p>A fish rescue will be required during de-watering of the cofferdam as it is highly likely that fish will congregate in these sheltered areas during Construction and then become trapped as the cofferdam is sealed.</p>
Loss of aquatic habitat due to construction of the Headpond and Embankments	Waterbodies and Watercourses	Part of the upstream catchment of Allt Beochlich / Buinne Dhubh Macrophytes Macroinvertebrates Other fish	Negative	<p>Loss of part of the upstream catchment of Allt Beochlich / Buinne Dhubh as a result of construction of the Headpond and Embankments. Loss of habitat which supports freshwater aquatic species because of the construction of infrastructure associated with the Proposed Development, potentially resulting in the disturbance or displacement of species during Construction.</p> <p>Works in this area will be supervised by the ECoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the runoff of silt-laden water to adjacent watercourses and water bodies.</p>
Loss of aquatic habitat due to construction of Marine Facility	Waterbodies	Loch Fyne Macrophytes Macroinvertebrates Other fish	Negative	<p>Pollution and loss of habitat due to the construction of infrastructure associated with the Proposed Development .</p>
Impacts to water quality during construction	Waterbodies	Loch Awe habitat Fish community in Loch Awe: Atlantic salmon Brown/sea trout	Negative	<p>Pollution during the construction of the cofferdam, access to the cofferdam, and during Inlet / Outlet structure excavation and construction; Impacts due to the transport of excavated tunnel material to the Headpond via dump trucks, and spoil</p>

Likely Effect	Area affected	Receptor affected	Effect Type (Positive or Negative)	Description of effect
		Arctic char European eel Lamprey species Macrophytes Macroinvertebrates Other fish species Atlantic Salmon and brown / sea trout in Allt Criche Brown / sea trout in Erralich Water, River Aray, and Unnamed tributary LA18		management of material from tunnelling works. Pollution and runoff may impact water quality, which may have an impact on spawning success for species of up to High importance (salmon). Installation of temporary site drainage will be supervised and monitored by the ECoW to ensure that it is effective in preventing the contamination of watercourses and water bodies. The implementation of SuDS features and attenuation features will control runoff into watercourses and Lochs and avoid contamination of these water bodies. Dust screens will be installed along Access Tracks to prevent contamination of the surroundings with dust and fine sediments during construction. Where possible, a 50 m buffer from watercourses and water bodies will be maintained to avoid the need for mitigation such as temporary silt fencing. Where considered necessary to prevent silt-laden runoff into aquatic habitats, silt fencing will be installed alongside spoil stockpiles. This will be supervised and monitored by the ECoW to ensure that silt control measures are effective.
Impacts to water quality during construction	Waterbodies and Watercourses	Lochan Breac-liath Watercourses and waterbodies downstream of the Embankment areas	Negative	Pollution from the construction of the Embankments at the Headpond. The implementation of SuDS features and attenuation features will control runoff into watercourses and Lochs and avoid contamination of these water bodies.
Impacts to water quality during construction	Waterbodies	Allt na Cuile Riabhaiche and tributaries (LA2) Keppochan River and tributaries (LA3) Archan River and tributaries (LA4) Allt a Chrosaid and small lochan (LA5) Allt Beochlich and tributaries (LA6) Lochan Beochlich (LA8) Lochan Romach (LA10) Allt na Fainge (LA12) Allt a' Ghreataidh (LA13) Alt Mor (LA14) River Aray and tributaries (LF1) Crom Allt and tributaries (LF2) Unnamed watercourse (LA18)	Negative	Pollution during the upgrade, construction or excavation of Access Tracks and compounds, and the construction of watercourse crossings. The implementation of SuDS features and attenuation features will control runoff into watercourses and Lochs and avoid contamination of these water bodies.
Impacts on fish passage	Waterbodies	Atlantic Salmon Brown trout	Negative	Potential barriers to fish passage, such as culverts and watercourse crossings may need to be introduced, impacting migratory species. Culverting of watercourses will be done under the supervision of the Aquatic ECoW, require sections to be isolated and fish rescues carried out. This process will

Likely Effect	Area affected	Receptor affected	Effect Type (Positive or Negative)	Description of effect
				<p>be informed by the fish surveys of watercourse crossing locations.</p> <p>Electric fishing surveys will be undertaken to inform mitigation for permanent and temporary watercourse crossings. Fish rescue and translocation may be required during construction.</p> <p>Where culverts are installed at watercourse crossings, the culvert invert will be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage through the culvert in line with SEPA best practice guidance.</p> <p>Watercourse crossings (new or upgraded) where appropriate will be designed as bottomless arch watercourse crossings.</p>
Potential spread or introduction of INNS	Waterbodies and Watercourses	Loch Awe habitat Lochan Airigh Loch Fyne Lochan Breac-liath Allt Criche Erralich Water River Aray Unnamed tributary LA18 Atlantic salmon Brown trout Macrophytes Macroinvertebrates Other fish species	Negative	<p>Impacts of the spread of INNS through the Proposed Development Site, and due to transporting materials onto or away from the Proposed Development Site, and the potential introduction of INNS through the operation of the Proposed Development. Potential to be spread at Loch Fyne due to transport of materials via barge.</p> <p>Survey of the extent of the proposed cofferdam and temporary jetty works in Loch Awe for the presence of INNS, notably Elodea sp. (Nuttall's waterweed and/or Canadian pondweed).</p> <p>Walkover survey of watercourse crossing locations for INNS, both aquatic and riparian species .</p> <p>Material excavated or dredged from Loch Awe must be retained in the immediate area, i.e., stockpiled on the loch shoreline, to prevent the spread of INNS, including Elodea sp., which is known to be present in Loch Awe.</p> <p>The Aquatic ECoW will supervise all excavation and dredging works in Loch Awe to check for the presence of INNS and ensure that appropriate biosecurity measures, as detailed in the CEMP, are implemented.</p> <p>Biosecurity measures should be implemented throughout the Proposed Development , following 'Check, Clean, Dry' principles as set out in the CEMP.</p>
Operational impacts on water levels and water quality in Loch Awe	Waterbodies	Loch Awe habitat Atlantic salmon Brown/sea trout European eel Lamprey species Aquatic macrophytes, Macroinvertebrates Other fish species	Negative	<p>Impacts on water levels and water quality in Loch Awe due to regular generation cycles with water pumped up to the Headpond then returned to the loch causing a distraction from migratory routes for salmon (including smolts) and other migratory species, including increased risk of predation. Impacts on water quality in Awe Ness during generation cycles with water returned to the loch (e.g., temperature fluctuations).</p> <p>Changes to water quality in Loch Awe during generation cycles, including temperature changes and potential effects on thermal stratification. Impacts on marginal habitats in Loch Awe, including impacts to flora and fauna inhabiting marginal habitats as a result of increased frequency of water level fluctuations.</p>

Likely Effect	Area affected	Receptor affected	Effect Type (Positive or Negative)	Description of effect
Improving the upstream and downstream passage of migratory fish in Loch Awe and the Loch Awe barrage	Waterbodies and Watercourses	Loch Awe River Awe Atlantic salmon Loch Awe habitat Brown/sea trout European eel Lamprey species	Negative	Fluctuations in water levels have the potential to impact fish passage and therefore the migratory success of fish species in the Loch and River Awe.
Effects of the Tailpond Intake / Outlet, including screen during operation	Waterbodies	Loch Awe habitat Atlantic salmon Fish assemblage of Regional importance in Loch Awe Other fish species, macrophytes, and macroinvertebrates in Awe Ness	Negative	Entrainment / impingement of fish at the Inlet / Outlet Smolt Screen, and distraction from migratory routes due to the operation of the water Intake / Outlet.

6.6 Assessing the Effects on Aquatic Biodiversity

Assessing the Scale and Magnitude of the Effects

The scale and duration of an effect are used to assess its magnitude.

The scale of an effect depends on the following:

- The severity of the impact on plants and animals that are directly affected;
- The spatial extent over which a direct impact occurs; and
- the overall consequences of the direct impact for the conservation of affected species or assemblages

The scale of likely effects is assessed using the SEPA guidance in Figure 6-1 and Figure 6-2 below.

The indicative guide in **Figure 6-3** is used to identify the magnitude of likely effects.

Length of watercourse affected (km)		< 0.1	0.1 < 0.5	0.5 to < 1.5	1.5 to < 5	5 to < 10	10 to < 20	≥ 20
Extent of any relevant habitat or species population affected as a proportion the total relevant habitat or species population of the "high biodiversity interest site" (%)		< 0.1	0.1 < 1	1 to < 2	2 to < 10	10 to < 20	20 to < 30	≥30
Change in condition								
H → G	Minor or slight	N	N	VS	VS - S	S - M	M	M - L
P ↔ B M ↔ P G ↔ M H → M	Slight or moderate	N	N - VS	VS - S	S - M	M	M - L	L
G ↔ P H → P	Major	N	VS	S	M	M - L	L - VL	L - VL
M ↔ B G ↔ B H → B	Major or severe	N - VS	VS - S	S - M	M - L	L	L - VL	VL
<p>Notes</p> <p>"High biodiversity interest site" means one of such sites referred to in Table 4.</p> <p>To assess the likely change in condition, you should apply the appropriate environmental standards. In this context, "change in condition" includes changes that do not affect the status of the water body as a whole (eg because the spatial extent over which the change occurs is too limited, etc).</p> <p>The scale of an effect on a high biodiversity interest site should only be assessed if the change in condition is expected to affect the particular biodiversity interest of that site. Where the particular interest is likely to be affected, you should assess the likely change in its condition. This scale of change in its condition may differ substantially from that of other aspects of the ecological quality of the affected part of the watercourse.</p> <p>N = negligible; VS = very small; S = small; M = medium; L = large; and VL = very large H = high; G = good; M = moderate; P = poor; and B = bad.</p>								

Figure 6-1. WAT-SG-67 Table 6: Scale assessment guidance for effects on the biodiversity of watercourses

Area of loch affected (ha)		< 0.5	0.5 < 2.5	2.5 to < 7.5	7.5 to < 50	50 to < 100	100 to < 500	≥ 500
Length of loch shore affected (km)		<0.1	0.1 < 0.5	0.5 to < 1.5	> 1.5 to < 5	> 5 to < 10	> 10 to < 20	≥ 20
Extent of any relevant habitat affected as a proportion the total relevant habitat of the "high biodiversity interest site" (%)		< 0.1	0.1 < 1	1 to < 2	2 to < 10	10 to < 20	20 to < 30	≥30
Change in condition								
H → G	Minor to slight	N	N	VS	VS - S	S - M	M	M - L
P ↔ B M ↔ P G ↔ M	Slight to moderate	N	N - VS	VS - S	S - M	M	M - L	L
H → M G ↔ P H → P	Major	N	VS	S	M	M - L	L - VL	L - VL
M ↔ B G ↔ B H → B	Major to severe	N - VS	VS - S	S - M	M - L	L	L - VL	VL
<p>Notes</p> <p>Depending on the proposed activity, the effects may be concentrated along the shore of the loch or extend across the body of the loch. You should refer to the most relevant of the first two rows of the table when assessing the scale of the effect.</p> <p>"High biodiversity interest site" means one of such sites referred to in Table 4.</p> <p>To assess the likely change in condition, you should apply the appropriate environmental standards. In this context, "change in condition" includes changes that do not affect the status of the water body as a whole (eg because the spatial extent over which the change occurs is too limited, etc).</p> <p>The scale of an effect on a high biodiversity interest site should only be assessed if the change in condition is expected to affect the particular biodiversity interest of that site. Where the particular interest is likely to be affected, you should assess the likely change in its condition. This scale of change in its condition may differ substantially from that of other aspects of the ecological quality of the affected part of the watercourse.</p> <p>N = negligible; VS = very small; S = small; M = medium; L = large; and VL = very large H = high; G = good; M = moderate; P = poor; and B = bad.</p>								

Figure 6-2. WAT-SG-67 Table 7: Scale assessment guidance for effects on the biodiversity of waterbodies

Duration of effect	Scale of effect				
	V Small	Small	Medium	Large	V Large
Only lasts up to around 1 year	VS	VS	VS	S	M
Only lasts up to around years 6 years	VS	VS	S	M	L
Lasts significantly more than 6 years	VS	S	M	L	VL
Starts up to around 2 to 3 years earlier*	VS	S	M	L	VL
Starts up to 3 to 12 years earlier*	VL	S-M	M-L	L	VL
Starts more than 12 years earlier*	S	M	L	L-VL	VL

Notes:
You should use these rows in the table when you are assessing a benefit that is already expected to be delivered through the implementation of the river basin management plan (RBMP) but which is expected to be realised sooner as a result of the proposal (ie the proposal will enable the early achievement of an RBMP improvement objective).
If you have assessed the scale of an effect as being negligible, you should not consider that effect further in your assessments.

Figure 6-3. WAT-SG-67 Table 1: Indicative guide to assessing the magnitude of an effect

Table 6-3. The magnitude of each effect resulting from the controlled activity

Likely Effect	Scale	Justification of scale	Duration of effect	Magnitude of effect
Construction of the cofferdam on the shoreline of Loch Awe, including piling, de-watering, and substrate removal	Small	The likely effect will only occur over a small area of the loch (7.5 to 50 hectares (ha)). A slight change in condition is likely to occur.	Only lasts up to around one year	Very Small
Loss of aquatic habitat due to construction of the Headpond and Headpond Embankments	Small	The likely effect will occur over a small section of the Allt Beochlich / Buinne Dhubh catchment, with major changes in condition.	Only lasts up to around 6 years	Very Small
Loss of aquatic habitat due to construction of Marine Facility	Very Small	The likely effect will occur over a small area of Loch Fyne (0.5 to 2.5ha). A slight change in condition is likely to occur.	Only lasts up to around 6 years	Very Small
Impacts to water quality during construction	Small	The likely effect will only occur over a small area of the loch (7.5 to 50 ha), and small sections of watercourse (less than 10 km). A slight change in condition is likely to occur. Given that Construction will adhere to measures outlined in the CEMP, the potential impacts to species within these water bodies is low.	Only lasts up to around 6 years	Very Small
Impacts to water quality during construction	Medium	The likely effect will occur over a moderate area of watercourse under 10 km in length. Given that Construction will adhere to measures outlined in the CEMP, the potential impacts water quality within these waterbodies downstream are low.	Only lasts up to around 6 years	Small
Impacts to water quality during construction	Medium	The likely effect will occur over a moderate area of watercourse under 10 km in length. Given that Construction will adhere to measures outlined in the CEMP and implement SuDS, the change in condition will be moderate.	Only lasts up to around 6 years	Small
Impacts on fish passage	Small	The likely effect will occur over a moderate area of watercourse under 10 km in length. Given the culverting, watercourse crossings, and surveys	Significantly longer than 6 years	Small

Likely Effect	Scale	Justification of scale	Duration of effect	Magnitude of effect
		stipulated, the change in condition should be moderate.		
Potential spread or introduction of INNS	Small	Equipment and materials will be transported to Loch Awe and to the Proposed Development Site via the marine facility on Loch Fyne. Therefore, the potential for the spread of INNS from elsewhere on the Proposed Development Site or off-site to Loch Awe because of construction activity is considered low and will affect small area of Loch Awe where the Inlet / Outlet structure is being situated, a length of Loch shore of approximately 1.5 km in length.	Significantly longer than 6 years	Small
Operational impacts on water levels and water quality in Loch Awe	Large	Entirety of Loch Awe will be affected by slight to moderate changes in water level and water quality, an area of over 500 hectares.	Significantly longer than 6 years	Large
Improving the upstream and downstream passage of migratory fish in Loch Awe and the Loch Awe barrage	Very small	The likely effect will occur over Loch Awe, but only concentrated around the Inlet / Outlet Structure, so will impact only a small area (0.5 to 2.5ha). With the surveys and culverting, the likelihood of the impact will be minimal.	Lasts significantly longer than 6 years	Very Small
Effects of the Tailpond Intake / Outlet, including screen during operation	Very small	The likely effect will occur over a moderate length of shoreline under approx. 1.5 km in length. The installation of a non-physical deterrent (to be finalised at detailed design) to deflect fish away from the smolt screen during key migration seasons (downstream smolt migration April to June inclusive). As a final mitigation option, curtailment of the operation of the Proposed Development could be instigated during the smolt migration season.	Lasts significantly longer than 6 years	Very Small

Assessing the Importance of the Effects

The importance of each affected factor is determined by its environmental value to society. For example, a factor which is of national importance will be of greater significance than the same magnitude of effect on a factor of local importance.

Figure 6-4 is used to determine the importance of each affected factor.

Low importance	<p>The part of the water environment concerned is:</p> <ul style="list-style-type: none"> • a loch that is locally rare or otherwise locally important based on its type and condition. To assess this, you should consider the frequency (locally, regionally and nationally) of lochs of the same or similar type and status to the loch concerned; or • a river or stream of low importance as identified according to Table 5 based on its type and condition; or • a high biodiversity interest site designated as a <i>Local nature reserve</i> or a <i>Local nature conservation site</i>.
Medium importance	<p>The part of the water environment concerned is:</p> <ul style="list-style-type: none"> • a loch that is regionally rare or otherwise regionally important based on its type and condition. To assess this, you should consider the frequency (locally, regionally and nationally) of lochs of the same or similar type and status to the loch concerned; or • a river or stream of medium importance as identified according to Table 5 based on its type and condition; or • a high biodiversity interest site because it plays an ecologically significant role in maintaining the ecological health of a large (regional-scale) river basin; or • a high biodiversity interest site because it supports a significant proportion of a habitat or a significant population of a species on the <i>Scottish Biodiversity List</i>. • a high biodiversity interest site because it supports a significant population of a species for which there is an <i>ICES</i> emergency plan (eg European eel).
High importance	<p>The part of the water environment concerned is:</p> <ul style="list-style-type: none"> • a loch that is nationally rare or otherwise nationally important based on its type and condition. To assess this, you should consider the frequency (locally, regionally and nationally) of lochs of the same or similar type and status to the loch concerned; or • a river of high importance as identified according to Table 5 based on its type and condition; or • a high biodiversity interest site designated as such (eg <i>Sites of Special Scientific Interest; National Nature Reserves</i>) because of its national importance for the conservation of a species it supports; a habitat it contains; or the rarity or quality of its geomorphological characteristics; or; or; • a high biodiversity interest site because it supports a nationally important assemblage of <i>Oceanic bryophytes</i>.
Very high importance	<p>The part of the water environment concerned is:</p> <ul style="list-style-type: none"> • a high biodiversity interest site designated as such because of its international importance for the conservation of a species it supports or a habitat it contains (ie <i>Special Areas of Conservation, Special Protection Areas or Ramsar sites</i>); or • a high biodiversity interest site because it supports a significant population of a globally threatened species (ie an <i>IUCN Red List of Threatened Species</i> species such as freshwater pearl mussel); or • a high biodiversity interest site because it supports an internationally important assemblage of <i>Oceanic bryophytes</i>.

Figure 6-4. WAT-SG-67 Table 4: Guidance to assessing the importance of an effect on the biodiversity of the water environment

Table 6-4 below summarises the importance of each factor effected by the controlled activity

Where a likely effect has multiple factors of varying importance, justification has been provided on the basis of one of the most important factors.

Table 6-4. The importance of each factor effected by the controlled activity.

Likely Effect	Importance	Justification
Construction of the cofferdam on the shoreline of Loch Awe, including piling, de-watering, and substrate removal	High	Loch Awe is assessed as of National value as it represents SBL Priority Habitat Oligotrophic and dystrophic lakes and is an important resource of large lochs of this size nationally.
Loss of Aquatic Habitat due to Construction of the Headpond and Headpond Embankments (waterbodies)	Medium	Allt Beochlich has a medium importance for hydromorphology, and as the current ecological status is unknown, the importance is assumed as Medium.
Loss of aquatic habitat due to construction of Marine Facility	Medium	Based on Atlantic salmon, brown / sea trout, lamprey and European eel all being on the SBL, the importance of the effect is Medium. Species and assemblages of regional importance (Brown/sea trout, Arctic charr, three-spined stickleback, and lamprey species) and local importance (macrophytes, macroinvertebrates and other fish) are also concerned.
Impacts to water quality during construction	High	The part of the water environment concerned is of national significance (Loch Awe and Atlantic salmon). Additionally, Atlantic salmon, brown / sea trout, lamprey and European eel all being on the SBL, have been identified in Loch Awe.
Impacts to water quality during construction	Medium	The part of the water environment concerned is of regional significance (Lochan Breac-liath), although no rare or notable species were recorded within the Lochan.

Likely Effect	Importance	Justification
Impacts to water quality during construction	Medium	River Aray is deemed as having Regional value due to brown trout spawning. Species and assemblages of local importance (brown trout, macrophytes, macroinvertebrates and other fish species) are also concerned.
Impacts on fish passage	Medium	Based on Atlantic salmon being on the SBL. Species and assemblages of local importance (Brown trout, macrophytes, macroinvertebrates and other fish species) are also concerned.
Potential spread or introduction of INNS	High	The part of the water environment concerned is of national significance (Loch Awe habitat and Atlantic salmon). Species and assemblages of regional importance (Brown/sea trout, European eel, and lamprey species) and local importance (macrophytes, macroinvertebrates and other fish) are also concerned.
Operational impacts on water levels and water quality in Loch Awe	High	The part of the water environment concerned is of national significance (Loch Awe). Salmon is a European protected species, and is on the SBL (along with brown / sea trout, lamprey, and European eel) and is present in Loch Awe.
Improving the upstream and downstream passage of migratory fish in Loch Awe and the Loch Awe barrage	High	The part of the water environment concerned is of national significance (Loch Awe). Salmon is a European protected species, and is on the SBL (along with brown / sea trout, lamprey, and European eel) and is present in Loch Awe. Species and assemblages of regional importance (Brown/sea trout, European eel, and lamprey species) and local importance (macrophytes, macroinvertebrates and other fish) are also concerned.
Effects of the Tailpond Intake / Outlet, including screen during operation	High	The part of the water environment concerned is of national significance (Loch Awe habitat and Atlantic salmon). Species and assemblages of regional importance (Brown/sea trout, European eel, and lamprey species) and local importance (macrophytes, macroinvertebrates and other fish) are also concerned.

Assessing the Significance of the Effects

The significance of an effect is dependent on the importance of a factor and the magnitude of the effect on the factor.

Figure 6-5 is used to judge the significance of an event.

Importance of affected factor	Magnitude of effect					
	Negligible	V Small	Small	Medium	Large	V Large
Very low / negligible	N	N	N	N	N	N
Low	N	VL	VL	L	M	M-H
Medium	N	VL	L	M	M-H	H
High	N	VL-L	M	H	H-VH	VH
Very High	N	L	M-H	H-VH	VH	VH

Key:
N = negligible significance; VL = very low significance; L = low significance; M = moderate significance; H = high significance; and VH = very high significance.

Figure 6-5. WAT-SG-67 Table 2: Indicative guide to assessing the significance of an effect

Table 6-5 below summarises likely significance of each effect likely occur as a result of the controlled activity.

Table 6-5. The significance of each effect likely to occur as a result of the controlled activity.

Likely Effect	Positive or Negative	Scale	Duration of effect	Magnitude of effect	Importance	Significance
Construction of the cofferdam on the shoreline of Loch Awe, including piling, de-watering, and substrate removal	Negative	Small	Only lasts up to around one year	Very Small	High	Low

Likely Effect	Positive or Negative	Scale	Duration of effect	Magnitude of effect	Importance	Significance
Loss of aquatic habitat due to construction of the Headpond and Headpond Embankments	Negative	Small	Only lasts up to around 6 years	Very Small	Medium	Very Low
Loss of aquatic habitat due to construction of Marine Facility	Negative	Very Small	Only lasts up to around 6 years	Very Small	Medium	Very Low
Impacts to water quality during construction	Negative	Small	Only lasts up to around 6 years	Very Small	High	Low
Impacts to water quality during construction	Negative	Medium	Only lasts up to around 6 years	Small	Medium	Low
Impacts to water quality during construction	Negative	Medium	Only lasts up to around 6 years	Small	Medium	Low
Impacts on fish passage	Negative	Small	Significantly longer than 6 years	Small	Medium	Low
Potential spread or introduction of INNS	Negative	Small	Significantly longer than 6 years	Small	High	Medium
Operational impacts on water levels and water quality in Loch Awe	Negative	Large	Significantly longer than 6 years	Large	High	Very high
Improving the upstream and downstream passage of migratory fish in Loch Awe and the Loch Awe barrage	Negative	Very small	Lasts significantly longer than 6 years	Very Small	High	Low
Effects of the Tailpond Intake / Outlet, including screen during operation	Negative	Very small	Lasts significantly longer than 6 years	Very Small	High	Low

Weighing up the Effects

SEPA makes the final judgement about where the balance of positive and negative effects lie but this will be based on the recommendation in this report.

Figure 6-6 below is used to inform this recommendation.

When considering the benefits of sustainable development. The guidance on sustainable development outline in 'WAT-RM-34: Derogation Determination - Adverse Impacts on the Water Environment' is also considered.

(a)	Is there a clear difference between the highest significance positive effect and the highest significance negative effect?
(b)	If (a) is not decisive, is there a clear difference in the number of the highest significance positive effects and the number of the highest significance negative effects?
(c)	If neither (a) or (b) is decisive, is there a clear difference between the number of positive and negative effects at the next lowest significance category?
(d)	If neither (a), (b) or (c) is decisive, can the balance of positive and negative effects be distinguished by considering where each effect lies within its significance category? For example, if there are two positive and two negative effects in the same significance category, is one or both of the positive effects clearly towards the top end of the significance category whilst both the negative effects are clearly towards the bottom end of the significance category?
(e)	If the balance remains unclear, is one or more of the factors positively impacted clearly of more importance than any of the factors that are negatively impacted or vice versa?

Figure 6-6. Guidance to determining the balance of the positive and negative effects

11 effects that may occur as a result of the controlled activity were recognised as part of this assessment. All 11 of these effects were negative.

The significance of negative effects ranged from low to medium to very high. The medium to very high significance which was assigned to some effects was due to the large scale of the project and the corresponding large scale over which the effects are likely to occur.

Notable concerns raised by Consultees focus on the potential effects of the Proposed Development on migratory fish species, the impact of the change in water quality on fish species, and the distraction, entrainment or impingement of fish at the intake screen of the Tailpond Inlet/Outlet structure.

A suite of mitigation measures in addition to mitigation embedded in the design of the Proposed Development is proposed, including, measures to deter salmon smolts from the intake screen, installation of improved fish passage at watercourse crossings, translocation of fish should it be required, and biosecurity measures to prevent the spread of INNS.

7. Effects on Biodiversity – Marine

7.1 Introduction

This chapter identifies the potential impacts and effects to marine ecology and nature conservation of Pre-Construction and Enabling, Construction and Operational phases (including maintenance) of the Proposed Development for the purposes of Controlled Activity Regulations.

This chapter concerns the Marine Facility, located south of Inveraray, which is comprised of a jetty constructed into Loch Fyne, a sea loch extending from the Firth of Clyde, where a direct impact is likely to occur during the construction and operation of the Proposed Development as a result of the controlled activity. Committed mitigation has been considered and predicted impacts are considered post mitigation.

Scope of Assessment

This chapter sets out a review of the existing marine ecological baseline conditions and assesses the potential permanent and temporary impacts from the Proposed Development. The marine ecological receptors that are considered in this chapter are:

- Benthic ecology (including INNS);
- Fish and shellfish;
- Marine mammals; and,
- Relevant designated sites.

For planning and consenting purposes the marine environment is defined as any area seaward of the mean high-water springs mark of any tidally influenced water body. Thus, it includes intertidal zones, which are periodically exposed by the tide and subtidal zones which are always submerged.

For the purposes of this assessment, important marine ecological features were taken to include:

- Qualifying features of Marine Protected Areas (MPA);
- Marine features of Special Areas of Conservation (SAC);
- Marine species listed on Schedules 2 and 4 of the Habitats Regulations,
- Marine species listed on Schedules 5 and 8 of the WCA,
- Priority Marine Features, as adopted by Scottish ministers (Tyler-Walters et al., 2016); and,
- Species or habitats indicated to be priorities in the Argyll and Bute Local Biodiversity Action Plan.

The Proposed Development directly overlaps with the Upper Loch Fyne and Loch Goil MPA and as such, direct impacts to the designated features of this site are likely to occur.

The remaining designated sites listed in **Chapter 8 of the EIAR** are each located >150 km from the Proposed Development Site. Although the marine mammal species for which these sites are designated are known to range over great distances, no connection has been reported between the populations of these sites and Loch Fyne. Occasional visitors are known to occur within the upper reaches of the loch, but no resident populations or regular visitors occur. As such, these sites have been screened out of any further assessment and only the Upper Loch Fyne and Loch Goil MPA is considered.

Information about the receptors that are considered in this assessment are found within **Table 7-1** below.

Table 7-1. Marine Ecology Receptor Sensitivity

Receptor	Relevant species or habitats	Sensitivity	Justification
Benthic Ecology	Kelp and seaweed communities on sublittoral sediment Burrowed mud Fireworks anemone	High	These habitats and species were observed in project-specific benthic surveys and are designated as PMFs in Scotland. Burrowed mud is also a designated feature of the Loch Fyne and Loch Goil MPA.
Fish and Shellfish	Migratory fish (e.g. Atlantic salmon, sea trout, European eel, lamprey)	High	Atlantic salmon, European eel, and lamprey are protected in the UK as Annex II species under the Conservation of Habitats and Species Regulations 2017. All species are Priority Marine Features (PMFs) in Scotland. Both Atlantic salmon and sea trout are associated with rivers in the upper loch and as such, may migrate through the Proposed Development Site.
Marine Mammals	Harbour seal Harbour porpoise Bottlenose dolphin	High	Protected in the UK as Annex II species under the Conservation of Habitats and Species Regulations 2017 and listed as PMFs in Scotland. Harbour seal are resident in the lower loch, with harbour porpoise and bottlenose dolphins likely occasional visitors.
Designated Sites	Upper Loch Fyne and Loch Goil MPA	High	Directly overlaps with Proposed Development Site. Designated for the protection of burrowed mud, sublittoral mixed sediment, flame shell beds, horse mussel beds; and ocean quahog aggregations. Of these features, only burrowed mud was observed in project-specific benthic surveys within the study area.

7.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- SEPA (2017a) WAT-RM-34: Derogation Determination – Adverse Impacts on the Water Environment;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 7 Aquatic Ecology;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 8 Marine Ecology;
- AECOM. (2025) Balliemanoach Pumped Storage Hydro Further Environmental Information Report.

7.3 Consultation

The assessment of impacts on aquatic ecology features has been informed by consultation held with several statutory and non-statutory consultees listed below.

- NatureScot
- Peel Port Group
- Marine Scotland Science

- Argyll & Bute Council

7.4 Embedded Mitigation

Embedded mitigation measures are incorporated into the design of a development and aim to avoid or reduce adverse effects, including those on ecological features. Embedded mitigation can be considered at the impact assessment stage, whereas specific mitigation measures which are not part of the design and are developed after the initial impact assessment, are assessed in the Additional Mitigation section below.

The Proposed Development has sought to avoid impacts on the relevant marine ecological features as far as possible by several infrastructure refinements embedded into the design, as set out below:

- The installation of the piles during the construction of the jetty will be undertaken using vibratory piling wherever possible and impact piling only used where necessary to drive the pile toe into bedrock;
- Where impact piling is used the project will follow the Joint Nature Conservation Committee (JNCC) guidance to minimise the risk of injury to marine mammals (JNCC, 2010) and such measures will be incorporated into the project CEMP;
- Measures in the Loch Fyne Marine Biosecurity Plan (Gov Scot, 2020) relevant to the construction methods used in the marine environment will be adopted and incorporated into the project CEMP;
- All vessels will follow the International Regulations for Preventing Collisions at Sea 1972 and International Convention for the Safety of Life at Sea 1974;
- All vessels will be in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations and will therefore be equipped with waste disposal facilities onboard. The discharging of contaminants is not permitted within 12 nautical miles from the coast to preserve bathing waters;
- Control measures and shipboard oil pollution emergency plans will be in place and adhered to under MARPOL Annex I requirements for all vessels;
- Ballast water discharges from all vessels will be managed under International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (Ballast Water Management Convention); and,
- All vessels will adhere to the International Maritime Organisation guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines) (resolution Marine Environment Protection Committee.207(62)).

Additional Mitigation

No additional mitigation was required as no significant effects on marine ecological receptors were identified.

7.5 Likely effects

The description of effect, receptors, effect, and residual effects as judged in Chapter 8 of the EIAR concerning marine ecology are listed below in **Table 7-2**. Note that as stated above, there is no additional mitigation, and therefore the residual effect is identical to the initial effect.

Table 7-2. Summary of likely effects on marine ecology

Description of effect	Receptor	Zone of Influence	Development Phase	Effect	Residual effect	Significance
Effects from underwater sound (UWS)	Fish & Shellfish Ecology Marine Mammal Ecology	Disturbance to some cetaceans may occur up to 26 km	Construction, operation, and decommissioning	Minor adverse	Minor adverse	Not significant
Permanent Loss of Benthic Habitat	Benthic Ecology	Installation of 72 piles of 0.6 m diameter giving a total footprint of 20.4 m ²	Construction	Minor adverse	Minor adverse	Not significant

Benthic habitat modification from the introduction of artificial structures on the substrate	Benthic Ecology	Installation of 72 piles of 0.6 m diameter giving a total footprint of 20.4 m ²	Construction	Minor adverse	Minor adverse	Not significant
Temporary physical disturbance to subtidal benthic habitats and species	Benthic Ecology	Footprint of jack up barge spud legs on the seabed estimated to be ~12 m ² (4 legs of 2 m diameter each).	Construction	Minor adverse	Minor adverse	Not significant
Temporary increase in SSC and sediment deposition leading to turbidity, smothering effects and contaminant mobilisation	Benthic Ecology Fish & Shellfish Ecology	Fine particulates may disperse up to 700 m away from the Marine Facility	Construction	Negligible	Negligible	Not significant
Disturbance to habitats and species due to scour from hydrodynamic change	Benthic Ecology Fish & Shellfish	Small region (<1 m) in the immediate vicinity of each pile	Operation	Minor adverse	Minor adverse	Not significant
Airborne sound and visual disturbance	Marine Mammal Ecology	500 – 1,500 m	Construction, operation, and decommissioning	Minor adverse	Minor adverse	Not significant
Vessel collision risk	Marine Mammal Ecology	Localised	Construction, operation, and decommissioning	Minor adverse	Minor adverse	Not significant
Reduction in water quality (discharges, unplanned releases, and accidental leaks and spills from vessels)	Benthic Ecology Fish & Shellfish Ecology Marine Mammal Ecology	700 m	Construction, operation, and decommissioning	Negligible	Negligible	Not significant
Introduction and spread of INNS	Benthic Ecology	700 m	Construction, operation, and decommissioning	Negligible	Negligible	Not significant

7.6 Assessing the Effects on Marine Biodiversity

Assessing the Scale of the Effects

The scale of likely effects is assessed using the SEPA guidance in **Figure 6-1** and **Figure 6-2**, however these do not account for marine environments. In the absence of relevant tables, the Clyde basin is assumed as a 'freshwater loch' to allow for Figure 5 to be used.

On this basis, the scale of the effect is Negligible, as the extent of any relevant habitat effected is assumed to be < 0.1.

Assessing the Magnitude of the Effects

The indicative guide in **Figure 6-3** is used to identify the magnitude of likely effects. Given the scale specified, and the duration of the effect being solely during the Construction phase of the project, which is approximately 7 years, the magnitude of the effect is assessed as Very Small.

Assessing the Importance of the Effects

The importance of likely effects is assessed using the SEPA guidance in **Figure 6-4**.

Based on Atlantic salmon, brown / sea trout and lamprey all being on the SBL, the importance of the effect on marine ecology is Medium.

Assessing the Significance of the Effects

Figure 6-5 is used to judge the significance of an event. Given the magnitude and importance, the significance of the effect is Very Low.

8. Effects on Biodiversity - Land

8.1 Terrestrial Biodiversity

This chapter addresses the potential impacts and effects of Pre-Construction and Enabling, Construction and Operational phases (including maintenance) of the Proposed Development on terrestrial biodiversity features for the purposes of Controlled Activity Regulations.

The controlled activities considered in this chapter include the construction of the headpond, impounding of water, and the abstraction and transfer of water between Loch Awe and the Proposed Development Headpond. Engineering works will be associated with these activities within and around lochs and rivers which is likely to impact upon aquatic habitats and the water environment.

This chapter concerns freshwater and ecological features, including waterbodies, watercourses, designated nature conservation sites, habitats, assemblages, and species, where a direct impact is likely to occur during the operation of the Proposed Development as a result of the controlled activity. Committed mitigation has been considered and predicted impacts are considered post mitigation.

A detailed assessment of the potentially impacted area was undertaken as part of the EIA for the Proposed Development. Within this section the matters relating to the CAR licence, the watercourses and waterbodies have been pulled from the EIA together with an assessment of the scale of impact in line with WAT-SG-67.

Two designated sites were identified and assessed in the EIA, the Loch Etive Woods SAC and Glen Shira SAC. Parts of Loch Etive Woods SAC are within the 10 km indicative distance of the Inlet / Outlet Structure on Loch Awe, on the opposite bank. The Glen Shira SAC is approximately 5.5km from the Proposed Development Site, and is within a different water catchment.

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 6 Terrestrial Ecology;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 11 – Water Environment.
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 6.2 – Non-Confidential Statement to Inform Habitats Regulations Appraisal;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 6: Appendix 6.2 – Statement to Inform Habitats Regulations Appraisal.
- AECOM. (2025) Balliemanoch Pumped Storage Hydro Further Environmental Information Report.

Baseline

Special Areas of Conservation

There are two SACs located within 10km of the Proposed Development which have the potential to be impacted by the controlled activities based on both distance and hydraulic link, this is the Loch Etive Woods SAC and Glen Shira SAC.

Loch Etive Woods SAC designation is based on the presence of:

- Tilio-Acerion forests of slopes, screes and ravines;
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- Otter

Glen Shira SAC has old sessile oak woods with *Ilex* and *Blechnum* in the British Isles.

For information on the Glen Etive and Glen Fyne Special Protection Area (SPA), see **EIAR Chapter 9 - Ornithology**.

Otter

There were nine desk study records of otter, all near Inveraray.

In the moorland zone, which includes the Headpond, seven holts and fourteen lay-ups were found. Spraints and rarely other evidence were found along the majority of watercourses, including far up minor tributaries, with larger concentrations at or near refuges. Most of the holts are along the Allt Beochlich (Buinne Dubh). Four holts on the Allt Beochlich are within the Headpond or associated compound footprints. One holt at Lochan Airigh was considered potentially viable as a natal holt, and this holt was used frequently by otter during camera monitoring, and bedding was seen to be carried inside. However, no evidence of use for breeding was recorded or observed, and the holt entrance(s) physically changed during the monitoring period, at times rendering the holt less suitable for natal purposes. The other two holts are beyond the Proposed Development Site and not likely to be disturbed. Other holts were considered unsuitable in various ways to be of likely value as natal holts.

At Loch Awe, one holt and five lay-ups were found, and several spraints sites. The holt is along the Allt a' Chrosaid, is not considered viable for natal purposes and would be liable to disturbance from temporary compound TC02. However, neither the holt nor any of the lay-ups would be directly impacted.

At Inveraray, five holts and six lay-ups were found, mainly along the River Aray but occasionally on smaller watercourses. The locations of all the holts and lay-ups, and given that none of the holts were considered viable as natal holts, are such that neither destruction or disturbance of these otter refuges is likely.

A single spraint was found on a small watercourse at Upper Sonachan, but no refuges or other evidence.

Additionally, six holts and six lay-ups were found in the Three Bridges area, and three lay-ups in the Blarghour area. However, since the Proposed Development will not construct the Three Bridges Access Track, there will be no direct impact on these refuges by the Proposed Development.

Bats

There were no desk study records within 2 km. However, the results of the Bat Roost Suitability (BRS) assessment, and follow-on surveys found:

One High BRS and six Low BRS trees within 30 m of the Proposed Development at Allt a' Chrosaid. Two roosts were confirmed. None are within the Proposed Development Site, the closest is 7 m from an Access Track, and the confirmed roosts are 30m or more from the Proposed Development Site. Several other trees with BRS were also recorded that (following Development redesign) are now more than 30 m from the Proposed Development Site;

At Loch Awe, six High BRS, six Moderate BRS and eight Low BRS trees within 30 m of the Proposed Development were identified. Of these, three High BRS, three Moderate BRS and four Low BRS trees are within the Tailpond works area.

Six High BRS, fourteen Moderate BRS and eleven Low BRS trees within 30m of the Proposed Development at Inveraray. However, three (large mature oaks) are immediately adjacent to the proposed Access Track along the forestry track west of Inveraray, and two others (sycamore *Acer pseudoplatanus* and beech) are immediately adjacent to the proposed Access Track along the forestry track north-east of Inveraray. Several other trees with BRS were also recorded that (following Development redesign) are now more than 30m from the Proposed Development Site.

The moorland and Loch Awe parts of the Proposed Development were considered together as having Moderate suitability for bats in general. The transect found very low bat activity in the vicinity of the Headpond, which was consistent with the findings of the static bat detector monitoring. Static detector monitoring at Allt a' Chrosaid (near Loch Awe) recorded the highest activity, consistent with the lowland setting, mature broad-leaved woodland and riparian habitat and known roosts nearby. Transects along the B840 and lower part of the western (Balliemeanoch) Access Track expectedly found the most bat activity.

The Inveraray parts of the Proposed Development were assigned High suitability for bats in general, and the transect recorded different species, with passes recorded frequently throughout the length of the route, and particularly concentrated along the northern section of the forestry track west of Inveraray.

Water Voles

A detailed assessment of water voles was carried out as part of the Proposed Development EIA and looked at the wider development area and not the watercourses and waterbodies impacted by the Controlled Activities in question in this assessment. Full details of the assessment and its findings can be seen in the Chapter 6 of the EIAR. To summarise:

There were no desk study records of water vole within 2 km.

The most optimal water vole habitat and most consistently-recorded evidence of water vole between years was found at Lochan Romach, at closest 150m from the nearest infrastructure (permanent compound PC19 and associated Access Track). Several burrows (approximately ten, counting potential burrows as well as those with confirmatory latrine/dropping evidence) and multiple latrines were found here, in particular along the outflowing stream which is highly suitable for water vole with deep, slow-flowing water, deep diggable banks and plentiful rushy vegetation for foraging;

Seven water vole locations were found in the Headpond area, sparsely spread across it, in which approximately 24 burrows (including those in all survey years and those without confirmatory evidence (latrines or droppings)) and one possible nest were found. However, the evidence at each location was not found in every survey year, and in some years was absent or comprised very little evidence, and the number of water voles in the Headpond area appears unlikely to much exceed 10-20 individuals;

A very few additional water vole burrows were found outside the Headpond area;

No evidence of water vole was found by or near Loch Awe or at Inveraray, where habitat is at best sub-optimal.

Likely Effect

Loch Etive Woods SAC

Pre-Construction and Enabling works and Construction-related changes to surface water hydrology would be of extremely small magnitude, would not significantly impact groundwater (particularly because most of the Proposed Development is on strata considered essentially impermeable, and would not impact Loch Awe water levels, and therefore there is no adverse effect on the integrity of Loch Etive Woods SAC from construction of the Proposed Development.

There are also no likely significant effects on qualifying habitats from operation of the Proposed Development, including from changes in water level in Loch Awe (given that the qualifying habitats do not approach the shore of Loch Awe closer than 50 m). Additionally, operational impacts on qualifying otter associated with the SAC are highly improbable, and if these occurred, they would be so minimal that the SAC conservation objectives would in no way be compromised and there would again be no likely significant effects. Therefore, it can be concluded that there is no adverse effect on the integrity of Loch Etive Woods SAC from operation of the Proposed Development.

Although Loch Etive Woods SAC potentially has hydrological connection to the Proposed Development, the nearest component area of this site is on the opposite side of Loch Awe, and uphill of the A85 road. There is consequently no realistic pathway by which waterborne pollution from the Proposed Development could be transported to this SAC due to dilution effects in Loch Awe, and because the site is not 'downstream' of the Proposed Development. Similarly, Loch Etive Woods SAC is not 'downstream' of the Proposed Development, and there is no potential for invasive non-native plants to be spread to this site.

Glen Shira SAC

Given the substantial separation, complete lack of connectivity, and the nature of the Proposed Development, there is no possibility of likely significant effects during construction of the Proposed Development on the sole qualifying feature (woodland habitat beside a stream in a different water catchment at closest 5.5 km from the Proposed Development with intervening mountainous terrain). Therefore, there is no adverse effect on the integrity of Glen Shira SAC from construction of the Proposed Development.

Additionally, there is no adverse effect on the integrity of Glen Shira SAC from operation of the Proposed Development, for the same reasons.

Glen Shira SAC is located approximately 5.5km from the Proposed Development, 'as the crow flies'. However, it is in a separate water catchment to the Proposed Development and would it require significant over-land travelling by otter to move between the Proposed Development Site and the SAC. It is thus not considered to be substantially connected to it via a direct hydrological pathway.

Otters

The only loss of known otter refuges will be at the Headpond, which will incur loss of four holts, as well as thirteen lay-ups. Of the four holts, all are considered unsuitable for natal purposes. Approximately 1.7 km of watercourse would be lost to the Headpond, all known to be used by otter, along which the four holts and thirteen lay-ups were found. The home range of a female otter along freshwater watercourses is known from limited studies to be around 15km or more of watercourse, with one study finding riverine female otter using 23 holts (Harris and Yalden, 2008). For male otters, the home range in such habitat could be around 40 km or more, and the same study found male otter using 37 holts (Harris and Yalden, 2008). Given known home ranges and holt numbers, it's likely otters in the Headpond area also use Loch Awe and nearby watercourses. The lost water features and refuges could represent up to a quarter of a female's or an eighth of a male's home range, though this is likely an overestimate given the small size of most watercourses apart from the Allt Beochlich (Buinne Dubh). As otter home ranges overlap, at least two adult otters, potentially including a breeding female, could be affected. This would likely cause a minor reduction in local carrying capacity due to lost refuges and water features. However, given the wide-ranging nature of their territories and the availability of alternative refuges and foraging areas (notably Loch Awe and other nearby lochans and watercourses), the overall impact would be limited. Any contraction in carry capacity would not be significant at the regional scale of Natural Heritage Zone 14, which encompasses abundant suitable otter habitat (including Loch Awe, numerous other substantial lochs, lochans and rivers, and extensive suitable maritime coastlines) and would hold a significant proportion of the estimated 8,000 otters in Scotland (<https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/otter>). Note that the continued suitability of the Headpond for fish prey resources (such as brown trout *Salmo trutta*) as it floods (and thereafter), which would otherwise provide some balancing, is not likely, owing to the great fluctuation in water level, and that fish would be liable to be drawn into the Headpond turbines. Consequently, otter population change through direct losses to otter habitat and refuges is considered a permanent adverse effect of local significance.

Direct harm to otters during construction is very unlikely owing to

- b. their high degree of mobility including in water (except when recently-born),
- c. low plant / vehicle speeds in the construction area,
- d. the embedded standard mitigation of overnight means of escape from excavations and capping of pipes that otters might enter, and
- e. the embedded standard mitigation of pre-construction surveys / ECoW appointment.

Through the latter, otter holts or lay-ups and their status at the time of construction will be confirmed, and derogation licensing put in place with any required proportionate mitigation. Under standard licensing procedures this will include supervision by the ECoW of any necessary destruction of otter refuges, with prior monitoring.

Otters using refuges in the Headpond area would be disturbed during construction and blasting, with most holts and lay-ups within the disturbance range of 30 m. Disturbance may occur over prolonged periods during the 7 years of construction and in different locations due to precise construction works. It would occur mainly in daylight, though this still affects daytime refuges. Despite this, given the abundance of otters and availability of alternative refuges locally and regionally, the effect would be similar to the eventual complete removal of the

refuges and associated water features within it, as discussed in the previous section and considered an adverse effect of local significance.

Around Loch Awe, disturbance would be limited, with minor short-term effects near the Tailpond during piling and low-level disturbance near temporary compounds. As otters have multiple refuges and most activity occurs outside daylight hours, effects would be less than locally significant.

No disturbance is expected at Inveraray, with works well away from known refuges. Overall, construction-related otter disturbance is considered a temporary adverse effect of local significance.

Hydrological impacts on otter habitats during operation are expected to be minimal. The Proposed Development design ensures continuous flow in the Allt Beochlich (Buinne Dubh) downstream of the Headpond, though natural flow already ceases 1 km downstream due to an existing dam. Loss of a small tributary and minor changes to others will have negligible effects, as most catchment areas remain intact. Lochans beyond the Headpond won't be affected, and fluctuations in Loch Awe's water levels are unlikely to impact wetter terrestrial otter habitats or fish prey availability. Consequently, impacts on retained supporting habitats of otter during operation are considered to result in a negligible effect.

Otters will be unable to enter the Loch Awe Inlet / Outlet due to fish screens, and the maximum intake velocity (0.15 m /s) is well below otters' swimming capabilities, posing negligible risk. The Headpond is unsuitable for fish and thus unlikely to attract otters. While its intake velocity is higher (1.1–1.2 m / s), otters could generally swim against this, and the water level will typically remain well above the intake, reducing encounter risk. Consequently, otter mortality from Headpond operations is expected to be extremely rare, if it occurs at all.

Security lighting at the Loch Awe inlet and outlet will be required but this will be low level and will be directed away from Loch Awe to avoid illuminating the shoreline and water's edge. This will therefore have very limited impact on otter. Maintenance attendance will be infrequent, small-scale and largely in daylight, and not liable to cause any appreciable disturbance of otter.

Bats

The Proposed Development will primarily affect exposed moorland and blanket bog at the Headpond, which holds negligible value for bats. Limited bat activity was recorded in the Headpond area, with far higher activity near Loch Awe. Key watercourses and rushy flushes offered some potential, but overall use was low, particularly away from water features. Remaining habitat along the Allt Beochlich and woodland beyond the Tailpond is extensive, and impacts elsewhere, including Inveraray, would be negligible. Overall, the minor loss of good bat habitat represents an insignificant proportion of the available local resource.

Potential bat roost loss is limited to woodland in the Tailpond area, affecting three High, three Moderate, and four Low BRS trees. This is minor in context, with many more suitable trees nearby and abundant woodland around Loch Awe and Inveraray. No known roost structures would be impacted. Although survey limitations (see **EIAR Appendix 6.5 Bats (Volume 5 Appendices)**) meant that the trees with BRS that would be lost to the Tailpond have not been subject to surveys to confirm whether roosts are present, Surveys detected mainly common bat species, with a few possible Natterer's bat calls, though this species is widespread, of least concern, and typically roosts in old buildings or caves. Overall, the loss of potential roost sites would have a negligible impact on local bat populations.

There is no means by which the Proposed Development could reasonably be expected to cause bat mortality during construction except by roost destruction. However, as noted above there will be little direct impact on potential roost sites, and the embedded mitigation of pre-construction surveys and ECoW appointment (with licensing, if required, and associated mitigation) will ensure that bat mortality is unlikely to occur.

Construction disturbance to bats is expected to be minimal, as works will mostly occur in daylight when bats are inactive, and the greatest works would be in the Headpond area where bat activity was found to be very limited. At the Tailpond, disturbance risk is limited, with only one Low BRS tree nearby and negligible vibration or sound impact expected from piling. Disturbance of trees with BRS beside the access routes at Inveraray is not likely to be major given that disturbance would arise only from vehicles passing by, and that these access routes almost entirely follow forestry / estate tracks that are already used by forestry and other vehicles (and, north of Inveraray, have been recently used by construction vehicles during other works). Any lighting impacts would be limited, given the small work area and abundance of quality bat habitat nearby.

Hydrological impacts on bat habitats in operation are expected to be minimal. The Proposed Development design ensures continuous flow in the Allt Beochlich (Buinne Dubh) downstream of the Headpond, preserving watercourse and riparian habitats with low recorded bat activity. Minor changes to small tributaries will not significantly affect flows or associated habitats. Lochans and wetter terrestrial habitats beyond the Headpond, as well as those around Loch Awe, will also remain largely unaffected, maintaining conditions for local bat use.

There is no mechanism by which operation of the Proposed Development could result in bat mortality.

External lighting at the Loch Awe inlet and outlet will be used only as needed, causing minimal impact on bats given the abundance of good habitat nearby. Navigational lights at Loch Fyne are unlikely to affect bats due to poor local habitat. Maintenance visits will be infrequent, small, and mostly in daylight, posing negligible disturbance.

Water Voles

Water voles are localized in the Headpond area with a small population expected to be around 10–20 individuals. Some scattered water vole evidence within the Headpond will be lost, but the key, consistently recorded population near Lochan Romach will remain unaffected, being over 150 m from infrastructure. Minor impact may occur to one burrow near the Access Track south of the Headpond. No other water vole populations are known to be affected. Therefore, habitat loss at the Headpond is unlikely to cause local water vole loss or affect the broader population, resulting in an effect of less than regional significance.

Water vole mortality during construction is directly linked to habitat and refuge loss, which would initially cause a similar ecological effect. Unlike some species, water voles cannot quickly replace lost individuals through breeding because the Headpond habitat will be permanently lost. Consequently, the local carrying capacity and population are likely to remain reduced, making recruitment to offset mortality largely irrelevant. Consequently, mortality of water voles during construction is considered a permanent adverse effect of local significance.

Disturbance to water voles would mainly occur during habitat and burrow loss, typically within short distances of tens of metres. This could happen during certain Headpond construction activities or licensed mitigation efforts like displacement. Therefore disturbance of water vole during construction is considered a negligible effect.

During operation, adverse hydrological impacts on the habitats of water voles at the Headpond and Lochan Romach is unlikely given the aforementioned 150 m distance and that most water vole activity is downstream along the outflow. Another retained area near the Access Track south of the Headpond contains two possible burrows found only in single years without confirmatory evidence. One is likely to be lost during construction, while the other, located about 180 m upslope, will not be hydrologically affected in operation.

There is no mechanism by which operation of the Proposed Development could realistically result in water vole mortality, or disturbance.

8.2 Summary of Terrestrial Ecology

Table 8-1 below summarises likely significance of each effect likely occur as a result of the controlled activity.

Table 8-1. Summary of Effects on water environment and impact on terrestrial ecology during construction phase

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance	Compensation or enhancement	Post-compensation effect
Loch Etive Woods SAC	Hydrological impact on qualifying habitat	Negligible	None	Negligible	Not Significant	No	Not Significant
Glen Shira SAC	Hydrological impact on qualifying habitat	Negligible	None	Negligible	Not Significant	No	Not Significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance	Compensation or enhancement	Post-compensation effect
Otters	Direct loss of habitat and refuges	Permanent Adverse effect of Local Significance	ECoW survey / monitoring; preparation of species protection plan; licensing; appropriate design of watercourse crossings / construction lighting (plus embedded mitigation including pre-construction survey, best-practice protection measures during construction and low construction vehicle speeds).	Permanent Adverse effect of Local Significance	Direct loss of habitat and refuges		
	Mortality	Negligible		Negligible	Mortality	No	Not Significant
	Disturbance	Temporary Adverse effect of Local Significance		Temporary Adverse effect of Local Significance	Disturbance	No	Not Significant
Bats	Direct loss of habitat and roosts	Negligible	Further survey of Tailpond trees; if necessary, licensing and preparation of species protection plan; appropriate design of construction lighting.	Negligible	Not significant	No	Not Significant
	Mortality	Negligible		Negligible	Not significant	No	Not Significant
	Disturbance	Negligible		Negligible	Not significant	No	Not Significant
Water vole	Direct loss of habitat and refuges	Permanent Adverse effect of Local Significance	Watercourse crossing design; licensing and preparation of species protection plan to remove or displace water voles (plus embedded mitigation including pre-construction survey).	Permanent Adverse effect of Local Significance	Not significant	Yes Water vole receptor habitat creation.	Not Significant
	Mortality	Permanent Adverse effect of Local Significance		Negligible effect	Not significant	No	Not Significant
	Disturbance	Negligible		Negligible	Not significant	No	Not Significant

Table 8-2 below summarises likely significance of each effect likely occur as a result of the controlled activity.

Table 8-2. Summary of Effects on water environment and impact on terrestrial ecology during operational phase.

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance	Compensation or enhancement	Post-compensation effect
Urquhart Bay Wood SAC	Hydrological impact on qualifying habitat	Negligible	None	Negligible	Not Significant	No	Not Significant
Ness Woods SAC	Hydrological impact on qualifying habitat	Negligible	None	Negligible	Not Significant	No	Not Significant
Otter	Impact on Retained Supporting	Negligible	None.	Negligible	Not Significant	No	Not Significant

	Habitats of Otter		Embedded mitigation includes sensitive lighting, sensitive water crossing design and water intake/discharge below otter swimming speeds.				
	Mortality of Otter	Negligible		Negligible	Not Significant	No	Not Significant
	Disturbance of Otter	Negligible		Negligible	Not Significant	No	Not Significant
Bats	Impact on Retained Supporting Habitats of Bats	Negligible	None.	Negligible	Not Significant	No	Not Significant
	Mortality of Bats	Negligible	Embedded mitigation includes sensitive lighting, sensitive water crossing design and water intake/discharge below otter swimming speeds.	Negligible	Not Significant	No	Not Significant
	Disturbance of Bats	Negligible		Negligible	Not Significant	No	Not Significant
Water vole	Mortality of Water vole	Negligible	None.	Negligible	Not Significant	No	Not Significant
	Disturbance of Water vole	Negligible	Embedded mitigation includes sensitive water crossing design.	Negligible	Not Significant	No	Not Significant
	Disturbance of Water Vole	Negligible		Negligible	Not Significant	No	Not Significant

8.3 Ornithology

This section addresses the potential impacts and effects of Pre-Construction and Enabling, Construction and Operational phases (including maintenance) of the Proposed Development on ornithological biodiversity associated with the proposed controlled activities effected on waterbodies and watercourses.

The controlled activities considered in this chapter include the construction of the Headpond, impounding of water, and the abstraction and transfer of water between Loch Awe and the Proposed Development Headpond. Engineering works will be associated with these activities within and around lochs and rivers which is likely to impact upon ornithological habitats and water environments.

A full EIA has been carried out in support of the planning application for the Proposed Development under Section 36 of The Electricity Act. Within this section the matters relating to the CAR licence, the watercourses and waterbodies have been pulled from the EIA together with an assessment of the scale of impact in line with WAT-SG-67.

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 9 Ornithology;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 9.1 – Ornithology;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 9.2 – Golden Eagle Topographical Modelling;

- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 6.2 – Non-Confidential Statement to Inform HRA;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 6: Appendix 6.2 – Statement to Inform Habitats Regulations Appraisal.

Baseline

For the purposes of the desk study, field survey and assessment, ‘important’ ornithological features were taken to include:

- The qualifying features of SPAs within 10km (or further where connectivity exists) of the Proposed Development;
- All species listed on Annex I of the Birds Directive;
- All species listed on Schedule 1 of the WCA;
- Species listed on the SBL;
- All species on the Argyll and Bute LBAP;
- All species on the Red List of Birds of Conservation Concern (BoCC) 5 (Stanbury et al, 2021).

Decommissioning has been scoped out of assessment as the decommissioning of large-scale pumped storage hydro projects is extremely rare due to the long operational lifespan of such facilities. Potential decommissioning effects are therefore considered to be similar to and associated with the components described in the construction project phase, and are not separately assessed, however a decommissioning survey and plan would be produced when required.

The Proposed Development will not construct an Access Track from Three Bridges, off the A819 to the south-east (such an Access Track will only be used if already consented and constructed by Blarghour Wind Farm and the necessary land rights have been secured). Therefore, assessment of possible impacts associated with the construction of the Three Bridges Access Track has been excluded. Potential operational phase impacts from use of this access route have been assessed.

Special Protection Areas

One international nature conservation designation exists within the desk study area: Glen Etive and Glen Fyne SPA. This is a large and predominantly upland site which rises from sea level to over 1,100 m and encompasses a diverse range of habitats including moorland, rough grassland, blanket bog, native woodland, montane heaths and exposed rock and scree. The sole qualifying feature of the SPA is breeding golden eagle. According to the citation for the SPA¹, the site supported nineteen pairs in 2003, this representing more than 4.2% of the British population. At closest, the Glen Etive and Glen Fyne SPA is approximately 230 m to the east of the Proposed Development Site boundary, on the east side of the A819 road between Inveraray and Dalmally.

Moorland Breeding Birds

A total of 54 species were recorded during moorland breeding bird survey. Of the 54 species recorded, 25 are considered to be important. Territory analysis was carried out, and a total of thirteen are believed to have held territories within the survey area in 2019. A further three which nest in groups are also believed to have bred.

Two additional territories of grasshopper warbler (BoCC Red List species and priority species under the SBL) were recorded during other surveys. Suitable habitat for this species is highly localised within the Proposed Development Site and largely confined to areas close to Loch Awe.

However, the moorlands are not hydraulically linked to the Proposed Development in construction and operation and therefore the habitats will not be affected.

¹ <https://sitelink.nature.scot/site/10113>

Raptors

The following target (i.e., important) raptor species were recorded at or near to the Proposed Development Site by field surveys:

- Golden eagle;
- White-tailed eagle;
- Hen harrier;
- Peregrine Falco peregrinus;
- Osprey Pandion haliaetus.

Other raptors which are not considered to be important and which are therefore not considered further but which were recorded by field survey were buzzard and sparrowhawk. Neither species is suspected to have bred within 2 km of above-ground infrastructure in 2019.

The Argyll Raptor Study Group provided records of breeding locations of barn owl and short-eared owl. In addition, two historical merlin breeding locations were identified by the Raptor Study Group, but these are not recent.

Divers

A total of eleven waterbodies were identified within the breeding diver survey area. No breeding by red-throated divers or black-throated divers within the survey area was identified or suspected during the 2019 breeding season.

The only sighting of red-throated divers on any waterbody within 1.5 km of above-ground infrastructure was of a pair on an un-named waterbody, to the west of the Blarghour Wind Farm access, noted during a moorland breeding bird survey in 2019.

Black Grouse

Black grouse leks were not confirmed with certainty within the survey area, and none were found during the targeted field surveys. The only confirmed occurrence of lekking black grouse was an auditory record (the lek was not seen) outside the survey area (and therefore beyond 1.5 km from above-ground infrastructure) near to Portsonachan in 2019. Additionally, three black grouse, at least two of which were males, were flushed during a raptor walkover in 2019. Black grouse (not lekking) were also incidentally recorded on six occasions outside the survey area, again near Portsonachan.

Non-breeding Coastal Waterbirds

Low numbers of waterbirds were recorded during high and low tide surveys, with no significant feeding or roosting aggregations observed. No notable species or large coastal bird groups were encountered. The largest shorebird gathering was nine birds (four turnstone and five redshank) over 500 m from the proposed jetty. Herring gull, oystercatcher, and shag were the most frequently recorded species, with occasional small numbers (three or fewer) of oystercatcher, redshank, red-breasted merganser, shag, herring gull, and mallard within 200 m of the proposed jetty. Additional records included four curlew, 28 oystercatcher, and six greylag geese at Dalchenna Farm, about 1 km south of the site.

Summary of Ornithology

This chapter has considered how the Proposed Development would affect the above features and determines if effects would be significant following the implementation of embedded and additional mitigation, if required. Potential impacts from the Proposed Development were identified as:

- Loss of supporting habitat during the Pre-Construction and Enabling and Construction Phases;
- Disturbance and displacement during the Pre-Construction and Enabling, Construction and Operational Phases.

Embedded and additional impact avoidance and mitigation comprised monitoring of breeding birds and implementation of exclusion zones to minimise disturbance and displacement and blasting specific works

exclusion zones. Following the implementation of impact avoidance and mitigation the only remaining residual significant effects comprised:

- Permanent loss of habitat for golden eagle – this is concluded to be Permanent Adverse effect of Regional Significance. However, this conclusion has been reached on a very precautionary basis, and it is possible that habitat enhancement delivered by the Landscape Ecological Management Plan (LEMP) could, in the medium-term, reduce effects on golden eagle to Negligible, or to be positive;
- Displacement of golden eagle during the construction phase – this impact is predicted to lead to a Temporary Adverse effect of Regional Significance, which cannot be mitigated. At worst, this could last for the entire duration of the construction phase (7 years), but in reality is likely to be less, as works at either end of the construction programme would be much reduced in intensity. At these times, displacement as a result of human activity can reasonably be expected to be much less intense.

A summary of the findings from the Ornithological Assessment undertaken in the EIA is summarised for the Construction stage in **Table 8-3** and for the operational stage in **Table 8-4**.

Table 8-3. Summary of Effects on water environment and impact on ornithology during construction phase (where No effect is predicted, it is not included in this table)

Ornithological Feature	Impact	Effects	Additional Mitigation	Residual Effects	Significance
Curlew	Habitat Loss	Permanent Adverse effect of Regional Significance	Implementation of the measures imposed by the Landscape and Ecological Management Plan (LEMP).	Permanent Adverse effect of Local Significance	Not Significant
	Disturbance and Displacement	Temporary Adverse effect of Regional Significance	Works exclusion zones around known breeding sites	Temporary Adverse effect of Local Significance	Not Significant
Golden Plover	Habitat Loss	Permanent Adverse effect of Local Significance	Implementation of the measures imposed by the LEMP.	Negligible	Not Significant
	Disturbance and Displacement	Temporary Adverse effect of Local Significance	Works exclusion zones around known breeding sites	Negligible	Not Significant
Other waders: common sandpiper, oystercatcher and snipe	Habitat Loss	Permanent Adverse effect of Local Significance	Implementation of the measures imposed by the LEMP.	Negligible	Not Significant
Skylark	Disturbance and Displacement	Permanent Adverse effect of Local Significance	Habitat created / enhanced by the LEMP is likely to benefit skylark.	Negligible	Significant
Golden Eagle	Habitat Loss	Permanent Adverse effect of Local Significance	Implementation of the measures imposed by the LEMP to increase live prey.	Permanent Adverse effect of Local Significance	Not Significant
	Displacement	Temporary Adverse effect of Regional Significance	None.	Temporary Adverse effect of Regional Significance	<u>Significant</u>
Black Grouse	Habitat Loss	Permanent Adverse effect of Local Significance	Habitat created / enhanced by the LEMP will benefit black grouse.	Negligible	Not Significant
	Disturbance and failure to produce young	Temporary Adverse effect of Local Significance	Surveys and works exclusion zones around known breeding sites	Negligible	Not Significant

Ornithological Feature	Impact	Effects	Additional Mitigation	Residual Effects	Significance
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Table 8-4. Summary of Effects on water environment and impact on ornithology during operation phase (where No effect is predicted, it is not included in this table)

Ornithological Feature	Impact	Effects	Additional Mitigation	Residual Effects	Significance
Golden Eagle	Displacement	Permanent Adverse effect of Local Significance	Habitat enhancement delivered through the LEMP is likely to compensate for any Locally significant adverse effects which could otherwise arise due to operational phase displacement.	Negligible	Not Significant

8.4 Assessing the Scale of the Effect

The scale of likely effects is assessed using the SEPA guidance in **Figure 6-1** and **Figure 6-2**. The Scale of the Effects on the land biodiversity receptors can be seen in **Table 8-5**.

8.5 Assessing the Magnitude of the Effect

The indicative guide in **Figure 6-3** is used to identify the magnitude of likely effects. The Magnitude of the Effects on the land biodiversity receptors can be seen in **Table 8-5**.

8.6 Assessing the Importance of the Effect

The importance of likely effects is assessed using the SEPA guidance in **Figure 6-4**. The Importance of the Effects on the land biodiversity receptors can be seen in **Table 8-5**.

8.7 Assessing the Significance of the Effect

Figure 6-5 is used to judge the significance of an event. The Significance of the Effects on the land biodiversity receptors can be seen in **Table 8-5**.

Table 8-5: Summary of Effects on Biodiversity - Land Receptors

Receptor	Description of Effect	Additional Mitigation	Residual Effects after Mitigation	Scale of Effect	Magnitude of Effect	Importance of Effect	Significance of Effect
Loch Etive Woods SAC	Hydrological impact on qualifying habitat	None	Negligible	Very Small	Very Small	Very High	Low
Glen Shira SAC	Hydrological impact on qualifying habitat	None	Negligible	Very Small	Very Small	Very High	Low
Otters	Direct loss of habitat and refuges	ECoW survey / monitoring; preparation of species protection plan; licensing; appropriate design of watercourse crossings / construction lighting	Permanent Adverse effect of Local Significance	Medium	Medium	High	High
	Mortality		Negligible	Very Small	Small	High	Moderate

Receptor	Description of Effect	Additional Mitigation	Residual Effects after Mitigation	Scale of Effect	Magnitude of Effect	Importance of Effect	Significance of Effect
	Disturbance	(plus embedded mitigation including pre-construction survey, best-practice protection measures during construction and low construction vehicle speeds).	Temporary Adverse effect of Local Significance	Small	Very Small	High	Low
Bats	Direct loss of habitat and roosts	Further survey of Tailpond trees; if necessary, licensing and preparation of species protection plan;	Negligible	Small	Small	High	Moderate
	Mortality	appropriate design of construction lighting.	Negligible	Small	Small	High	Moderate
	Disturbance		Negligible	Small	Very Small	High	Low
Water vole	Direct loss of habitat and refuges	Watercourse crossing design; licensing and preparation of species protection plan to remove or displace water voles (plus embedded mitigation including pre-construction survey).	Permanent Adverse effect of Local Significance	Medium	Medium	High	High
	Mortality		Negligible effect	Small	Small	High	Moderate
	Disturbance		Negligible	Small	Very Small	High	Low
Curlew	Habitat Loss	Implementation of the measures imposed by the LEMP.	Permanent Adverse effect of Local Significance	Medium	Medium	High	High
	Disturbance and Displacement	Works exclusion zones around known breeding sites	Temporary Adverse effect of Local Significance	Small	Very Small	High	Low
Golden Plover	Habitat Loss	Implementation of the measures imposed by the LEMP.	Negligible	Small	Small	High	Moderate
	Disturbance and Displacement	Works exclusion zones around known breeding sites	Negligible	Very Small	Very Small	High	Low
Other waders: common sandpiper, oystercatcher and snipe	Habitat Loss	Implementation of the measures imposed by the LEMP.	Negligible	Very Small	Very Small	Medium	Very Low
Skylark	Disturbance and Displacement	Habitat created / enhanced by the LEMP is likely to benefit skylark.	Negligible	Very Small	Very Small	High	Low
Golden Eagle	Habitat Loss	Implementation of the measures imposed by the LEMP to increase live prey.	Permanent Adverse effect of Local Significance	Large	Large	High	High
	Displacement	None.	Temporary Adverse effect of Regional Significance	Medium	Medium	High	High
Black Grouse	Habitat Loss	Habitat created / enhanced by the LEMP will benefit black grouse.	Negligible	Small	Small	High	Moderate

Receptor	Description of Effect	Additional Mitigation	Residual Effects after Mitigation	Scale of Effect	Magnitude of Effect	Importance of Effect	Significance of Effect
	Disturbance and failure to produce young	Surveys and works exclusion zones around known breeding sites	Negligible	Small	Small	High	Moderate
Golden Eagle	Displacement	Habitat enhancement delivered through the LEMP is likely to compensate for any Locally significant adverse effects which could otherwise arise due to operational phase displacement.	Negligible	Small	Small	High	Moderate

9. Effects on Economy

9.1 Introduction

The economic effect of the Proposed Development has been assessed in accordance with the SEPA Guidance Note WAT-SG-67.

The results of the assessment have determined that the significance of the economic effect of the Proposed Development is a **Positive High Significance**.

9.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 16 Socioeconomics, Tourism and Recreation
- AECOM. (2025) Balliemanoach Pumped Storage Hydro Further Environmental Information Report.

9.3 Economic Effect

Employment and Community

The Proposed Development is likely to have a beneficial effect on the local economy during the seven-year construction phase, as a result of job creation and local expenditure by the developer and contractors, alongside supply chain benefits. During the construction phase, workers involved in the project would use local services and spend in local restaurants and shops which would be especially beneficial outside of the high tourist season.

The job market is considered to have a medium sensitivity to change, being regionally important, but robust due to existing employment numbers. The applicant anticipates that up to 1000 personnel will be employed on site during the seven-year construction phase at its peak. The average number of personnel working on the Proposed Development Site will be an average of 600 to 800 workers on-site, although reduced numbers will be required during the mobilisation period and as the project nears completion. A Workers Housing Strategy has been prepared to guide the location and design of the worker housing, with particular focus on retaining the character of the small settlements within the study area.

During construction, local businesses are predicted to have medium sensitivity and will be impacted for up to seven years which would be a medium magnitude of change. The significance of effect on the local economy is assessed to be moderate beneficial and is therefore considered to be significant.

The operational phase of a PSH scheme is typically considered to be around 100 years, although it can be longer. General maintenance will be ongoing for the duration of operation including regular inspection of the Headpond. The electrical plant will require refurbishment or overhaul approximately every 25 years. During operation it is expected that there will be 10 permanent full time jobs created on site. There is also likely to be additional jobs created in a remote control centre, and local procurement will support jobs in local businesses.

There are no community receptors within the Proposed Development Site. The communities of Inveraray, Portsonachan and Ardchonnell are all located outside of the Proposed Development Site Boundary but within the

study area. Proposed access routes on site do not pass through any of these communities, and AILs are not expected to pass any sensitive community receptors.

Importing Electricity Effects

To meet the UK Government's Net Zero by 2050 target, and Clean Power by 2030, substantial increases in clean, renewable energy are required. As many of these technologies, such as onshore and offshore wind and solar, are intermittent, flexible low carbon energy generation and storage assets are needed to support the grid and this includes energy storage.

Constraints on the electricity grid mean that some wind farms are unable to export the energy they produce. This results in curtailment – when clean electricity is wasted because the system cannot absorb it – driving up costs for consumers and reducing the overall efficiency of the energy system.

A study for Drax found that in 2021, there was 2.3 terawatt-hour (TWh) of curtailment in the UK, equivalent to providing enough electricity to power 800,000 homes each year. The study undertaken by researchers at Imperial College London found that 4.5 GW of pumped storage hydro could reduce curtailment by up to 11 TWh in 2050. According to UK Wind Curtailment Monitor data, in 2022 consumers paid £215 million to turn wind farms off, and £717 million to buy gas-fired power to make up the difference. The National Energy System Operator forecasts that levels of curtailment will increase fourfold by 2030, with costs forecast to reach £2.5 billion a year by the end of this decade.

Exporting Electricity Effects

Presently, unabated natural gas generation is the most commonly utilised and effective solution to support the electricity grid as times of renewable energy shortfall, i.e. when the wind isn't blowing. As an established and proven technology, pumped storage hydro is well-placed to play this role as it can release large quantities of stored electricity. Many of the best locations for pumped storage hydro are in areas where significant renewable capacity will be added, e.g. the north of Scotland. As a result, pumped storage hydro can:

- deliver system savings for consumers by reducing the need for additional transmission infrastructure and more expensive generation assets;
- strengthen energy security by storing large volumes of renewable energy for use during periods of low supply or high demand; and
- increase grid efficiency by reducing curtailment payments and enabling a more responsive, resilient electricity network.

Potential Employees

The Authorised person recognises that there are appropriate local contractors, suppliers, and employees that will be available during the construction phase of the Proposed Development. Argyll & Bute has an excellent variety of businesses that have extensive experience and skills in energy and renewables development. Some of the employment opportunities during the construction phase of the Proposed Development relate to civil engineering, groundworks, electrical works, steel fixing, plant hire, concrete, and aggregates supply.

During operation, it is envisaged that all these posts will be employed onsite and will be taken by people residing, and potentially relocating, in the Highlands.

9.4 Assessing the Economic Effects

Assessing the Scale of Economic Effect

Gross Value Added (GVA)

As can be seen from **Figure 9-1**, the gross direct value-added economic effect (GVA in £ / year) for Electricity Developments this is £47,000 per annual GWh generated.

Business sector	Units	Approximate annual GVA per unit (£/year)
Aquaculture	Number of employees at site	£63,000
Agriculture	Number of employees at site	£25,000
Electricity generation	Giga Watt hours power generated/year at site	£47,000
Manufacture of beverages	Number of employees at site	£204,000
Manufacture of chemicals and chemical products	Number of employees at site	£95,000
Manufacture of food products	Number of employees at site	£46,000
Manufacture of paper and paper products	Number of employees at site	£52,000
Mining and quarrying	Number of employees at site	£64,000
Notes: GVA = Gross Value Added		

Figure 9-1. WAT-SG-67 Table 8: Estimated direct contribution to Gross Value Added of different business sectors

The Proposed Development is modelled to run at 10 hours generation and 10 hours pumping, on repeat with no breaks, which would produce 3942 GWh / year. Hence, the approximate annual GVA calculated is £185,274,000.

Figure 9-2 below shows Table 9 of Appendix B of SEPA's Supporting Guidance (WAT-SG-67), providing multipliers that taken into consideration indirect and induced economic effects. As can be seen from **Figure 9-2**, for Electricity Developments a multiplier of 1.9 is deemed suitable.

Business sector	GVA multiplier
Aquaculture	2.4
Agriculture	1.7
Beverage manufacture	1.8
Chemicals manufacturing (listed as 'other chemicals')	1.5
Electricity generation	1.9
Food manufacturing	1.8
Mining and quarrying (average of coal and lignite and other mining and quarrying)	1.8
Paper and paper products manufacture	1.9
The Scottish Government has produced estimates of the <i>Multipliers</i> associated with all industrial sectors. This Table reproduces only a sub-set of multipliers	

Figure 9-2. WAT-SG-67 Table 9: GVA multipliers for different business sectors

The result of this is the adjusted GVA for the Proposed Development, £352,202,600.

Figure 9-3 was then used to categorise the scale of the GVA per year calculated for the Proposed Development in proportion to the size of the GVA of the Scottish economy as a whole.

	Scale of economic impact				
	Very Small	Small	Medium	Large	Very Large
% of Scottish GVA	≤ 0.002%	0.002 – 0.01%	0.01 – 0.04%	0.04 – 0.2%	> 0.2%
GVA based on the Scottish economy's GVA in 2015/16 (£/year) (rounded)	≤ £3m	£3 - £100m	£100- £500m	£500- £3,000m	>£3,000m

Figure 9-3. WAT-SG-67 Table 10: Categorising the scale of an activity's GVA

The most recent annual Scottish GVA estimates have been obtained and presented in **Table 9-1** below, these updated values have been used to calculate the scale of economic effect. In the financial year 2023 the Scottish GVA was £181 billion.

Table 9-1. Most recent annual GVA estimates 2023

	Scale of economic impact				
	Very Small	Small	Medium	Large	Very Large
% of Scottish GVA	≤ 0.002%	0.002 – 0.01%	0.01 – 0.04%	0.04 – 0.2%	> 0.2%
GVA based on the Scottish economy's GVA in 2023 (£/year) (rounded)	≤ £4m	£4 – 180m	£180 – 720m	£720 – 3620m	> £3,620m

Source: [GDP Quarterly National Accounts: 2024 Quarter 3 \(July to September\) - gov.scot](#)

Based on the Scottish economy's GVA in 2023 / 24 (£ / year) (rounded), the Proposed Development is classed as having a **Medium** scale of economic effect.

Assessing the Magnitude of Economic Effect

The magnitude of the economic effect of the Proposed Development has been assessed using **Figure 6-3** in Section 6. It is anticipated that the duration of the Proposed Development's effect will last considerably longer than 6 years, as pumped storage hydro projects have very long operation lifetimes. Taking this into consideration, the magnitude of the economic effect of the Proposed Development is **Medium**.

Assessing the Importance of Economic Effect

SEPA Guidance Note WAT-SG-67 (SEPA, 2017b) stipulates that 'Economic growth is a key national priority. You should treat positive economic effects on the Scottish economy as of national (i.e. high) importance'. Therefore, the importance of the Proposed Development is **High**.

Assessing the Significance of the Economic Effect

The significance of the economic effect of the Proposed Development has been assessed using **Figure 6-5**, in Section 6.

In conclusion, the economic effect of the Proposed Development to have a **Positive High Significance**.

10. Effect on Health and Safety

10.1 Introduction

The effects on the health and safety on the population of the Proposed Development have been assessed in accordance with the SEPA Guidance Note WAT-SG-67 (SEPA, 2017b). In terms of human health and human safety, the following categories have been reviewed:

- The risk of ill-health or disease;
- The risk of injury; or
- Human well-being more generally. The results of the assessment have determined that the significance of the effects on the health and safety of the Proposed Development is a **Negative Medium Significance**.

10.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b) Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 16.1 – Outline Access Management Plan;
- AECOM (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 3.1 – Construction Environmental Management Plan;
- AECOM (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 11.5 – Outline Water Management Plan;
- AECOM (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 11 – Water Environment;
- AECOM (2025) Balliemanoch Pumped Storage Hydro Further Environmental Information Report.

10.3 Health and Safety Effects

Ill-health or Disease

The entire study area (excluding Loch Fyne) is within the Oban and Kintyre Groundwater Drinking Water Protected Area. In addition, all aquifers in Scotland are considered to be within a groundwater Drinking Water Protected Area. Drinking Water Protected Areas are where there are specific measures to protect the quality of water as it may be abstracted for public potable supplies. Scottish Water is the water supply company in Scotland and has provided guidance for working in or near these areas; 'Your Guide to living or working in a drinking water protected area' (Scottish Water, 2013). This includes the following measures:

- Store all detergents, oils, fuels and chemicals securely. Do not leave any potential contaminants next to watercourses.
- Ensure all vehicles and plant are maintained to avoid leaks and spillages.
- Avoid driving through and working in watercourses where possible. Avoid an alternative drinking point for animals if required. If unavoidable, please follow SEPA guidelines.

- Make sure all septic tanks/wastewater treatment works, slurry and drains are operated and maintained correctly to avoid leaks.

Contamination

Contamination of surface waters, groundwaters and soil could result from leakage and spills of fuels, oils, chemicals, and concrete during pre-construction and 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. The risk associated with this hazard is anticipated to be controlled by following the principles and procedures outlined in the Outline Surface Water Management Strategy that form part of the CEMP, produced as part of the EIAR and found in Appendix C and Appendix D, respectively. Detail of the surface water drainage arrangement for the Proposed Development will form part of the Secondary CAR Application and therefore is not considered in any further detail in the document.

Private Water Supply

A Private Water Supply (PWS) survey and assessment has been completed as part of the EIA, which highlighted four private water supplies situated within 250 m of the planned works (moderate risk PWS) and one private water supply within 50 m of the Proposed Development (high risk PWS).

The high risk PWS (Stronmagachan) is situated nearby to Blarghour Farm access track. The track may be used for Balliemanoch if the Blarghour Windfarm is constructed. Therefore, there may small risk of pollution from vehicles using the track from accidental chemical spillages.

The moderate risk PWS are:

- Three Bridges is 80 m upstream of the Blarghour Farm access track. The track may be used for Balliemanoch if the Blarghour Windfarm is constructed, and there may be a cumulative effect. Therefore, there may small risk of pollution from vehicles using the track from accidental chemical spillages.
- Castle Fisheries is situated nearby to the Inveraray bypass and 85 m downgradient from the bypass. However, as the PWS is already situated close to the road, and we would not expect the quality of road runoff to change significantly, the water quality is unlikely to change. Although no confirmation of the usage, the name 'Castle Fisheries' suggests that the PWS is for industrial / fisheries use. Therefore, is unlikely to be a PWS as it is not a potable use and so will not be considered further in this assessment.
- Barr-beithe is situated on the opposite bank of the Allt Beochlich, and will therefore not be at risk of being potentially impacted by any potential contaminated run-off and is unlikely to be impacted by the Proposed Development. Therefore, this PWS will not be considered further in this assessment.

As a precautionary measure mitigation measures and monitoring have been outlined within the Water Management Plan (WMP) and CEMP.

The operation of the controlled activities is not anticipated to produce any emissions which could cause ill health or disease.

The Risk of Injury

Recreational Activity

During the construction phase there is a potential risk of injury of general public members partaking in recreational activity within the proximity of the construction area. The public's legal right of access to water will be maintained with Loch Awe remaining largely accessible for recreational activities during the Construction Phase. In the interest of public safety, access to the immediate area around the Tailpond Inlet / Outlet structure in Loch Awe will be restricted during construction. A suite of safety measures, specific to the Tailpond Inlet / Outlet structure, will be implemented to ensure public safety. This is expected to include temporary booms and markers to give a safe working zone around the work on Loch Awe.

During operation there is not anticipated to be a risk of injury to general public members partaking in recreational activity within the proximity of the Proposed Development caused by operation of the Proposed Development.

Embankment Failure

The construction of the Headpond introduces a new, large, raised reservoir. The failure of either of the two embankments would cause a sudden release of a significant volume of water. The risk associated with a large, raised reservoirs would be managed through the application of the Reservoirs (Scotland) Act 2011.

The failure of Embankment 1 would result in flood water being released into Loch Awe, following the path of Allt Beochlich, due to the natural topography of the surrounding area. There would be a risk that the micro-hydro station at Beochlich would get washed away, and that Balliemeanoch Farm and other houses on the east and west coast of Loch Awe would be affected.

Failure of Embankment 2 would result in a much lesser flood, towards Loch Awe following the path of the Allt na Dail-fearna. This could affect Sonachan House and the settlements at Portsonachan.

Between 1000 and 10,000 people would be affected with a very small increase in risk based on the very remote likelihood of such an event occurring. Based on these parameters the scale of the effect on human safety is regarded as being Small.

Human Well-Being

The main potential effect on human well-being of the controlled activities would be a result of any disturbance to the recreational activities caused by the Proposed Development from pre-construction through to operation. Mitigation and procedures to manage noise, waste, dust etc has been outlined within the CEMP.

10.4 Assessing the Effects on Health and Safety

Assessing the Scale of the Effects

Figure 10-1 has been utilised to determine the scale of the identified effects on human health and safety of controlled activities at the Proposed Development.

Increase or decrease in risk, or benefit, to health and well-being	Number of people likely to be affected					General population; or Disadvantaged groups
	< 10	10 to < 100	100 to < 1,000	1,000 to < 10,000	> 10,000	
			10 to < 100	100 to < 1,000	> 1,000	
Very small (perhaps imperceptible)	N	VS	VS - S	S	S - M	
Small	VS	VS - S	S	S - M	M	
Modest	S	S - M	M	M	M - L	
Large	S - M	M	M - L	L	L - VL	
Very large (eg a risk to health completely, or nearly completely, eliminated)	M	M - L	L	L - VL	VL	
Key: N = negligible; VS = very small; S = small; M = medium; L = large; and VL = very large						

Figure 10-1: WAT-SG-67 Table 12: Indicative guide to assessing the scale of an effect on human health or human safety

The effect of contamination of surface waters, groundwaters and soil resulting from leakage and spills of fuels, oils, chemicals, and concrete during pre-construction and construction has been assessed as affecting 100 to <1000 people with a Small increase in risk, indicating a **Small** scale effect.

The effect on private water supplies of the controlled activities during preconstruction, construction and operation has been assessed as affecting 10 to <100 people with a Small increase in risk, indicating a **Very Small to Small** scale effect.

The likelihood of the effect on the potential risk of injury of general public members as a result of failure of an embankment is very remote and based on the numbers of people likely to be affected the scale of the effect is regard as being **Very Small to Small**.

The effect on the potential risk of injury of general public members partaking in recreational activity within the proximity of the construction area has been assessed as affecting 100 to <1000 people with a Modest increase in risk, indicating a **Medium** scale effect.

The effect on human well-being of the controlled activities as a result of any disturbance to the recreational activities caused by the Proposed Development from pre-construction through to operation has been assessed as affecting potentially 1,000 to < 10,000 people with a Very Small decrease to health and well-being, indicating a **Small** scale effect.

Assessing the Magnitude of the Effects

The magnitude of the effect on health and safety of the controlled activities at the Proposed Development has been assessed using **Figure 6-3**.

The magnitude of the effect of contamination of surface waters, groundwaters and soil resulting from leakage and spills of fuels, oils, chemicals, and concrete during pre-construction and construction has been assessed as Small based on the construction of the Proposed Development lasting around 6 years and the scale of the effect being a **Small** scale effect.

The magnitude of the effect on private water supplies of the controlled activities during preconstruction, construction and operation has been assessed **Very Small** based on the construction and operation of the Proposed Development lasting significantly more than 6 years and the scale of the effect being a Very Small to Small scale effect.

The scale of effect based on consequence and likelihood of the failure of one of the Headpond embankments is regarded as being Very Small to Small. Based on a precautionary approach the Small effect results in an effect of **Small** magnitude.

The magnitude of the effect on the potential risk of injury of general public members partaking in recreational activity within the proximity of the construction area has been assessed as **Small** based on the construction of the Proposed Development lasting around 6 years and the scale of the effect being a Small scale effect.

The magnitude of the effect on human well-being of the controlled activities as a result of any disturbance to the recreational activities caused by the Proposed Development from pre-construction through to operation has been assessed **Small** based on the construction and operation of the Proposed Development lasting significantly more than 6 years and the scale of the effect being a Small scale effect.

Assessing the Importance of the Effects

The importance of an effect on human health and safety depends on the seriousness of the potential effect were it to occur and the degree of control people have over their exposure to a risk, according to SEPA Guidance Note WAT-SG-67 (SEPA, 2017b).

Figure 10-2 has been utilised to determine the importance of the identified effects on human health and safety of controlled activities at the Proposed Development.

Low importance	<ul style="list-style-type: none"> The effect would be to produce or remove a health or safety issue that would not be (or is) not very serious; people are unlikely to notice the change; and people are easily able to control their exposure to the risk to their health or safety.
Medium importance	<ul style="list-style-type: none"> The effect would be to produce or remove a health or safety issue that would not be (or is) not life-threatening, not particularly debilitating and not long-lasting; effective treatments/alternatives are readily available and full recovery would be likely in a few days; and with care, people are able to avoid exposure to the risk to their health or safety.
High importance	<ul style="list-style-type: none"> The effect would change the status of a Bathing Water; or The effect would be to produce or remove a health or safety issue of significant concern and that would be (or is) debilitating at least for a short period; effective treatments/alternatives exist but recovery may take several weeks; people are unlikely to be able to completely avoid exposure to the risk to their health or safety but may have some control over exposure; and the people affected will tend to include those from vulnerable or disadvantaged groups.
Very high importance	<ul style="list-style-type: none"> The effect would be to produce or remove a health or safety issue that would be (or is) very serious, life-threatening or very debilitating; completely effective treatments/alternatives may not be available and recovery is likely to require a lengthy period of time; people are not able to avoid their exposure to the risk to their health or safety; and the effect is likely to be particularly concentrated on vulnerable or disadvantaged groups.
<p>Notes: To use this guide, you need to decide if a proposal would remove or create effects falling within a particular importance category.</p>	

Figure 10-2. WAT-SG-67 Table 11: Indicative guide to assessing the importance of effects on human health or safety

The effect of contamination of surface waters, groundwaters and soil resulting from leakage and spills of fuels, oils, chemicals, and concrete during pre-construction and construction has been assessed as **Medium** importance based on the possible impact of potential health risks.

The effect on private water supplies of the controlled activities during preconstruction, construction and operation has been assessed as **Medium** importance based on the possible impact of potential health risks.

The effect on the potential risk of injury of general public members partaking in recreational activity within the proximity of the construction area has been assessed as **High** importance based on the possible impact of the injury occurring during construction.

The effect on the potential risk of injury of general public members as a result of failure of an embankment has been assessed as **Very High** importance as people are unlikely to be able to completely avoid their exposure to the risk to their health and safety.

The effect on human well-being of the controlled activities as a result of any disturbance to the recreational activities caused by the Proposed Development from pre-construction through to operation has been assessed as **High** importance as the impact may be difficult to avoid.

Assessing the Significance of the Effects

The significance of the effect on health and safety of the Proposed Development has been assessed using **Figure 6-5**.

The significance of the effect of contamination of surface waters, groundwaters and soil resulting from leakage and spills of fuels, oils, chemicals, and concrete during pre-construction and construction has been assessed as **Low negative significance** based on a Small magnitude of effect and a Medium importance of effect.

The significance of the effect on private water supplies of the controlled activities during preconstruction, construction and operation has been assessed as **Very Low significance** based on a Very Small to Small magnitude of effect and a Medium importance of effect.

The significance of the effect on the potential risk of injury of general public members partaking in recreational activity within the proximity of the construction area has been assessed as **Moderate negative significance** based on a Small magnitude of effect and a High importance of effect.

The significance of the effect on the potential risk of injury of general public members as a result of failure of an embankment has been assessed as a **High negative significance** based on a Small magnitude of effect and Very High importance of effect.

The significance of the effect on human well-being of the controlled activities as a result of any disturbance to the recreational activities caused by the Proposed Development from pre-construction through to operation has been assessed as **Moderate Negative significance** based on a Small magnitude of effect and a High importance of effect.

11. Effects on Recreation

11.1 Introduction

The effects on the population in terms of public recreation and access of the Proposed Development have been assessed in accordance with the SEPA Guidance Note WAT-SG-67. Consideration has been taken to determine the effects likely to increase or decrease opportunities for recreation or the quality of a recreational experience of the controlled activities at the Proposed Development.

The results of the assessment have determined that the significance of the effects on recreational opportunities of the Proposed Development is a Negative Very Low Significance.

11.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 16 Socioeconomics, Tourism and Recreation
- AECOM. (2025) Balliemanoach Pumped Storage Hydro Further Environmental Information Report.

11.3 Recreation Effects

The Study Area for the assessment of the effect of the Proposed Development on recreation and tourism extends to:

- Tourism and Recreation Receptors: 5 km from the Proposed Development Site to ensure receptors in the wider area around the Proposed Development Site are considered.
- Users of Loch Awe: Recreation and commercial users of Loch Awe in relation to potential impacts resulting from the Construction and Operation of the Proposed Development.

Recreation Receptors

A review of publicly available information for the Study Area has been undertaken. This review identified key recreation receptors within 5 km of the Proposed Development Site. The recreational receptors are as follows:

- Long distance trails and cycling routes;
- Walking trails including core paths, long distance routes and local paths;
- Lochs and other water bodies;
- Historic Visitor attractions;
- Local Amenities and
- Tourist services.

In terms of the effect of the controlled activities, this reduces the key recreation receptors to the lochs and other water bodies. All recreation not directly utilising the lochs and watercourses for the activity, has not been considered during this assessment.

The following recreation receptors, identified within the Study Area, have the potential to be impacted negatively by the Proposed Development:

- Walking trails including core paths, long distance routes and local paths;
- Long distance trails and cycling routes; and
- Historic Visitor attractions.

Recreation Routes

Recreation routes support outdoor pursuits and activities. Loch Awe is a scenic attraction for visitors with cultural significance at a local and regional level. Loch Awe is used for a variety of water based recreational uses, including swimming, fishing and boating, as well as commercial uses such as fishing. Given the regional importance of Loch Awe as an area for recreation and sports, and following review of **Figure 11-1**, the importance of the effect on the recreational routes is medium.

Low importance	<ul style="list-style-type: none"> • The part of the water environment is frequently used for recreation but does not meet any of the other criteria listed in this Table.
Medium importance	<ul style="list-style-type: none"> • The part of the water environment is among the most popular locations regionally for a particular form of recreation or type of experience/challenge within that form; and the qualities of the part of the water environment (including its landscape qualities) place it amongst the best sites in the region for a particular form of recreation or type of experience/challenge within that form. Similar sites are likely to be rare to very rare in the region; or the site is used by clubs in the region as a venue for training or competitions; or the site is particularly important regionally because its location means that it is particularly accessible to recreational users in the region; or the site is a recreational resource for deprived or otherwise disadvantaged communities or groups.
High importance	<ul style="list-style-type: none"> • The part of the water environment is regularly used by people from all over Scotland; and the qualities of the part of the water environment place it amongst the best sites in Scotland for a particular form of recreation or type of experience/challenge within that form. Similar sites are likely to be rare to very rare in Scotland; or the site is one of the top sites regionally for a particular form of recreation and its location means that it is particularly accessible from a number of Scotland's major population centres - so making it of national importance; or the site is a recreational resource for one or more of the most deprived or otherwise disadvantaged communities in Scotland; or the site may host national competitions or events or be an important training site for such events.
Very high importance	<ul style="list-style-type: none"> • The part of the water environment specifically attracts overseas visitors interested in this form of recreation; and the qualities of the part of the water environment make it one of the most renowned sites for this form of recreation or type of experience/challenge within the form in the UK; or the site is a venue for international competitions or events or an important training venue for such events.

Figure 11-1. WAT-SG-67 Table 13: Indicative guide to assessing the importance of an effect on recreation

The Construction Phase works on Loch Awe will be to a limited area around the Tailpond Inlet/Outlet structure, and the ability to undertake recreational activities will only be impacted in the small area around the works. The sensitivity of Loch Awe is considered to be high due to its national importance.

During the Operational Phase visitors to Loch Awe will be able to see the Tailpond Inlet/Outlet structure from the loch and both loch shores. This may impact the experience of visitors, particularly where the purpose of the visit is to appreciate the scenic landscape. To minimise this impact the Tailpond Inlet/Outlet structure will be designed sensitively to limit its prominence using materials that are in keeping with the more natural loch shore. Visitors will also still be able to appreciate the wider landscape around Loch Awe.

The following long-distance routes are located within the Proposed Development Site and would potentially be effected by the controlled activities:

- National Cycle Network Route 78 (The Caledonia Way): Cycle route running 235 miles from Campbeltown to Inverness, falls within study area. Located to the west of Loch Awe, outwith the Proposed Development Site boundary.
- C200: Coille Bhraghad-Queens Drive: 4.7km walk to the northwest of Inveraray. Part of the Argyll and Bute Core Path network. The access route at Inveraray crosses this Core Path.
- C201: Dun Na Cuaiche: Part of the Argyll and Bute Core Path network. The access route at Inveraray crosses this Core Path.
- C203: Bealach an Fhuarain: Part of the Argyll and Bute Core Path network. The access route at Inveraray crosses this Core Path.
- Public Right of Way SA128: Recorded National Catalogue Rights of Way which crosses the Proposed Development Site, intersecting the access route to the north of the site.

Recreational Fishing

Recreational fishing currently takes place at Loch Awe and Loch Fyne. The Proposed Development will involve the construction of a Marine Facility jetty in Loch Fyne. This construction will occur within the Argyll and Bute Council's Local Development Plan (LDP) designated Upper Loch Fyne Marine Consultation Area. The Marine Facility will be temporary and small scale, consisting of a temporary pier constructed into the loch. Approximately 10 boats are expected to use the pier throughout the seven year construction period in order to service the pumped storage hydro scheme. As such, any disturbance to recreational loch users will be infrequent and impacts on recreational fishing in Loch Fyne are expected to be minimal.

During operation, impacts upon recreational fishing may occur as a result of the piles left in-situ from the Marine Facility installed as part of this proposal. This facility's installation would lead to the overall loss of 20.4 m² of benthic habitat and the potential displacement of fishing activities on account of obstructed access to approximately 1,800 m² fishing grounds. However, considering the relatively small area of impact, overall the magnitude of the impact is deemed to be Negligible and the sensitivity of the receptor is considered to be Medium. The effect will therefore be Minor Adverse and Not Significant. Greater detail on the impacts of the Proposed Development upon benthic habitat loss and commercial fishing on Loch Fyne has been included in the Balliemanoach EIA Chapter 8: Marine Ecology and Chapter 20: Commercial Fisheries, respectively.

11.4 Assessing the Effects on Recreation

Assessing the Scale of the Effects

According to WAT-SG-67, 'The scale of an effect on recreation depends on the size of the increase or decrease in opportunity for recreation or the quality of the recreational experience.' Following review of **Figure 11-2**, it was determined that the scale of the effect on recreational routes of the Proposed Development will be very small during pre-construction and operational phases, and small during the construction phase, as all routes will remain open, although some will cross access routes used during construction and operation.

Additionally, following review of **Figure 11-2**, it was determined that the scale of the effect on recreational fishing of the Proposed Development, was very small during construction and operational phases as it is understood that the area of the loch which will be affected by the Proposed Development is very small compared to the overall area of the loch.

Very small	<p>Very small effects less than around a 5% increase in:</p> <ul style="list-style-type: none"> • the availability of the recreational resource (within a time period); or • the usage of the resource (numbers of people)
Small	<p>Small effects:- around a 6% to 15% reduction or increase in:</p> <ul style="list-style-type: none"> • the availability of the recreational resource; or • the usage of the resource <p>If effects are concentrated at low usage times (eg week days) then a greater than 15% reduction or increase in the availability of the resource at these times may still be small.</p> <p>If effects are concentrated at high usage times (eg weekends), then reductions or increases in availability of less than 15% may be medium scale</p>
Medium	<p>Moderate effects:- around a 16% to 40% reduction or increase in:</p> <ul style="list-style-type: none"> • the availability of the recreational resource; or • the usage of the resource <p>If effects are concentrated at low usage times (eg week days) then a greater than 40% reduction or increase in the availability of the resource at these times may still be small.</p> <p>If effects are concentrated at high usage times (eg weekends), then reductions or increases in availability of less than 40% may be medium scale</p>
Large	<p>Large effects:- around a 41% to 80% reduction or increase in:</p> <ul style="list-style-type: none"> • the availability of the recreational resource; or • the usage of the resource
Very Large	<p>Very large scale effects:- more than an 80% reduction or increase in:</p> <ul style="list-style-type: none"> • the availability of the recreational resource; or • the usage of the resource

Figure 11-2. WAT-SG-67 Table 14: Indicative guide to assessing the scale of an effect on recreation

Assessing the Magnitude of the Effects

The magnitude of the effect on recreational activities of the Proposed Development has been assessed using **Figure 6-3** in Section 6. Due to the longevity of pumped storage hydro power stations, the duration of any effects will be significantly more than 6 years. Taking this into consideration, the magnitude of the effects of the Proposed Development has been determined to be very small.

Assessing the Significance of the Effects

The significance of the effect on recreational activities of the Proposed Development has been assessed using **Figure 6-5** in Section 6. The importance of the effect has been judged to be very low.

In conclusion, the effect of the Proposed Development on recreational activities would be **Negative Very Low Significance**.

12. Effect on Visual Amenity and Landscapes

12.1 Introduction

The effects on visual amenity and landscapes of the Proposed Development have been assessed in accordance with the SEPA Guidance Note WAT-SG-67.

The results of the assessment have determined that the significance of the effects on visual amenity and landscapes of the Proposed Development is a negative of Very Low to Moderate Significance.

A full Landscape and Visual Impact Assessment (LVIA) has been completed as part of the EIA supporting the planning application for the Proposed Development under Section 36 of the Electricity Act. This is available at: [Scottish Government - Energy Consents Unit - Application Details](#)

Only sections of the LVIA relevant to the effects of the proposed controlled activity on the appearance of

- Watercourses and that part of their riparian zone on which their physical condition and ecological health depends. The latter will include the corridor of land along the bank top and any adjacent land directly shaped by its connection with the river, such as floodplain wetlands and oxbow lakes;
- lochs and their shore zones; and
- wetlands

The findings of the LVIA are summarised in this chapter together with an assessment of the scale of the effect on visual amenity in line with WAT-SG-67

12.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 16 Socioeconomics, Tourism and Recreation
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 5 – Landscape and Visual
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 5.2 – Landscape Assessment
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 5: Appendix 5.3 – Visual Assessment
- AECOM. (2025) Balliemanoch Pumped Storage Hydro Further Environmental Information Report.

12.3 Limitations and Assumptions

Regarding limitations, no technical difficulties or practical problems were encountered in producing the landscape and visual assessment. Fieldwork to inform the design process and assessment of the Proposed Development

was undertaken in variable weather with moderate visibility, however, photographs used to inform the assessment were taken with good visibility.

Assumptions of the assessment of effects within the LVIA are set out as follows:

- The assessment has been undertaken based on the worst-case scenario of the Proposed Development. This includes the maximum heights and footprints of the various component parts of the Proposed Development.

12.4 Visual Amenity Effects

Table 12-1: Viewpoints below, provides a list of the 19 specific and representative viewpoints that were considered in the Landscape and Visual impact Assessment in the EIA. These were selected for assessment within the LVIA as the most likely to be significantly affected by the construction and operation of the Proposed Development. These viewpoints have been selected based on a desktop study, analysis of the Zones of Theoretical Visibility (ZTV), targeted site work and consultation with Argyll & Bute Council. They have been selected to provide a range of viewing distance and viewing experience of the different scheme components (during Pre-Construction and Enabling Works, construction and permanent structures in operation).

The location and direction of the Viewpoints set out in **Table 12-1** can be seen in **Figures 17, 18 and 19 in Appendix A**, together with the Landscape Character Types and Designations. The Figures in Appendix A consist of the following:

- Figure 17 – Landscape Designations and Operational Zone of Theoretical Visibility
- Figure 18 – Landscape Character Type and Operational Zone of Theoretical Visibility
- Figure 19 – Viewpoints and Operational Zone of Theoretical Visibility

It is acknowledged that part of the landscape within the Study Area is comprised of plantation forests at different stages of felling. It is assumed that this would remain to some degree as expressed within the baseline description and value judgements for each viewpoint below. Where any planned felling would affect views, this has been considered at the assessment phase.

Table 12-1: Viewpoints

ID	Viewpoint	Receptor Groups	Relevant Landscape Characteristic Type	Easting	Northing
1	Dun Na Cuaiche, Inveraray	Recreational and visitors to places of interest	Within Landscape Character Type (LCT) 53 Rocky Coastland – Argyll	210013	710137
2	Minor road – near A815	Residential and road users	Within LCT 34 Steep Ridges and Mountains	210296	705864
3	Kilmaha	Recreational, visitors to places of interest and road users	Within LCT 40 Craggy Upland – Argyll	194065	708443
4	Dalavich Jetty	Recreational and residential	Within LCT 40 Craggy Upland – Argyll	197049	712740
5	Loch shore off coastal road between Inverinan and Dalavich	Recreational	Within LCT 40 Craggy Upland – Argyll	199618	715747
6	Inverinan	Residential, recreational and road users	Within LCT 53 Rocky Coastland – Argyll	199949	717718
7	Eilean na Moadail peninsula	Recreational	Within LCT 53 Rocky Coastland – Argyll	200840	716917

8	Ben Cruachan	Recreational and visitors to places of interest	Within LCT 35 Rugged Mountains	206969	730472
9	Dorlin Point	Recreational and visitors to places of interest	Within LCT 40 Craggy Upland – Argyll	191510	713749
10	Ardanaiseig Garden and Designed Landscapes (GDL)	Recreational and visitors to places of interest	Within LCT 40 Rocky Coastland – Argyll	209356	724557
11	A85	Road users and visitors to places of interest	Within LCT 53 Rocky Coastland – Argyll	209914	725862
12	Stob Garbh	Recreational and visitors to places of interest	Within LCT 35 Rugged Mountains	209558	730246
13	Ben Eunaich	Recreational and visitors to places of interest	Within LCT 35 Rugged Mountains	213563	732797
14	Beinn a' Chleibh	Recreational and visitors to places of interest	Boundary of LCT 35 Rugged Mountains and LCT 251 Highland Summits	225046	725606
15	Ben Lui	Recreational and visitors to places of interest	Boundary of LCT 35 Rugged Mountains and LCT 251 Highland Summits	226631	726297
16	Duncan Bann Macintyre Monument	Recreational and visitors to places of interest	Within LCT 40 Craggy Upland – Argyll	214415	725855
17	Loch Awe watercraft	Recreational	Between LCT 40 Craggy Upland – Argyll and LCT 53 Rocky Coastland – Argyll	199815	716025
18	A815 – St Catherines	Residential and road users	Within LCT 34 Steep Ridges and Mountains	211787	707197
19	A83 lay-by	Road users and recreational	Within LCT 53 Rocky Coastland – Argyll	208540	707183

Effects on Visual Receptors during Construction

It is anticipated that there would be significant effects on several viewpoints assessed during construction. The significance of the effects are summarised in Table 12-2: Summary of Effects: Construction.

Table 12-2: Summary of Effects: Construction

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Viewpoint 1 - Dun Na Cuaiche, Inveraray	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant

Viewpoint 2 - Minor road - near A815	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 3 - Kilmaha	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 4 - Dalavich Jetty	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 5 - Loch shore off coastal road between Inverinan and Dalavich	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 6 - Inverinan	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 7 - Eilean na Moadail peninsula	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 8 - Ben Cruachan	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 9 - Dorlin Point	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 10 - Ardanaiseig GDL	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 11 - A85	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 12 - Stob Garbh	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 13 - Ben Eunaich	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 14 - Beinn a' Chleibh	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 15 - Ben Lui	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 16 - Duncan Bann Macintyre Monument	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant

Viewpoint 17 - Loch Awe watercraft	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 18 - A815 – St Catherines	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 19 - A83 lay-by	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant

Effects on Visual Receptors during Operation Year 1

There is anticipated significant effects at a number of viewpoints based on the Headpond and the Tailpond Inlet / Outlet structure at year 1 of the scheme operation. These are summarised in Table 12-3: Summary of Effects: Operation Year 1.

Table 12-3: Summary of Effects: Operation Year 1

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Viewpoint 1 - Dun Na Cuaiche, Inveraray	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 2 - Minor road - near A815	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 3 - Kilmaha	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 4 - Dalavich Jetty	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 5 - Loch shore off coastal road between Inverinan and Dalavich	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 6 - Inverinan	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 7 - Eilean na Moadail peninsula	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 8 - Ben Cruachan	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 9 - Dorlin Point	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant

Viewpoint 10 - Ardanaiseig GDL	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 11 - A85	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 12 - Stob Garbh	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Viewpoint 13 - Ben Eunaich	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 14 - Beinn a' Chleibh	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 15 - Ben Lui	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 16 - Duncan Bann Macintyre Monument	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 17 - Loch Awe watercraft	Effect on visual amenity	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
Viewpoint 18 - A815 – St Catherines	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 19 - A83 lay-by	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant

Effects on Visual Receptors during Operation Year 15

There are no anticipated significant effects on the viewpoints assessed at operation year 15. All effects are summarised in Table 12-4: Summary of Effects: Operation Year 15.

Table 12-4: Summary of Effects: Operation Year 15

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Viewpoint 1 - Dun Na Cuaiche, Inveraray	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 2 - Minor road - near A815	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant

Viewpoint 3 - Kilmaha	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 4 - Dalavich Jetty	Effect on visual amenity	Moderate adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 5 - Loch shore off coastal road between Inverinan and Dalavich	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 6 - Inverinan	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 7 - Eilean na Moadail peninsula	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 8 - Ben Cruachan	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 9 - Dorlin Point	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 10 - Ardanaiseig GDL	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 11 - A85	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 12 - Stob Garbh	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
Viewpoint 13 - Ben Eunaich	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 14 - Beinn a' Chleibh	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 15 - Ben Lui	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 16 - Duncan Bann Macintyre Monument	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 17 - Loch Awe watercraft	Effect on visual amenity	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant

Viewpoint 18 - A815 – St Catherines	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Viewpoint 19 - A83 lay-by	Effect on visual amenity	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant

12.5 Landscape Effects

Landscape Designations

The landscape of certain parts of the Study Area have been designated or defined due to their scenic qualities or historic landscape qualities as shown on *Figure 17 - Landscape Designations and Operational Zone of Theoretical Visibility*. The ZTVs have been used to identify landscape designations and defined areas within the Study Area that may have visibility of the Proposed Development. Any designations and defined areas that are not within the ZTVs are scoped out of the LVIA and are not included within the baseline section as there is no potential for the Proposed Development to result in effects on receptors outside the ZTVs.

Inveraray Castle GDL

Inveraray Castle GDL encompasses part of the Proposed Development Site near to Inveraray. The GDL is located within North Argyll LLA and West Loch Fyne (Coast) Local Landscape Area (LLA). There are several local paths and core paths through the GDL.

Inveraray Castle GDL is a designed estate landscape with Inveraray Castle as its focal point incorporating an 18th century improvement landscape (parklands, garden buildings and vast woodland plantations) and the planned town of Inveraray. Inveraray GDL provides the setting for over one hundred listed buildings, with many listed buildings ancillary to the castle, and is described as one of the most culturally significant designed landscapes in Scotland.

The focal point of the designed landscape is Inveraray Castle, located at the mouth of the River Aray on the north-western shores of Loch Fyne. The planned town of Inveraray is located 600 m north-west of the castle. The GDL has an outstanding nature conservation value. Three fingers of naturally low-lying land extend outward from the castle. These low-lying areas form the parklands and pastures of the designed landscape. Loch Fyne, one of Scotland's largest sea-lochs, borders the designed landscape to the southeast. The boundary of the Inveraray GDL broadly follows the sloping contours of plantation surrounding these three flatland areas including Ballantyre Wood, Brackley Wood, Dub-Loch Wood and the plantations at Sron-ghabh and Tom-breac. The Woodlands, covering more than four thousand acres, are a key component of the landscape intervention.

To the north-west of Inveraray Castle, within the GDL, Dun Na Cuaiche (the hill of the cup) and the watchtower on its summit, are key in the local topography and contribute to the overall experience of the designed landscape. Viewpoints include the introductory view of the town from the Garron Bridge at the mouth of Glen Shira and the view of the town and castle simultaneously from the Aray Bridge. Key views across the designed landscape are from the watchtower at the summit of Dun Na Cuaiche, including elevated views of the castle, town, parklands and plantations with the loch, moorland and mountains of Argyll forming the wider backdrop. Long-range views include the hills of Strachur and Cruach-nan-Capull and the A815 road along the opposite side of Loch Fyne.

The landscape value of Inveraray Castle GDL is deemed to be **Very High**.

Ardkinglas and Strone GDL

Ardkinglas and Strone GDL is located within the Study Area on the southern side of Loch Fyne. The GDL is located within the North Argyll LLA. There are several local paths through the GDL.

Ardkinglas and Strone GDL is of outstanding horticultural interest for its woodland garden collections. As well as mixed woodland, the GDL consists of large specimen trees, historic buildings (including Ardkinglas House), areas of parkland and formal gardens. The woodlands include a series of woodland trails. Ardkinglas House is located

on a terrace overlooking Loch Fyne, with its gardens, estate buildings and parks on the surrounding flat ground. Woodlands extend along the shore to the southwest, up onto the higher ground behind Ardkinglas House, and either side of the deeply incised Kinglas Water, which flows into Loch Fyne at Cairndow.

In views across and along Loch Fyne, the extensive woodlands and parkland are an important scenic element of the Ardkinglas and Strone GDL, with the canopy and large specimen trees providing visual contrast with the adjacent surrounding uplands. There are also views south over Loch Fyne from the various woodland trails within the GDL.

The landscape value of Ardkinglas and Strone GDL is deemed to be **Very High**.

Ardanaiseig House GDL

Ardanaiseig House GDL is located within the Study Area on the western side of Loch Awe. The GDL is located within the North Argyll LLA. A minor road and woodlands form the northern and southern boundaries of Ardanaiseig House GDL. The GDL is an 18th century designed landscape at the lochside comprising mainly woodland, walled gardens, parkland and architectural features. The gardens contain a notable collection of trees and shrubs. The GDL includes built form, including Ardanaiseig House which has framed views of Loch Awe through shelter woodlands and a loch side timber structure.

There are extensive panoramas of the upland scenery from various locations, especially to Ben Cruachan and east across Loch Awe to Ben Lui. There are several local walks through the woodlands.

The landscape value of Ardanaiseig House GDL is deemed to be **Very High**.

Local Landscape Areas (LLAs)

LDP2 identifies a suite of LLAs (formerly known as Areas of Panoramic Quality) as areas of regional importance in terms of their landscape quality. There are no descriptions of the LLAs or the defining characteristic within LDP2, but it does note that they are important for “their physical landforms and scenic value, but also for the environmental assets that they represent”. A combination of field survey and the Argyll and Bute Landscape Wind Energy Capacity Study (Argyle and Bute Council, 2017) has been used to inform landscape value.

There are five LLAs within the Study Area as listed below and shown on Figure 17 - Landscape Designations and Operational Zone of Theoretical Visibility. Those LLAs that are scoped into the landscape assessment include a description and landscape value judgement, those scoped out are explained in Table 5.5 Landscape Assessment Scope.

- North Argyll LLA;
- West Loch Fyne (Coast) LLA;
- East Loch Fyne (Coast) LLA;
- Knapdale / Melfort LLA; and
- North West Argyll (Coast) LLA.

North Argyll LLA

The LLA is located within the northern, eastern and south-eastern parts of the Study Area.

Within the Study Area, the LLA spans several LCTs, including the rugged mountains comprising the summits of Ben Cruachan and Ben Lui, which fall towards the craggy coast and islands and craggy upland, upland glens and finally the rocky coastland. The LLA also includes the northern part of Loch Awe and lies adjacent to the boundary of Loch Fyne. There are dramatic, panoramic outward views available from the higher parts of the LAA, including Ben Cruachan, across this varied landscape of forestry plantations and open moorland with sparse built form, pockets of woodland vegetation including along glens, mature loch side vegetation and open water expanses of the lochs. There are views of wind turbines and overhead power lines which run through the LLA.

The LLA is located within the Inveraray GDL, Ardkinglas and Strone GDL, Ardanaiseig House GDL, Ben Lui WLA and Loch Etive Mountains WLA. Despite some detracting features in the landscape, there is high scenic quality, sense of identity, wildness and tranquillity, cultural and natural heritage value and recreational opportunities. Taking all of this into account, the landscape value of this LLA in the Study Area is deemed to be Very High.

West Loch Fyne (Coast) LLA

The LLA is located within the central and southern part of the Study Area.

Within the Study Area, the LLA is located within two LCTs, comprising the plateau moor and forest and rocky coastland. The LLA has outward views towards expansive upland landscapes, including the rugged mountains which forms a backdrop to views. Where views are restricted by landform and woodland, outward views are focused on opposite loch shores. The LLA comprises recreational opportunities and is relatively more settled and farmed than the upland landscapes. There are detracting features including transport routes alongside lochs and views of forestry plantation, overhead lines and wind farms.

The LLA is located within the Inveraray GDL and Crarae GDL. Despite some detracting features in the landscape, there is high scenic quality, cultural and natural heritage value and recreational opportunities. Taking all of this into account, the landscape value of this LLA in the Study Area is deemed to be High.

East Loch Fyne (Coast) LLA

The LLA is located within the central and southern part of the Study Area.

Within the Study Area, the LLA is located within several LCTs, comprising the steep ridges and mountains, rocky coastland and plateau moor and forest. The LLA has outward views towards expansive upland landscapes, including the rugged mountains which forms a backdrop to views. Where views are restricted by landform and woodland, outward views are focused on opposite loch shores. The LLA comprises recreational opportunities and is relatively more settled and farmed than the upland landscapes. There are detracting features including transport routes alongside lochs and views of plantation forests and wind farms.

The LLA is not located in any other landscape designations within the Study Area. Despite some detracting features in the landscape, there is high scenic quality, natural heritage value and recreational opportunities. Taking all of this into account, the landscape value of this LLA in the Study Area is deemed to be High.

Effects on Landscape Designations during Construction

It is anticipated that there would be significant effects on the Loch Etive Mountains Wild Land Area and the Inveraray Castle GDL, the North Argyll LLA, the West Loch Fyne LLA and the East Loch Fyne LLA during construction.

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Inveraray Castle GDL	Effect on landscape character	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
Ardkinglas and Strone GDL	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Ardanaiseig House GDL	Effect on landscape character	Neutral	N/A (All mitigation is embedded)	Neutral	Not significant
North Argyll LLA	Effect on landscape character	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
West Loch Fyne (Coast) LLA	Effect on landscape character	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant

East Loch Fyne (Coast) LLA	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
WLA 09 Loch Etive Mountains	Effect on landscape character	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
LCT 34 Steep Ridges and Mountains	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
LCT 35 Rugged Mountains	Effect on landscape character	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
LCT 37 Upland Glens - Argyll	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 39 Plateau Moor & Forest - Argyll	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
LCT 40 Craggy Upland - Argyll	Effect on landscape character	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant
LCT 53 Rocky Coastland - Argyll	Effect on landscape character	Major adverse	N/A (All mitigation is embedded)	Major adverse	Significant

Effects on Landscape Designations during Operation Year 1

There are no anticipated significant effects on landscape designations at operation year 1.

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Inveraray Castle GDL	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Ardkinglas and Strone GDL	Effect on landscape character	Neutral	N/A (All mitigation is embedded)	Neutral	Not significant
Ardanaiseig House GDL	Effect on landscape character	Neutral	N/A (All mitigation is embedded)	Neutral	Not significant
North Argyll LLA	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
West Loch Fyne (Coast) LLA	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant

East Loch Fyne (Coast) LLA	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
WLA 09 Loch Etive Mountains	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
LCT 34 Steep Ridges and Mountains	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 35 Rugged Mountains	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
LCT 37 Upland Glens - Argyll	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 39 Plateau Moor & Forest - Argyll	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 40 Craggy Upland - Argyll	Effect on landscape character	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant
LCT 53 Rocky Coastland - Argyll	Effect on landscape character	Moderate adverse	N/A (All mitigation is embedded)	Moderate adverse	Significant

Effects on Landscape Designations during Operation Year 15

There are no anticipated significant effects on landscape designations at operation year 15.

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Inveraray Castle GDL	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
Ardkinglas and Strone GDL	Effect on landscape character	Neutral	N/A (All mitigation is embedded)	Neutral	Not significant
Ardanaiseig House GDL	Effect on landscape character	Neutral	N/A (All mitigation is embedded)	Neutral	Not significant
North Argyll LLA	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
West Loch Fyne (Coast) LLA	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant

East Loch Fyne (Coast) LLA	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
WLA 09 Loch Etive Mountains	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 34 Steep Ridges and Mountains	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 35 Rugged Mountains	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
LCT 37 Upland Glens - Argyll	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 39 Plateau Moor & Forest - Argyll	Effect on landscape character	Negligible adverse	N/A (All mitigation is embedded)	Negligible adverse	Not significant
LCT 40 Craggy Upland - Argyll	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant
LCT 53 Rocky Coastland - Argyll	Effect on landscape character	Minor adverse	N/A (All mitigation is embedded)	Minor adverse	Not significant

12.6 Assessing the Effects on Visual Amenity and Landscapes

Importance of Landscapes and Viewpoint

The importance of the effect on the visual amenity and landscapes of the water environment depends on the following factors, according to SEPA Guidance Note WAT-SG-67:

- the prominence of, or role played by, the water environment in the landscape or visual amenity concerned.
- the local, regional, national or international conservation value of the landscape. Some of Scotland's landscapes are unique or otherwise culturally important even though few people may see them. The conservation of these landscapes can be of high importance for future generations; and
- the social and economic value of water environment features in visual amenity terms. If the water environment is a prominent feature of a visual amenity that attracts large numbers of overseas visitors, it is likely to be of high or very high importance. Improvements to degraded parts of the water environment can also be of high importance, for example, where they significantly improve visual amenity for deprived and disadvantaged communities.

Figure 12-1 below, has been utilised to determine the importance of the landscapes and viewpoints of the water environment which have the potential to be affected by the Proposed Development.

The landscape importance of the assessed LCTs and viewpoints ranges from **Medium** to **Very High Importance** due to their being located in the Loch Lomond and the Trossachs National Park, such as Viewpoint 15 – Ben Lui.

Negligible	<p>Visual amenity – types of viewpoints</p> <ul style="list-style-type: none"> • Minor transport routes not meeting the criteria for medium importance. • Formal outdoor recreation facilities not meeting the criteria for low or medium importance. • Workplaces.
Low importance	<p>Visual amenity – types of viewpoints onto the water environment</p> <ul style="list-style-type: none"> • Informal recreational routes and areas not meeting the criteria applicable for medium, high or very high importance. • Formal outdoor recreation facilities (swimming pools; golf courses; etc) acting as regional centres or regularly hosting regional sporting events). • Residences and residential areas not meeting the criteria for medium, high or very high importance. • Listed buildings, ancient monuments and other built heritage sites not meeting the criteria for medium or high importance. <p>Landscapes</p> <ul style="list-style-type: none"> • The water environment is a feature of the landscape of a <i>Country park</i>.
Medium importance	<p>Visual amenity – types of viewpoints onto the water environment</p> <ul style="list-style-type: none"> • Informal recreational routes, and other areas, that are amongst the most visited locally. • Major transport routes not meeting the criteria for high importance. • Minor transport routes used frequently by visitors to Scotland or people from other parts of Scotland. • Residences and residential areas in neighbourhoods that are amongst the most deprived regionally. • Extensive residential areas in villages, towns or cities. • Formal recreation facilities regularly hosting national or international sporting events. Listed buildings, ancient monuments and other built heritage sites that are amongst the most visited regionally. <p>Landscapes</p> <ul style="list-style-type: none"> • The water environment is a feature of a designated <i>Local Landscape Area</i>. • The water environment is a feature of a <i>Regional park</i>.
High importance	<p>Visual amenity – types of viewpoints onto the water environment</p> <ul style="list-style-type: none"> • Informal recreational routes and areas that are amongst the most visited regionally and in which the water environment is a major component of the visual amenity. • Major transport routes used extensively by visitors to Scotland as well as people from throughout Scotland. • Residences and residential areas in neighbourhoods that are amongst the most deprived nationally. • Residential areas in villages, towns or cities with an historic association with the part of the water environment concerned. • Listed buildings, ancient monuments and other built heritage sites attracting large numbers of visitors from across Scotland and beyond. <p>Landscapes</p> <ul style="list-style-type: none"> • The water environment is a feature of the landscape character of <i>National Scenic Areas; National Parks; and areas listed in Scotland's Inventory of Gardens & Designed Landscapes and Wild Land Areas</i>.
Very high importance	<p>Visual amenity – types of viewpoints onto the water environment</p> <ul style="list-style-type: none"> • Informal recreational routes and areas attracting especially large numbers of visitors from across Scotland and beyond and in which the water environment is the dominant component of the visual amenity. • Residences and residential areas that are within a national priority area for regeneration. <p>Landscapes</p> <ul style="list-style-type: none"> • The water environment is a feature of the landscape character of a world heritage site for which landscape was an important factor in its designation

Figure 12-1. WAT-SG-67 Table 16: Indicative guide to assessing the importance of landscapes and viewpoints

The scale of effect on visual amenity has been assessed based on the scale of the effect and the importance of the effect have been assessed based on the criteria set out in **Figure 12-2**.

Very small	<p>Viewpoints</p> <ul style="list-style-type: none"> • Small change in the quality of the view for a small or moderate proportion of viewpoints <p>Landscapes</p> <ul style="list-style-type: none"> • Only features that play a minor role in creating the distinctiveness and character of the landscape would be altered and the changes would be virtually imperceptible and/or within the capacity of the landscape to absorb.
Small	<p>Viewpoints</p> <ul style="list-style-type: none"> • Small degree of change in the quality of the view for a large or very large proportion of viewpoints; or • Moderate change in the quality of the view for a small proportion of viewpoints; and/or <p>Landscapes</p> <ul style="list-style-type: none"> • Features that contribute to the distinctiveness and character of the landscape would be altered slightly but noticeably in a localised area.
Medium	<p>Viewpoints</p> <ul style="list-style-type: none"> • Moderate change in the quality of the view for a moderate or large proportion of viewpoints; • large change in the quality of the view for a small or moderate proportion of viewpoints; or • very large change in the quality of the view for a small proportion of viewpoints; and/or <p>Landscapes</p> <ul style="list-style-type: none"> • Features that contribute to the distinctiveness and character of the landscape would be altered to a medium extent over a wide area or altered substantially in a localised area.
Large	<p>Viewpoints</p> <ul style="list-style-type: none"> • Large change in the quality of the view for a large or very large proportion of viewpoints; or • Very large change in the quality of the view for a moderate or large proportion of viewpoints; and/or <p>Landscapes</p> <ul style="list-style-type: none"> • Features that contribute significantly to the distinctiveness and character of the landscape would be moderately altered over a wide area or altered very substantially over a limited area.
Very Large	<p>Viewpoints</p> <ul style="list-style-type: none"> • Very large change in the quality of the view for a very large proportion of viewpoints; and/or <p>Landscapes</p> <ul style="list-style-type: none"> • Features that contribute significantly to the distinctiveness and character of the landscape would be lost or very substantially altered over a wide area.

Figure 12-2. WAT-SG-67 Table 17: Determining the scale of an effect on visual amenity

The Magnitude of the impact is based on the duration of the effect. The construction works are regarded as lasting up to around 6 years with the operational phase lasting significantly more than 6 years. The magnitude of the impact has been assessed in line with **Figure 6-3** in Section 6.

Taking account of the importance, scale of effect, magnitude of effect the significance of the impact on the visual amenity and landscape at the receptors are summarised in **Table 12-5**. These are based on the long term impact and are based on the operational scenario and compared to the year 15 results from LVIA in the EIA Report.

Table 12-5: Summary of Effects: Operation Year 15

Receptor	Description of Effects	EIA LVIA Results	WAT-SG-67			
		Significance	Importance	Scale of Effect	Magnitude of Effect	Significance
Inveraray Castle GDL	Effect on landscape character	Not significant	Very High	Small	Small	Moderate
Ardkinglas and Strone GDL	Effect on landscape character	Not significant	Very High	Small	Small	Moderate
Ardanaiseig House GDL	Effect on landscape character	Not significant	Very High	Small	Small	Moderate
North Argyll LLA	Effect on landscape character	Not significant	Very High	Small	Small	Moderate
West Loch Fyne (Coast) LLA	Effect on landscape character	Not significant	High	Small	Small	Moderate

Receptor	EIA LVIA Results		WAT-SG-67			
	Description of Effects	Significance	Importance	Scale of Effect	Magnitude of Effect	Significance
East Loch Fyne (Coast) LLA	Effect on landscape character	Not significant	High	Small	Small	Moderate
WLA 09 Loch Etive Mountains	Effect on landscape character	Not significant	Very High	Small	Small	Moderate
LCT 34 Steep Ridges and Mountains	Effect on landscape character	Not significant	High	Small	Small	Moderate
LCT 35 Rugged Mountains	Effect on landscape character	Not significant	Very High	Small	Small	Moderate
LCT 37 Upland Glens - Argyll	Effect on landscape character	Not significant	High	Small	Small	Moderate
LCT 39 Plateau Moor & Forest - Argyll	Effect on landscape character	Not significant	Medium	Small	Small	Low
LCT 40 Craggy Upland - Argyll	Effect on landscape character	Not significant	Medium	Small	Small	Low
LCT 53 Rocky Coastland - Argyll	Effect on landscape character	Not significant	High	Small	Small	Moderate
Viewpoint 1 - Dun Na Cuaiche, Inveraray	Effect on visual amenity	Not significant	Very High	Very Small	Very Small	Low
Viewpoint 2 - Minor road - near A815	Effect on visual amenity	Not significant	Medium	Very Small	Very Small	Very Low
Viewpoint 3 - Kilmaha	Effect on visual amenity	Not significant	Medium	Small	Small	Low
Viewpoint 4 - Dalavich Jetty	Effect on visual amenity	Not significant	High	Very Small	Small	Low
Viewpoint 5 - Loch shore off coastal road between Inverinan and Dalavich	Effect on visual amenity	Not significant	High	Small	Small	Moderate
Viewpoint 6 - Inverinan	Effect on visual amenity	Not significant	Medium	Small	Small	Low
Viewpoint 7 - Eilean na Moadail peninsula	Effect on visual amenity	Not significant	High	Small	Small	Moderate
Viewpoint 8 - Ben Cruachan	Effect on visual amenity	Not significant	Very High	Small	Small	Moderate
Viewpoint 9 - Dorlin Point	Effect on visual amenity	Not significant	Medium	Very small	Very small	Very Low
Viewpoint 10 - Ardanaiseig GDL	Effect on visual amenity	Not significant	High	Very small	Very small	Low
Viewpoint 11 - A85	Effect on visual amenity	Not significant	High	Very small	Very small	Low
Viewpoint 12 - Stob Garbh	Effect on visual amenity	Not significant	Very High	Small	Small	Moderate
Viewpoint 13 - Ben Eunaich	Effect on visual amenity	Not significant	Very High	Very small	Very small	Low

Receptor	EIA LVIA Results		WAT-SG-67			
	Description of Effects	Significance	Importance	Scale of Effect	Magnitude of Effect	Significance
Viewpoint 14 - Beinn a' Chleibh	Effect on visual amenity	Not significant	Very High	Small	Small	Moderate
Viewpoint 15 - Ben Lui	Effect on visual amenity	Not significant	Very High	Small	Small	High
Viewpoint 16 - Duncan Bann Macintyre Monument	Effect on visual amenity	Not significant	High	Very small	Very small	Low
Viewpoint 17 - Loch Awe watercraft	Effect on visual amenity	Not significant	High	Small	Small	Moderate
Viewpoint 18 - A815 – St Catherines	Effect on visual amenity	Not significant	Medium	Small	Small	Low
Viewpoint 19 - A83 lay-by	Effect on visual amenity	Not significant	Medium	Small	Small	Low

The result of the WAT-SG-67 (SEPA, 2017b) assessment are based on the scale of the effect of the visual amenity at the receptors that are impacted. The results are supported by the assessment carried out in the LVIA carried out as part of the EIA. Taking account of all the impacts at the receptors the overall impact is regarded as **Very Low to Moderate**.

13. Effects of Economic Opportunities for Disadvantaged Groups

13.1 Introduction

The effects on the economic opportunities for disadvantaged groups of the Proposed Development has been assessed in accordance with the SEPA Guidance Note WAT-SG-67.

The results of the assessment have determined that the significance of the economic opportunities for disadvantaged groups of the Proposed Development is a Positive Negligible Significance.

13.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoach Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 16 Socioeconomics, Recreation and Tourism
- AECOM. (2025) Balliemanoach Pumped Storage Hydro Further Environmental Information Report.

13.3 Economic Opportunities

The pre-construction and construction stages combined is expected to take seven years in total to complete, with pre-construction and enabling generating a peak, temporary workforce of around 1000 workers onsite; and construction of the Proposed Development requiring an average of 600 to 800 works onsite, over seven years, which equates to ~4,900 Person Years of Employment PYE in total over the construction period. This seven year construction period is the focus of the assessment on the effects of economic opportunities for disadvantaged groups.

The Operational Phase activities associated with the Proposed Development will generate employment both directly and indirectly in the supply chain. It has been estimated that there will be a gross number of 10 direct permanent jobs generated by the Proposed Development, all of which will be within Argyll & Bute Council area. It is expected that the Operational Phase will require predominantly skilled workers, hence there may be limited opportunities for disadvantaged groups without training or educational opportunities. Hence, these permanent roles have not been included in this assessment.

13.4 Assessing the Effects of Economic Opportunities for Disadvantaged Groups

Assessing the Scale of the Effects

According to WAT-SG-67, 'The scale of an effect on economic opportunity depends on the degree of change in economic opportunity and the numbers of people affected by the change.' Following review of Figure 13-1, it was determined that the scale of an effect on economic opportunity for disadvantaged groups of the Proposed Development was **very small**, due to the potential temporary employment opportunities during the pre-construction and construction phases of the Proposed Development.

Very small	There would be a very small change to the economic opportunities of the group as a whole. A very small number of individuals may benefit more significantly
Small	There would be a small change to the economic opportunities of the group as a whole. A small number individuals may benefit more significantly
Medium	There would be a moderate change to a moderate proportion of the affected group
Large	There would be a large change to a moderate proportion of the affected group or a moderate change to a very large proportion of the group
Very Large	There would be a very large change to the economic opportunities available to a very large proportion of the affected group. The size of the affected group or groups is large (eg several 1,000s of people)

Figure 13-1: WAT-SG-67 Table 21: Indicative guide to assessing the scale of an effect on a disadvantaged group

Assessing the Magnitude of the Effect

The magnitude of the effect on economic opportunity for disadvantaged groups of the Proposed Development has been assessed using **Figure 6-3**, in Section 6. It is anticipated that the combined pre-construction and construction phases of the Proposed Development will last approximately seven years. Taking this into consideration, the magnitude of the effect of the Proposed Development has been determined to be **Very Small**.

Assessing the Importance of the Effects

The importance of the effect has been judged to be **low**, based on review of **Figure 13-2**.

Low importance	The affected community is, or would be, in the most deprived >20% to 30 % of neighbourhoods in Scotland
Medium importance	The affected community is, or would be, in the most deprived >10% to 20% of neighbourhoods in Scotland
High importance	The affected community is, or would be, in the most deprived > 5% to 10% of neighbourhoods in Scotland
Very high importance	The affected community is, or would be, in the most deprived 5% of neighbourhoods in Scotland

Figure 13-2. WAT-SG-67 Table 20: Indicative guide to assessing the social importance of an economic effect

Assessing the Significance of the Effect

The significance of the effect on economic opportunity for disadvantaged groups of the Proposed Development has been assessed using **Figure 6-5**, in Section 6. The importance of the effect has been judged to be very low / negligible.

In conclusion, the positive economic effect of the Proposed Development on disadvantaged groups would be **Positive Negligible Significance**.

14. Effects on Climate Change

14.1 Introduction

The effects of the Proposed Development on Climate Change have been assessed in accordance with the SEPA Guidance Note WAT-SG-67.

The results of the assessment, detailed below, have determined that the significance of the effects on Climate Change of the Proposed Development is a **Positive Very High Significance**.

14.2 Guidance and Information Sources

The following documents were used to inform this assessment:

- The information provided with the application.
- Responses from the consultation with relevant statutory and non-statutory consultees.
- SEPA (2017b). Supporting Guidance (WAT-SG-67), Assessing the Significance of Impact – Social, Economic and Environmental (V5.1);
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 2 Project and Site Description;
- AECOM. (2024) Balliemanoch Pumped Storage Hydro Environmental Impact Assessment Report Volume 2: Chapter 17 Climate
- AECOM. (2025) Balliemanoch Pumped Storage Hydro Further Environmental Information Report.

14.3 Climate Effects

Reducing the reliance on fossil fuel energy and the associated greenhouse gas (GHG) emissions to achieve the aim of Scotland being net zero by 2045 will require a significant increase in the generating capacity of renewables. This increase in renewable generation capacity will lead to larger fluctuations in generation, making the grid more susceptible to excess generation or deficits for longer periods. During periods of deficit, the gap in demand means there is a reliance on gas fired power generation to meet demand which results in carbon emissions.

This deficit can be mitigated on a short-term basis through Battery Energy Storage Systems and interconnectors however this would not be able to meet excess demand over sustained periods of energy shortage where renewables are unable to meet demand or not generating due to weather conditions. For this reason, long-term and large-scale electricity storage will also be required.

PSH is the only mature, proven technology that has been demonstrated to be capable of providing large-scale storage of energy long term at a cost per MWh that is competitive with other technologies. PSH also offers very fast response times to fluctuations in electricity demand, allowing them to support with grid stability.

PSH can reduce the reliance on fossil fuel energy typically required during periods of energy shortage and the associated GHG emissions. Additionally, PSH can reduce the curtailment of renewables during periods of excess generation, improving the ability to utilise the electricity generated by these renewables. The proposed development would contribute to net zero targets with annual CO₂e savings of up to approximately 2 million tonnes during its operational life.

14.4 Assessing the Effects on Climate Change

Assessing the Scale of the Effect

According to WAT-SG-67, to assess the scale of climate change effects of the Proposed Development, an estimate is required of the additional:

- Renewable energy generated or reduction in non-renewable energy consumed in GWh per year;
- Non-renewable energy consumed in GWh per year;
- Greenhouse gas emitted in tonnes of carbon equivalents per year; or
- Greenhouse gas emissions saved in tonnes of carbon equivalents per year.
-

Table 14-1. Emissions and Energy Summary

Factor	Value
Reduction in non-renewable energy consumed	3,942 GWh

Following review of **Table 14-1** and comparing with **Figure 14-1** below, it was determined that the scale of a climate change effect of the Proposed Development was a **Positive Very Large**, due to the large reduction in non-renewable power energy demand the project can offer through storage of ~4,000 GWh per annum, and the resulting reduction in emissions associated of up to approximately 2 million tonnes CO₂e per annum.

	Scale					
	Negligible	Very Small	Small	Medium	Large	Very Large
Average net increase in renewable energy generated or non-renewable energy consumed per year (GWh)	≤ 0.25	> 0.25 to < 20	20 to < 120	120 to < 150	150 to < 200	≥ 200
Carbon equivalents ⁹ (t/year)	≤ 108	> 108 to < 8,600	8,600 to < 51,600	51,600 to < 65,000	65,000 to < 86,000	≥ 86,000
Note: You should treat effects on greenhouse gas emissions that are smaller than those in the "very small" category as non-significant effects. You should ignore such effects when weighing up the positive and negative effects of the proposed activity.						

Figure 14-1. WAT-SG-67 Table 22: Indicative guide to assessing the scale of a climate change effect

Assessing the Magnitude of the Effect

The magnitude of the effect on climate change of the Proposed Development has been assessed using **Figure 6-3**, in Section 6. The Proposed Development has a design life of at least 100 years, exceeding the criteria of lasting significantly more than 6 years. Taking this into consideration, the magnitude of the effect of the Proposed Development on climate has been determined to be **Very Large**.

Importance of the Effect on Climate Change

The environmental impact associated with GHG emissions is a national and global issue. Accounting for Scotland's climate objective to achieve net zero carbon by 2045, and in line with SEPA Guidance Note WAT-SG-67 (SEPA, 2017b) for assessing the importance and scale of climate change effects, Scotland's carbon reduction targets and the UK sectoral carbon budgets have been used to contextualise emissions from the Proposed Development. Ensuring Scotland plays its part in tackling climate change is a national policy priority. Therefore, the reduction of GHG emissions, compared to the without-project baseline, that the Proposed Development could bring is considered of **High Importance**.

Assessing the Significance of the Effect

The significance of the effect on climate change of the Proposed Development has been assessed using **Figure 6-5**, in Section 6. The importance of the effect has been judged to be **Positive Very High Significance**.

15. Summary of Positive and Negative Impacts

As part of the assessment of the CAR Licence Application the positive and negative effects of the proposed licenced activities must be weighed up by SEPA. In line with WAT-SG-47 guidance the applicants have weighed up effects and recommendation have been considered and these are summarised below.

In line with the conservative assumptions used within the EIA process to assess the impacts of the Proposed Development the findings of the balancing test are regarded as a worst-case scenario.

Table 15-1: Summary of Impacts

Effect	Assessment (see Chapter of this report)	+/- Impact	Significance of Effect
Aquatic Biodiversity	6	Negative	Very Low to Very High
Marine Biodiversity	7	Negative	Very Low
Terrestrial Biodiversity	8	Negative	Low to High
Ornithology	8	Negative	Very Low to High
Economy	9	Positive	High
Health and safety	10	Negative	Very Low to High
Recreation	11	Negative	Very Low
Visual Amenity and Landscape	12	Negative	Very Low to Moderate
Economic Opportunities to Disadvantaged Groups	13	Positive	Negligible
Climate Change	14	Positive	Very High

The Proposed Development has a **very high positive** effect in providing a part of the solution to reducing climate change, as well as boosting the economy in the region. The positive benefits of this are significantly greater than the negative impacts of the Proposed Development.

16. References

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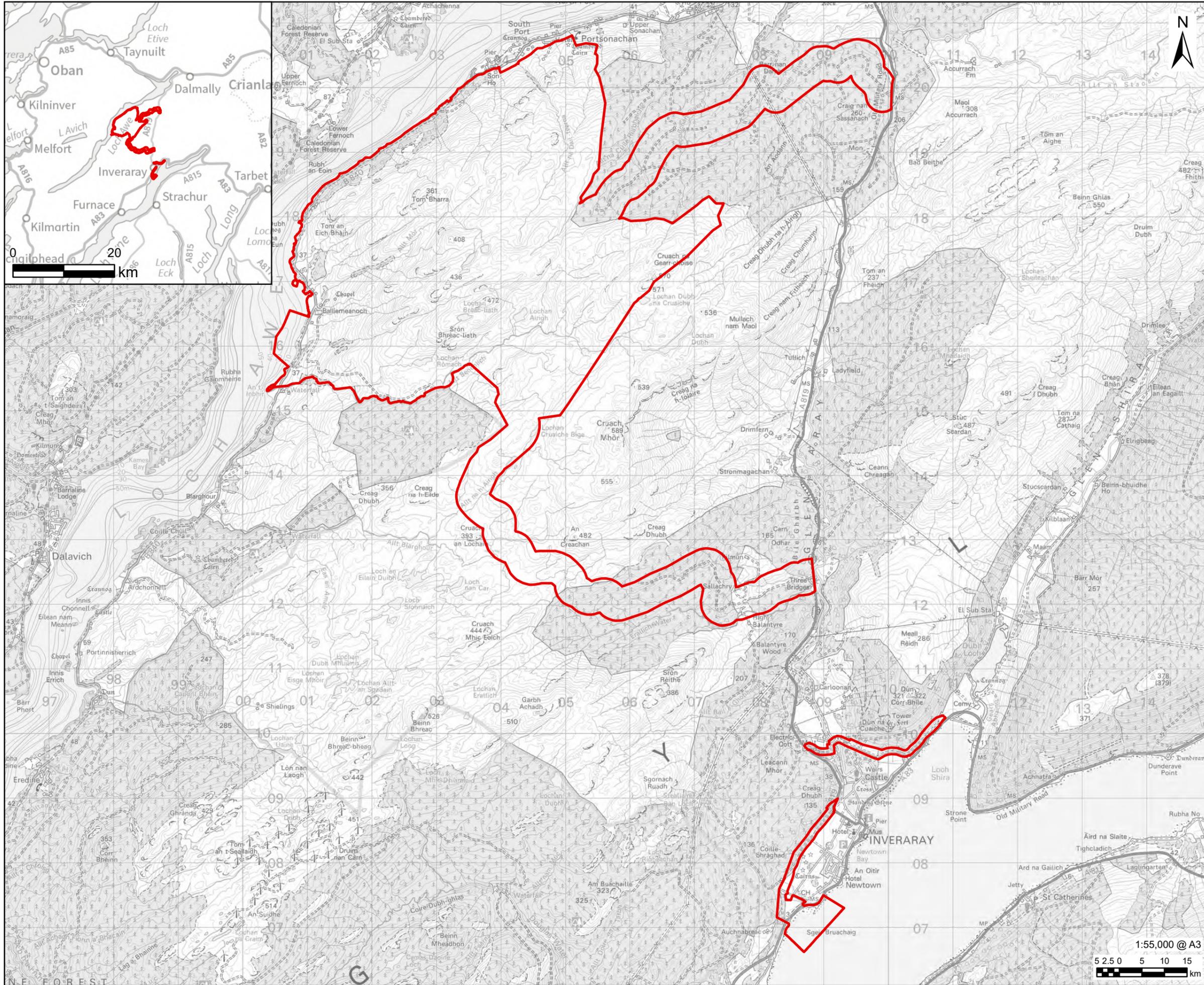
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Appendix A Figures

The below figures are provided in Appendix A:

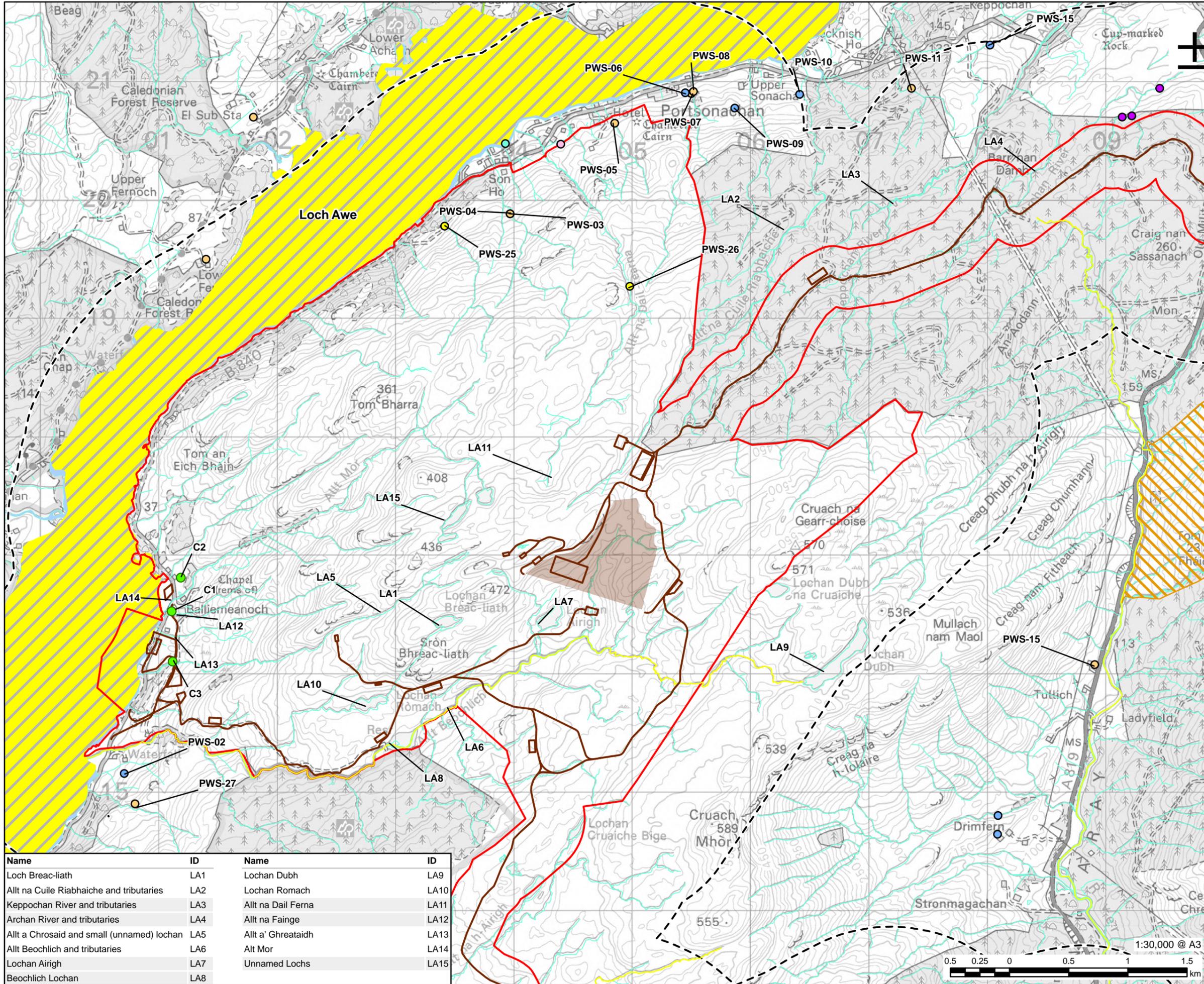
- Figure 1 – Site Location
- Figure 2a-b – Surface Water and Groundwater Receptors Wider Context
- Figure 3a-b – Above Ground Infrastructure
- Figure 4 – Development Cross Section
- Figure 5 - Outline Access Management Plan
- Figure 6 - Headpond Inlet / Outlet Structure
- Figure 7 – Headpond Arrangement Plan
- Figure 8 – Headpond Cross Section
- Figure 9 – Headpond Embankment Typical Detail
- Figure 10 – Tailpond Inlet/Outlet Structure Plan
- Figure 11 – Tailpond Inlet/Outlet Structure Section
- Figure 12 – Construction and Access Tunnel – Plan and Sections
- Figure 13 – Power Tunnel - Plan and Section
- Figure 14 – Waterways – Plan and Sections
- Figure 15a-d – General Arrangement – Access Route
- Figure 16 – Temporary Marine Facility
- Figure 17 – Landscape Designations and Operational Zone of Theoretical Visibility
- Figure 18 – Landscape Character Type and Operational Zone of Theoretical Visibility
- Figure 19 – Viewpoints and Operational Zone of Theoretical Visibility



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LEGEND

- Development Boundary
- Development Boundary - 1km Buffer
- Above Ground Infrastructure
- Headpond
- Special Protection Area
- WFD Status**
- Moderate ecological potential
- non WFD Loch/Lochan
- Good ecological status
- Moderate ecological status
- Other watercourse
- SEPA Car Licences
- SEPA Monitoring Points
- Private Water Supplies**
- Unknown
- Groundwater Spring
- Surface Watercourse
- Surface Loch
- Surface Rainwater



Name	ID	Name	ID
Loch Breac-liath	LA1	Lochan Dubh	LA9
Allt na Cuille Riabhaiche and tributaries	LA2	Lochan Romach	LA10
Keppochan River and tributaries	LA3	Allt na Dail Ferna	LA11
Archan River and tributaries	LA4	Allt na Fainge	LA12
Allt a Chrosaid and small (unnamed) lochan	LA5	Allt a' Ghreataidh	LA13
Allt Beochlich and tributaries	LA6	Alt Mor	LA14
Lochan Airigh	LA7	Unnamed Lochs	LA15
Beochlich Lochan	LA8		

NOTES

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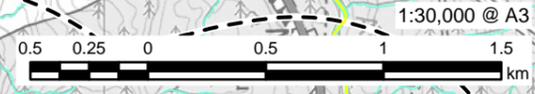
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ISSUE PURPOSE
 FINAL

PROJECT NUMBER
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FIGURE TITLE
 Surface Water and Groundwater Receptors and Attributes - Headpond Study Area

FIGURE NUMBER
 Figure 2a



LEGEND

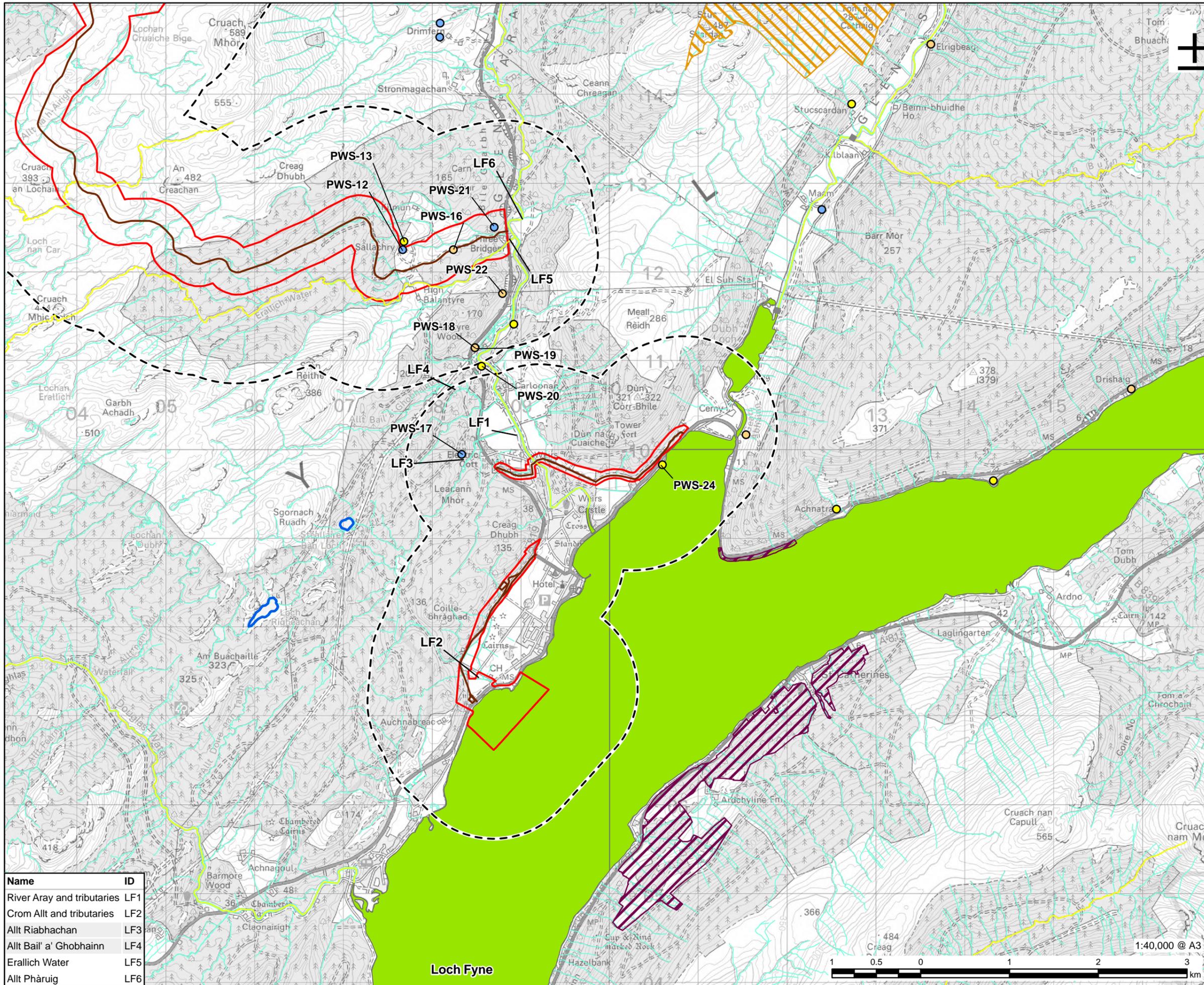
- Development Boundary
- Development Boundary - 1km Buffer
- Above Ground Infrastructure
- Site of Special Scientific Interest
- Special Protection Area
- Drinking Water Protection Areas

WFD Status

- Good ecological status
- Moderate ecological status
- Moderate ecological potential
- Other watercourse

Private Water Supplies

- Unknown
- Groundwater Spring
- Surface Watercourse



Name	ID
River Aray and tributaries	LF1
Crom Allt and tributaries	LF2
Allt Riabhachan	LF3
Allt Bail' a' Ghobhainn	LF4
Erallich Water	LF5
Allt Phàruig	LF6

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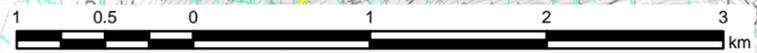
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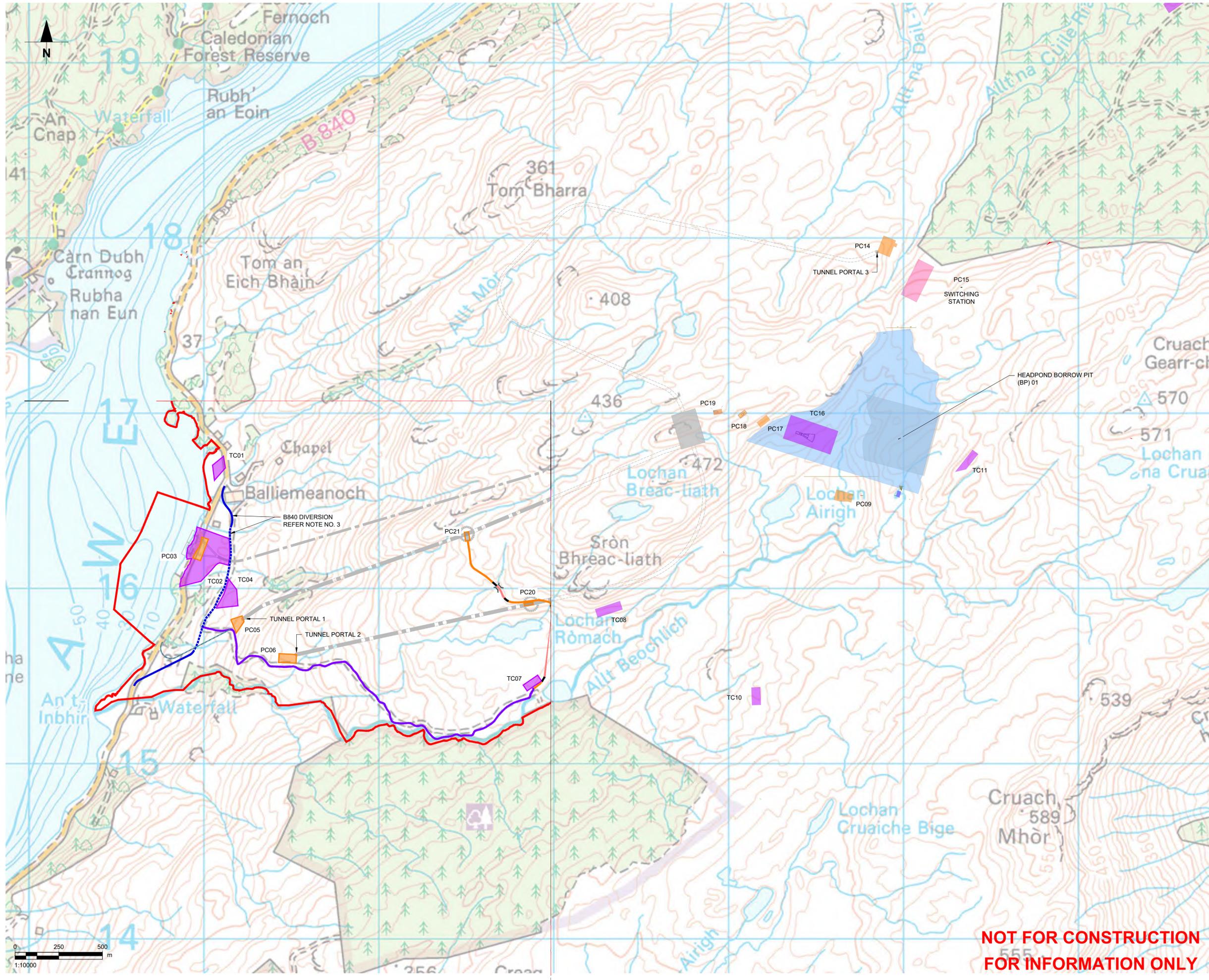
ISSUE PURPOSE
 FINAL

PROJECT NUMBER
 60570241

FIGURE TITLE
 Surface Water and Groundwater Receptors and Attributes - Loch Fyne Study Area

FIGURE NUMBER
 Figure 2b





LEGEND

- BLARGHOUR WIND FARM ACCESS TRACK
- NEW ACCESS TRACK (FLOATING)
- NEW ACCESS TRACK (FLOATING TRANSITION)
- TEMP. CONSTRUCTION ACCESS TRACK
- HEADPOND EMBANKMENT
- TEMPORARY (TC) COMPOUND
- PERMANENT (PC) COMPOUND
- SWITCHING STATION
- CULVERT / BRIDGE
- SPILLWAY

NOTES

1. DRAWING IS FOR INDICATIVE PURPOSES ONLY
2. SELECTED PERMANENT BELOW GROUND INFRASTRUCTURE SHOWN FOR REFERENCE
3. B840 TO BE DIVERTED FOR INLET/OUTLET STRUCTURE CONSTRUCTION.
4. BLARGHOUR WIND FARM ACCESS TRACK TO BE USED FOR BALLIEMEANOCH ONLY IF BLARGHOUR WIND FARM IS NOT CONSTRUCTED. IF WIND FARM IS NOT CONSTRUCTED, ACCESS WILL ONLY BE TO/FROM THE NORTH.
5. PERMANENT COMPOUND (PC03) AT INLET/OUTLET STRUCTURE TO HOUSE INLET/OUTLET STRUCTURE GATE HOUSES.

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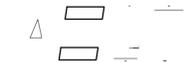
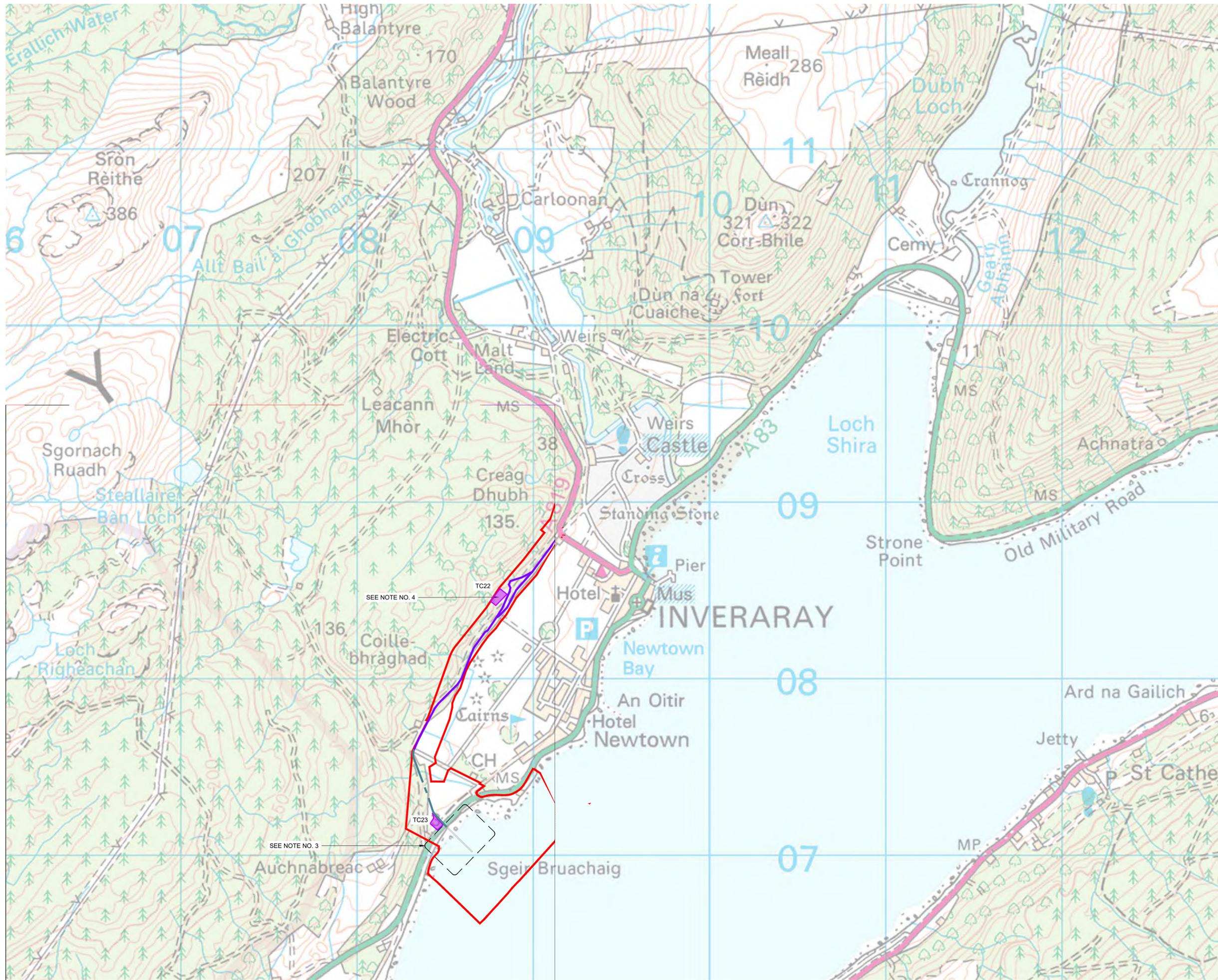
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A AC	DL	JIG	
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Figure 3a



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- LEGEND**
- RED LINE BOUNDARY
 - EXISTING ACCESS TRACK TO BE UPGRADED
 - TEMP. CONSTRUCTION ACCESS TRACK
 - TEMPORARY (T) / PERMANENT (P) CONSTRUCTION COMPOUND

- NOTES**
1. DRAWING IS FOR INDICATIVE PURPOSES ONLY
 2. SEE DRAWING S03-Z2-00-DR-CE-321101 FOR ZONE 2 ACCESS ROUTES
 3. TEMPORARY COMPOUND TC22 LOCATED IN EXISTING BORROW PIT WITHIN RED LINE BOUNDARY. AT CONSTRUCTION, BORROW PIT TO BE LEVELED AND USED AS A CONSTRUCTION COMPOUND

SEE NOTE NO. 4

SEE NOTE NO. 3

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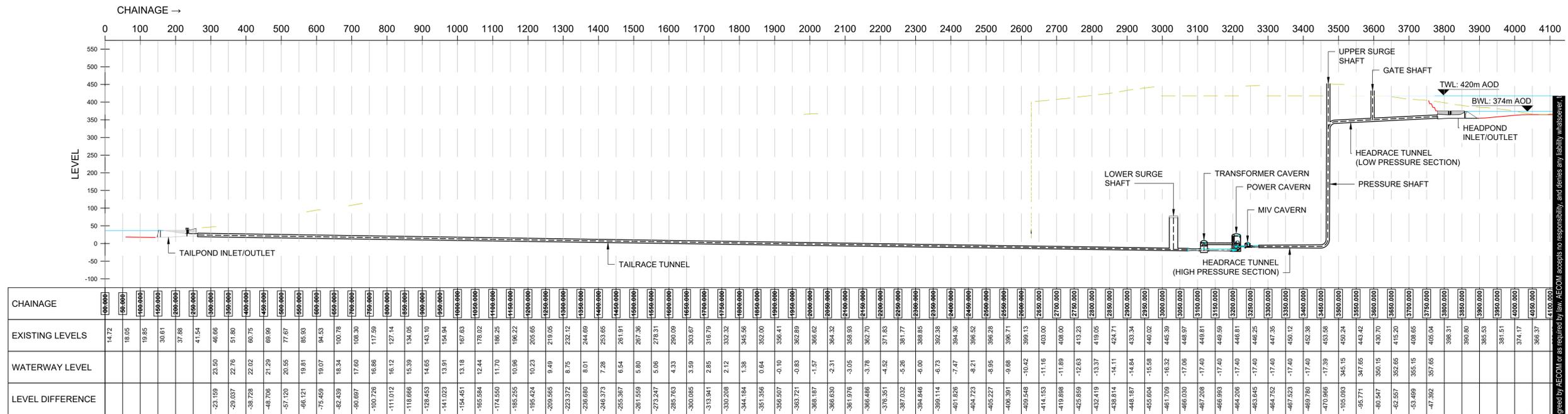
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Figure 3b

Waterways Longsection - LONGSECTION
SCALE: H 1:5000, V 1:5000 - DATUM: -125.000



- NOTES**
- DRAWING IS FOR INDICATIVE PURPOSES ONLY
 - TURBINE SETTING LEVEL at -17.4m AOD

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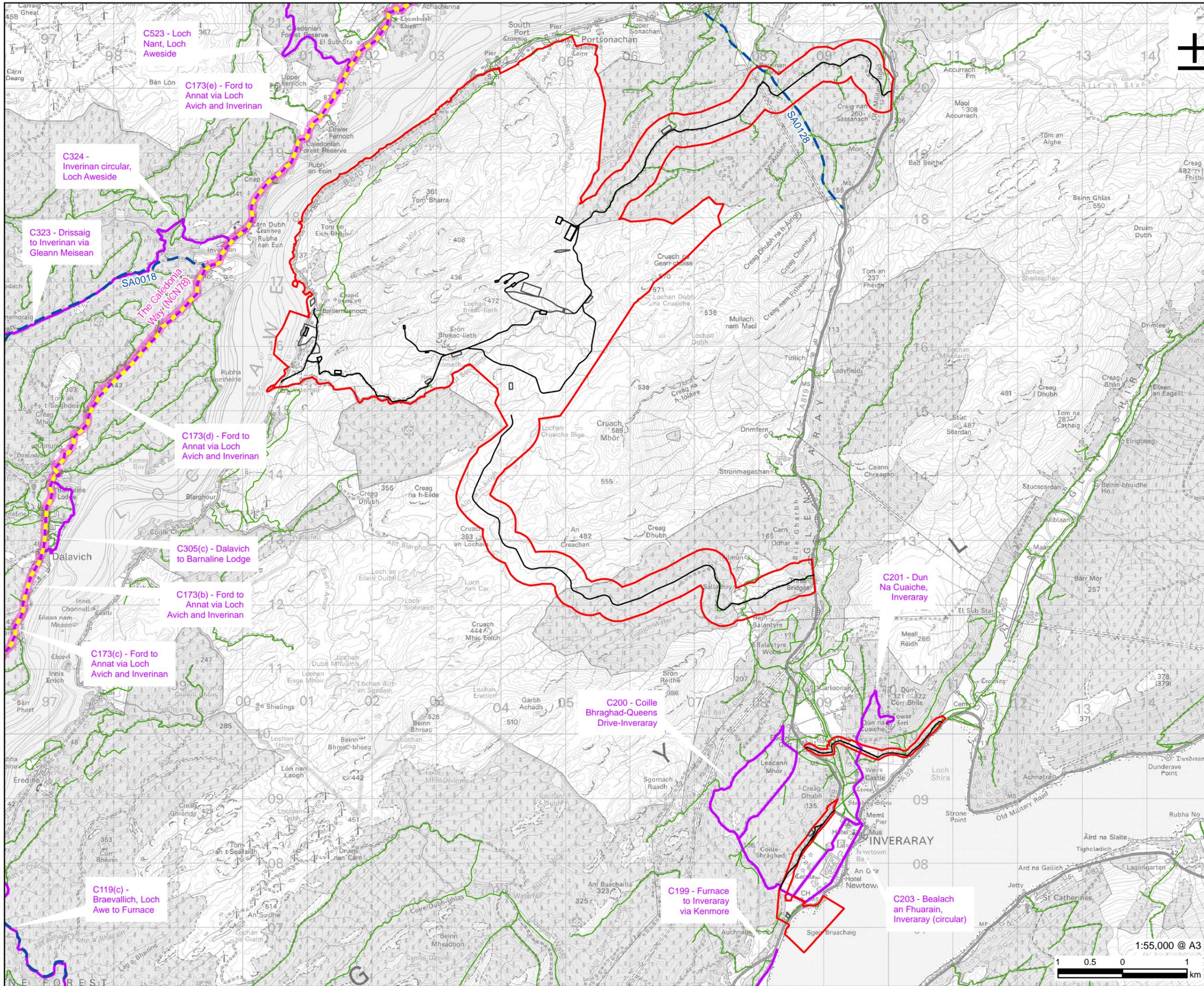
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SHEET TITLE
BALLIEMEANOCH PSH
ZONE 1 - WATERWAYS
LONGSECTION

SHEET NUMBER
Figure 4

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LEGEND

- Development Boundary
- Permanent Infrastructure
- Core Paths
- Recreational Routes
- Caledonia Way (NCN78)
- Local Walking Paths
- Public Right of Way (Heritage Paths)

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FIGURE TITLE
Outline Access Management Plan

FIGURE NUMBER
Figure 5

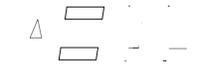
1:55,000 @ A3



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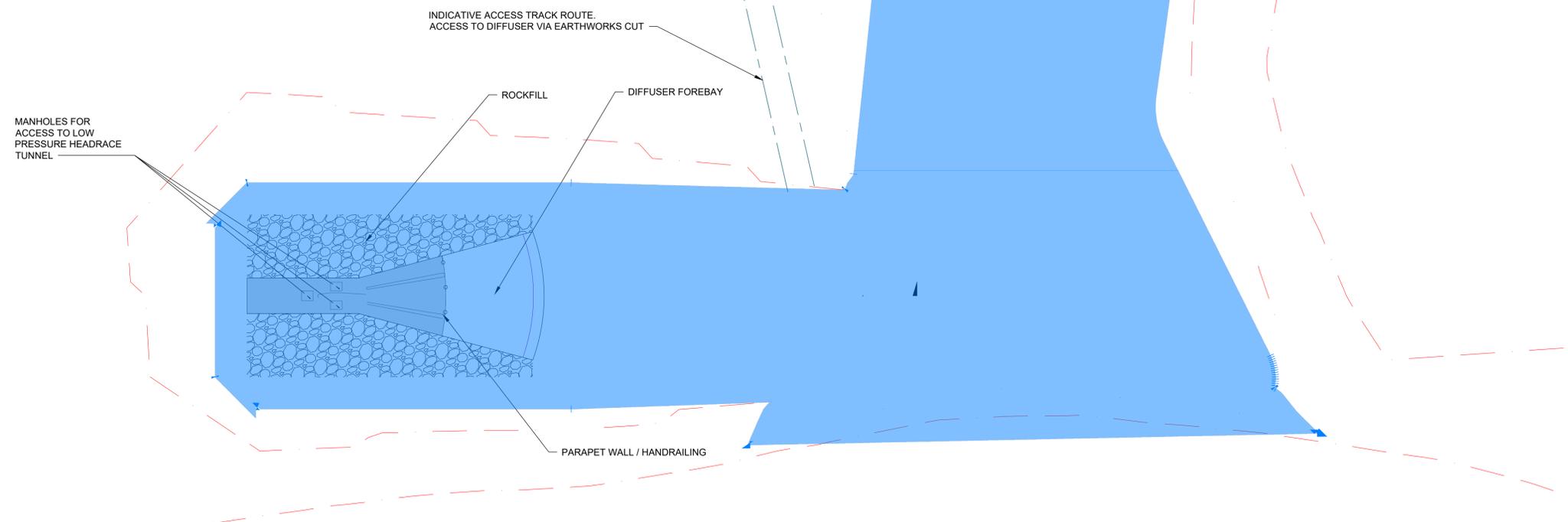


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Pumped Storage Hydro

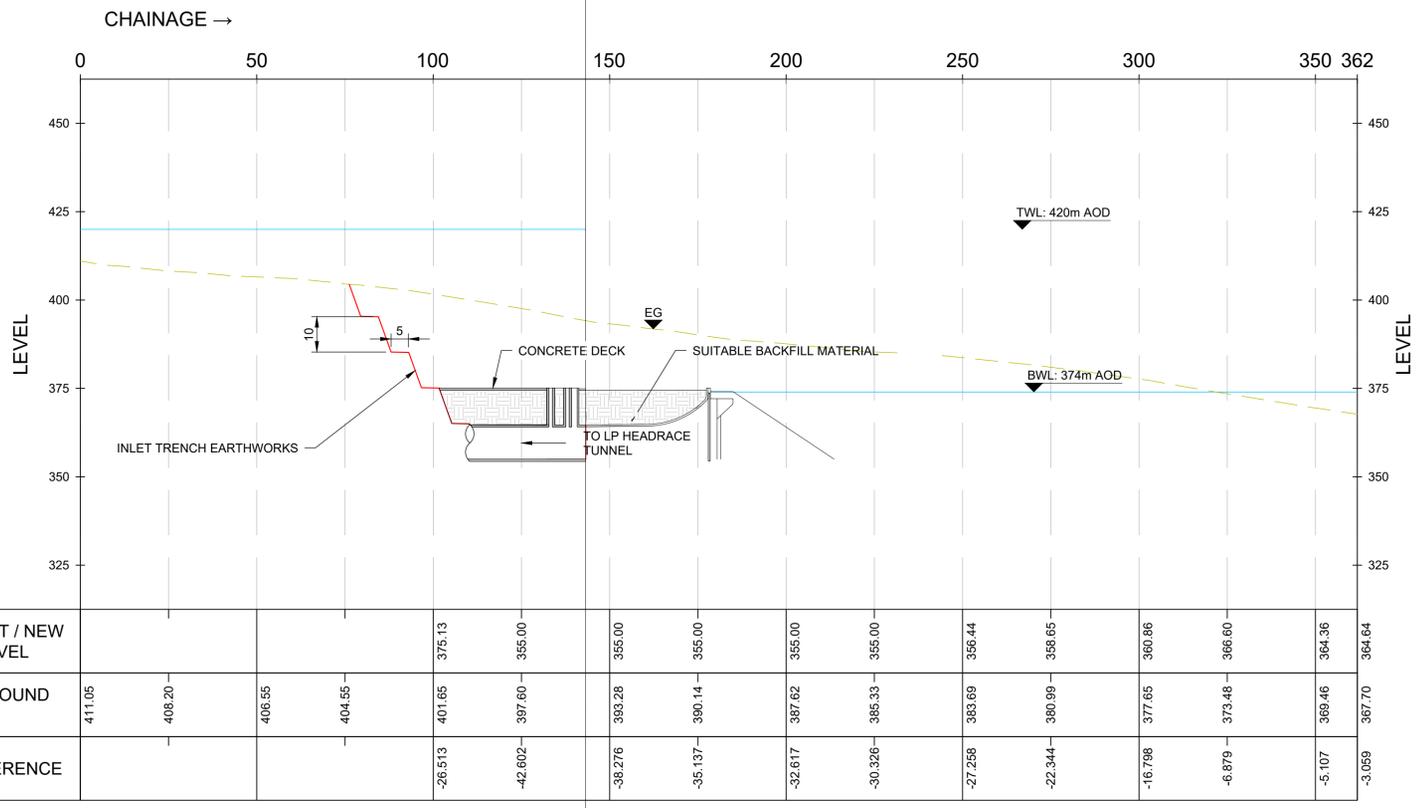
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LEGEND
[Blue shaded area] EXISTING GROUND (EG)



HEADPOND INLET / OUTLET PLAN
1:1000m



HEADPOND INLET / OUTLET PLAN
A | HEADPOND INLET / OUTLET SECTION
1:1000m

- NOTES**
- DRAWING IS FOR INDICATIVE PURPOSES ONLY
 - LEVELS TAKEN FROM 5m DIGITAL TERRAIN MODEL (DTM)
 - BWL SET AT 374m AOD
 - SEE DRAWING S03-Z1-05-DR-CE-315201 FOR PLAN OF HEADPOND
 - CONTOURS SHOWN AT 5m INCREMENTS BASED ON 5m DTM

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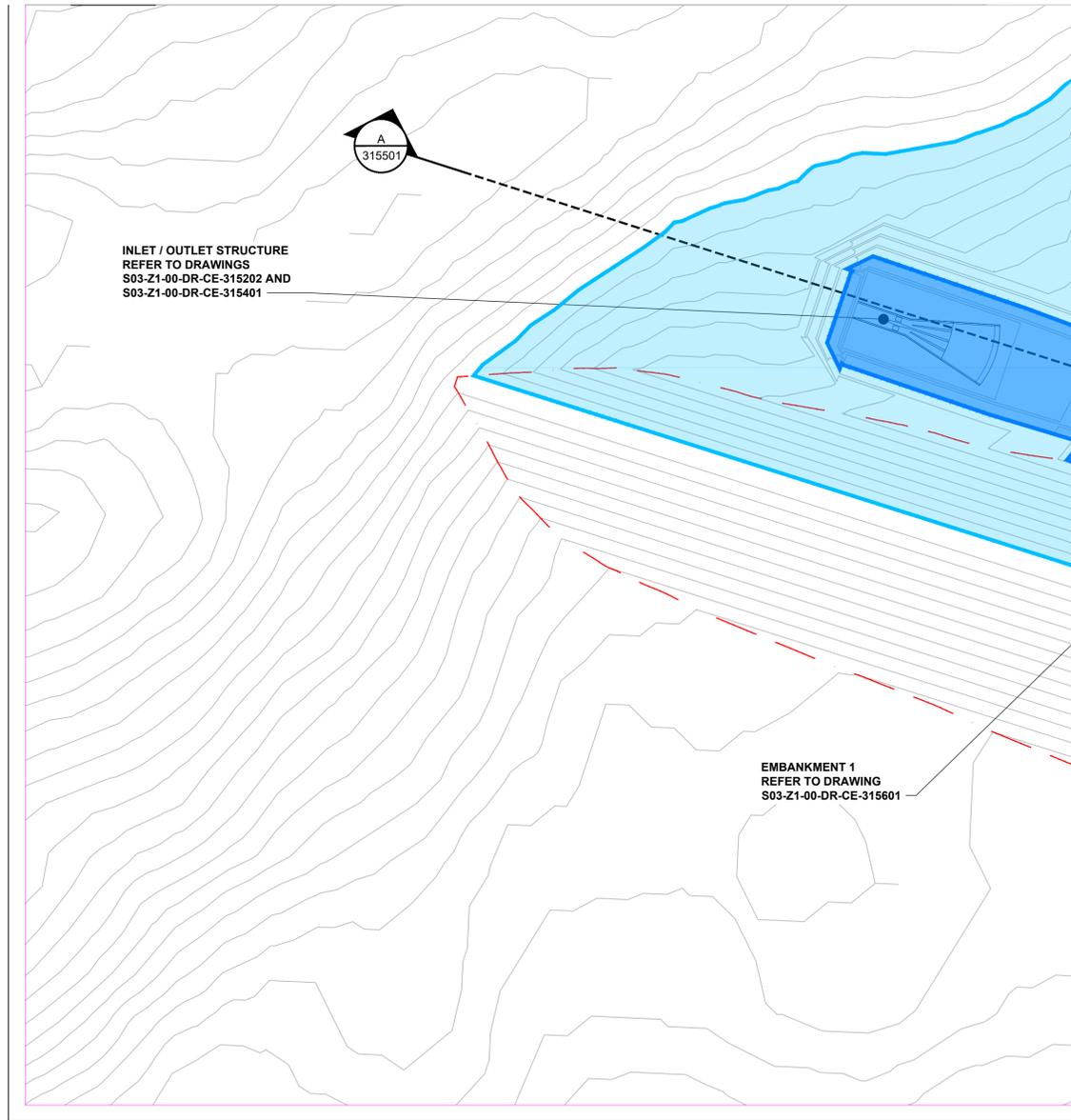
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SHEET TITLE
BALLIEMEANOCH PSH
HEADPOND INLET / OUTLET
PLAN AND SECTION

SHEET NUMBER
Figure 6

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INLET / OUTLET ACCESS TRACK
SEE NOTE NO.4

B
315501

EMBANKMENT 2
REFER TO DRAWINGS
S03-Z1-00-DR-CE-315601

BORROW PIT 01
REFER TO DRAWINGS
S03-Z1-00-DR-CE-315203
AND
S03-Z1-00-DR-CE-315401

■
■ **BOTTOM WATER LEVEL (BWL)**

1. DRAWING IS FOR INDICATIVE PURPOSES ONLY
2. SUPPORTING INFRASTRUCTURE HAS BEEN OMITTED FOR CLARITY PURPOSES. SEE RELEVANT DRAWINGS FOR DETAILS
3. EATHWORKS SHOWN ARE BASED ON 5m DIGITAL TERRAIN MODEL (DTM)
4. INLET/OUTLET ACCESS TRACK EARTHWORKS SHOWN INDICATIVELY FOR REFERENCE. TRACK TO BE USED FOR CONSTRUCTION PRIMARILY AND LEFT IN-SITU POST CONSTRUCTION AND FLOODED. OPERATIONAL ACCESS TO INLET/OUTLET WHEN HEADPOND IS DRAWN DOWN TO BOTTOM WATER LEVEL
5. 5m CONTOURS SHOWN BASED ON 5m DTM

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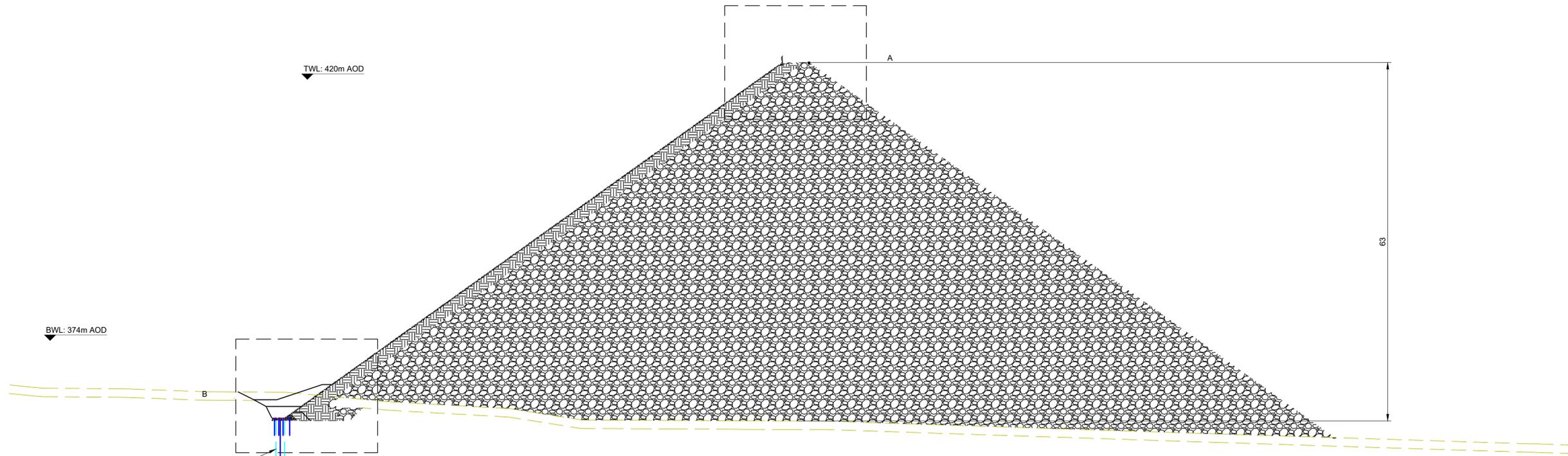
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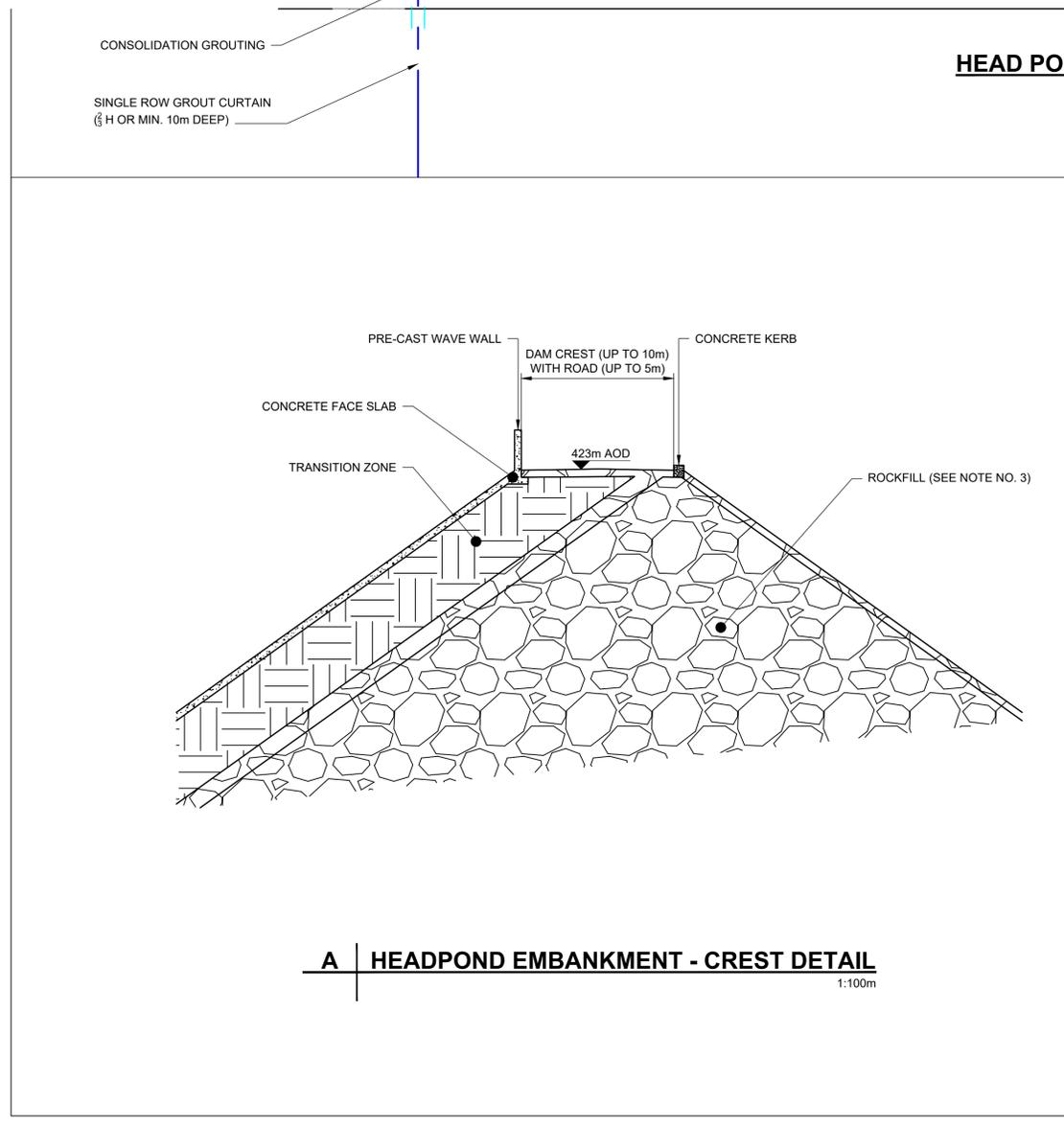
Figure 7

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Balliemeanoch
Pumped Storage Hydro

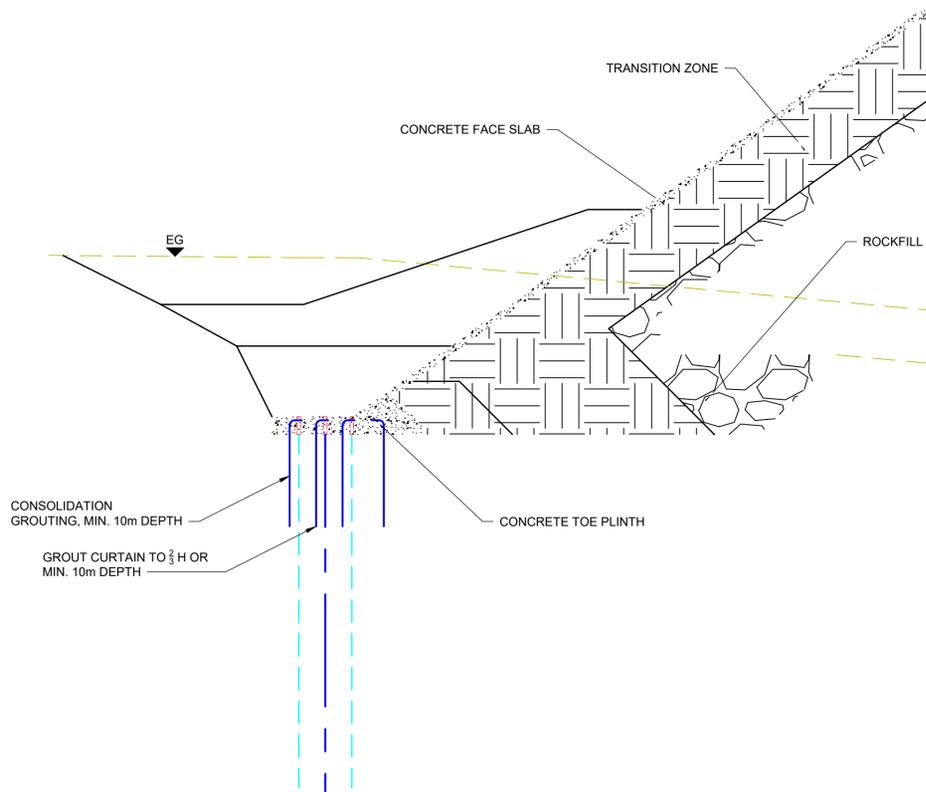


LEGEND



NOTES

1. DRAWING IS FOR INDICATIVE PURPOSES ONLY
2. LEVELS BASED ON 5m DIGITAL TERRAIN MODEL (DTM)
3. ROCKFILL SHOWN INDICATIVELY. FINAL DESIGN OF ROCKFILL ZONING TO BE CONFIRMED BY DESIGNER.

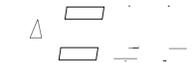


B AC JIG DL

A HEADPOND EMBANKMENT - CREST DETAIL
1:100m

SHEET TITLE
BALLIEMEANOCH PSH
HEADPOND EMBANKMENT
DETAILS

SHEET NUMBER
Figure 9

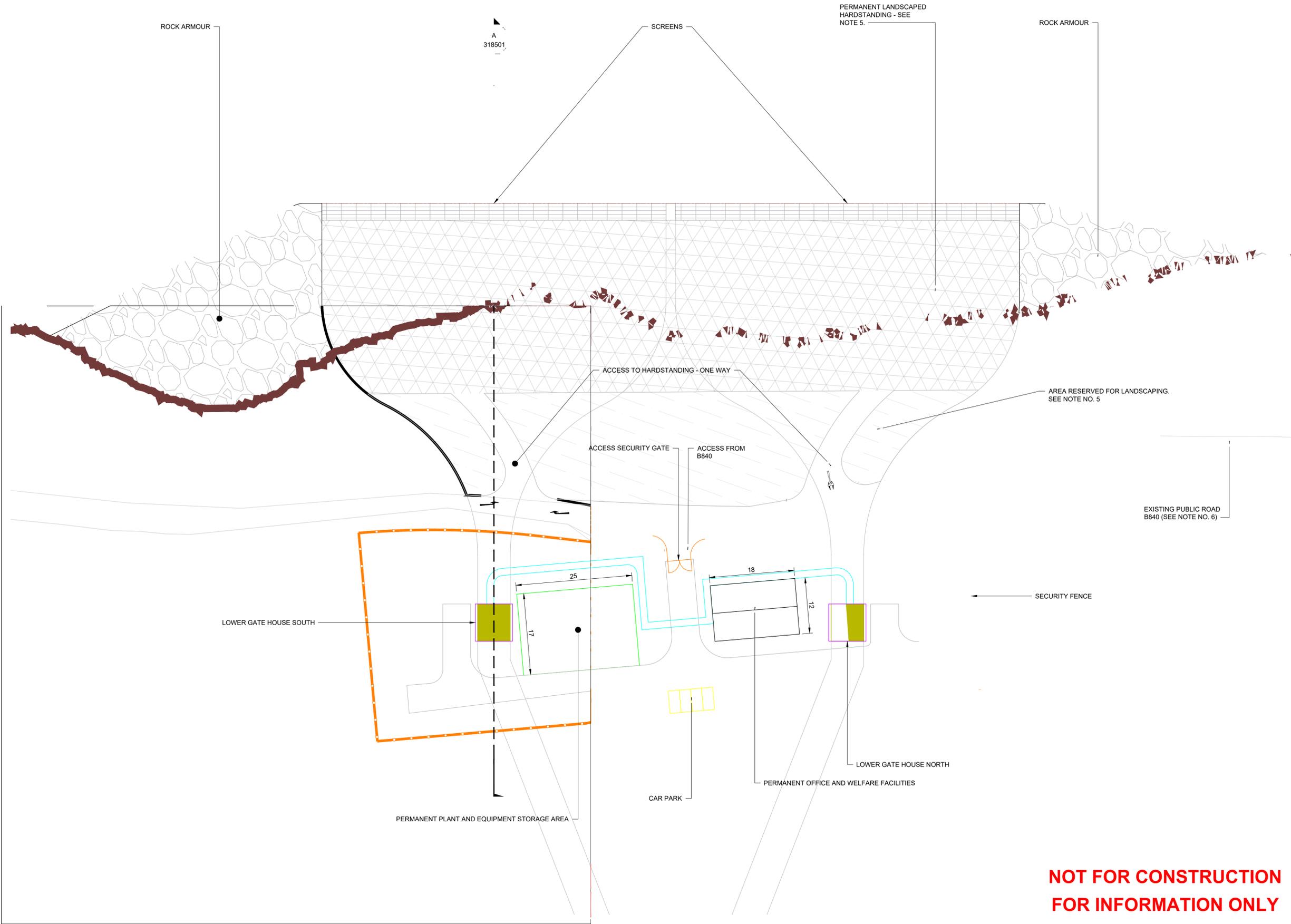


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LEGEND



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2. LOCH EDGE AT 36.4m AOD AND DETERMINED FROM BATHYMETRIC SURVEY UNDERTAKEN BY ASEPT SURVEYS.
3. ACCESS TO PERMANENT COMPOUND VIA EXISTING PUBLIC ROAD B840.
4. BELOW GROUND INFRASTRUCTURE SHOWN FOR REFERENCE.
5. THIS SECTION OF EXISTING B840 TO BE DIVERTED DURING CONSTRUCTION AND POTENTIALLY REINSTATED AT OPERATION - CONFIRMATION FROM THE COUNCIL IS REQUIRED.

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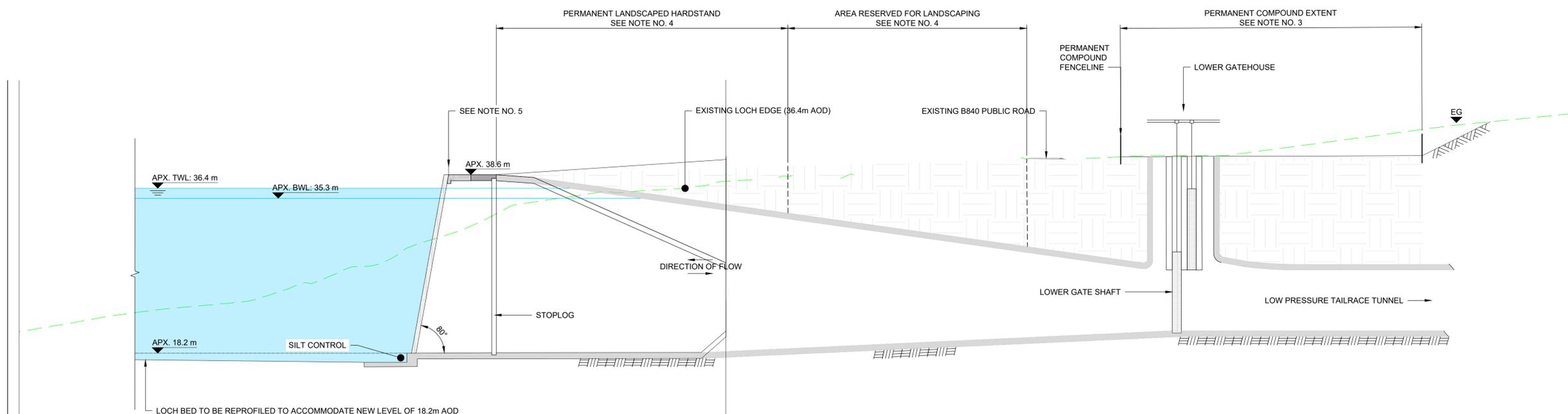
LEGEND

NOTES

1. DRAWING IS FOR INDICATIVE PURPOSES ONLY
2. ALL LEVELS IN METERS AND ABOVE ORDNANCE DATUM (AOD) UNLESS OTHERWISE STATED.
3. REMOVABLE SAFETY HANDRAIL REQUIRED AT INLET/OUTLET STRUCTURE EDGE AND SHOWN INDICATIVELY

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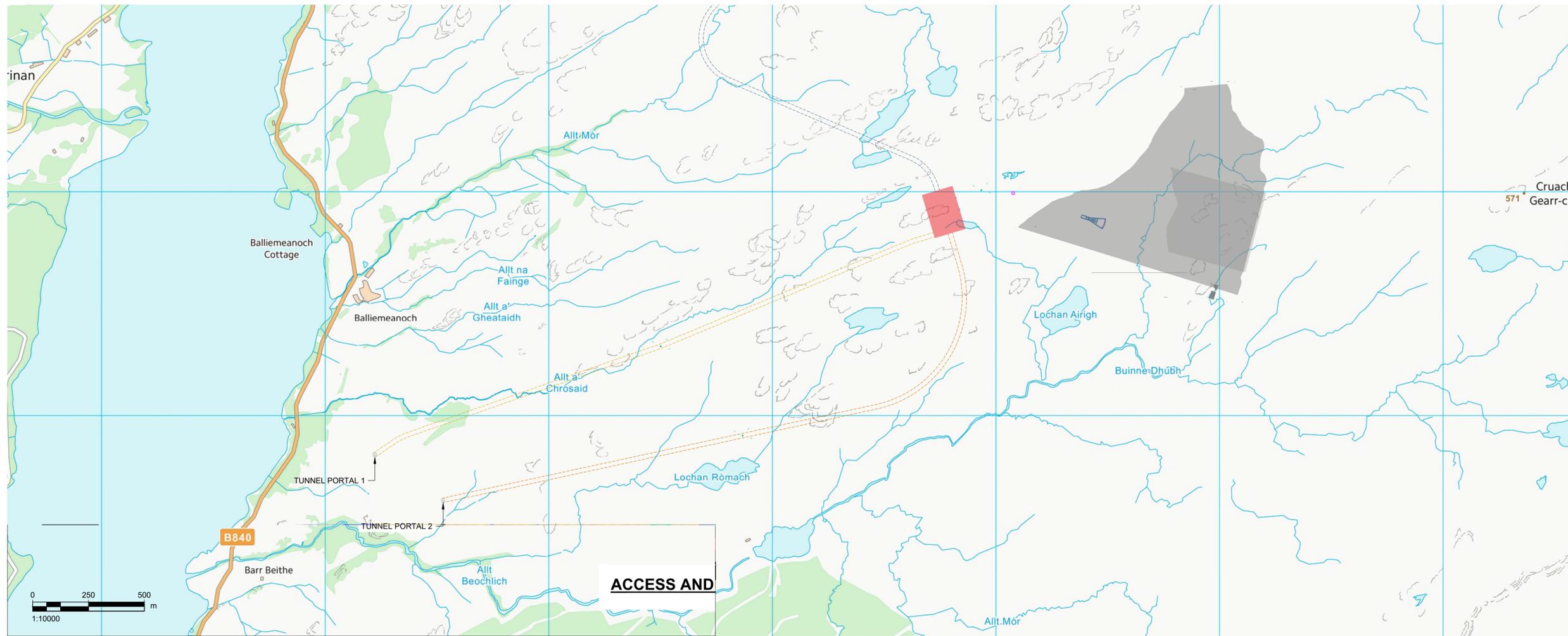


A | INDICATIVE INLET/OUTLET STRUCTURE SECTION

1:250m

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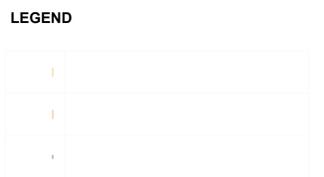
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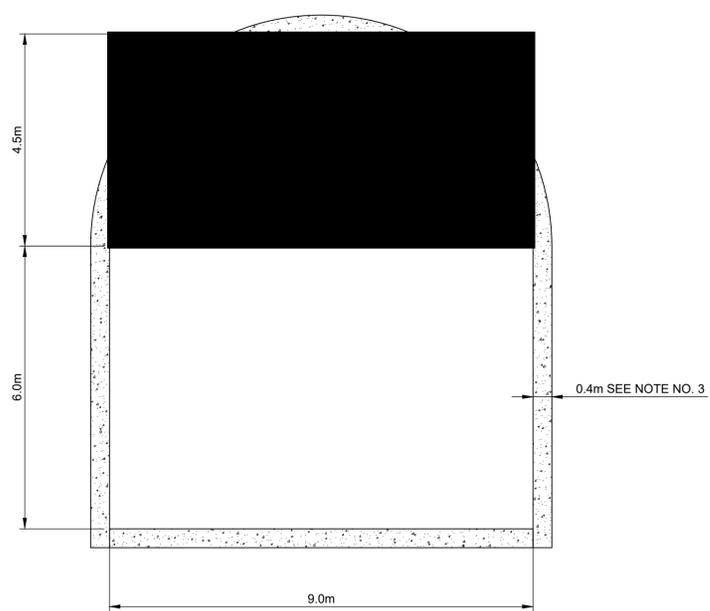
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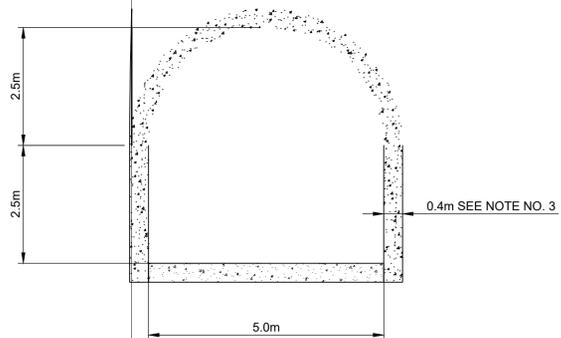
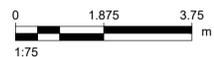
ACCESS AND

- NOTES**
1. DRAWING IS FOR INDICATIVE PURPOSES ONLY.
 2. ALL SECTIONS ARE INDICATIVE.
 3. TUNNEL LINING THICKNESS IS SUBJECT TO ROCK SUPPORT DESIGN AT THE NEXT DESIGN PHASE. MINIMUM THICKNESS OF 400mm IS SHOWN INDICATIVELY.
 4. UPPER HEADPOND SHOWN FOR REFERENCE.

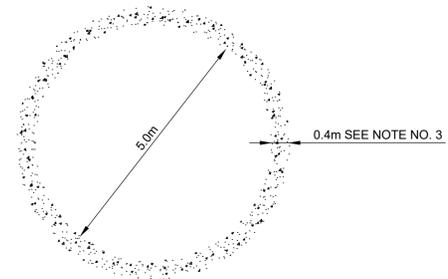
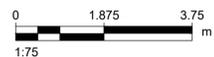
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ACCESS TUNNEL SECTION
 SCALE 1:75m



CONSTRUCTION

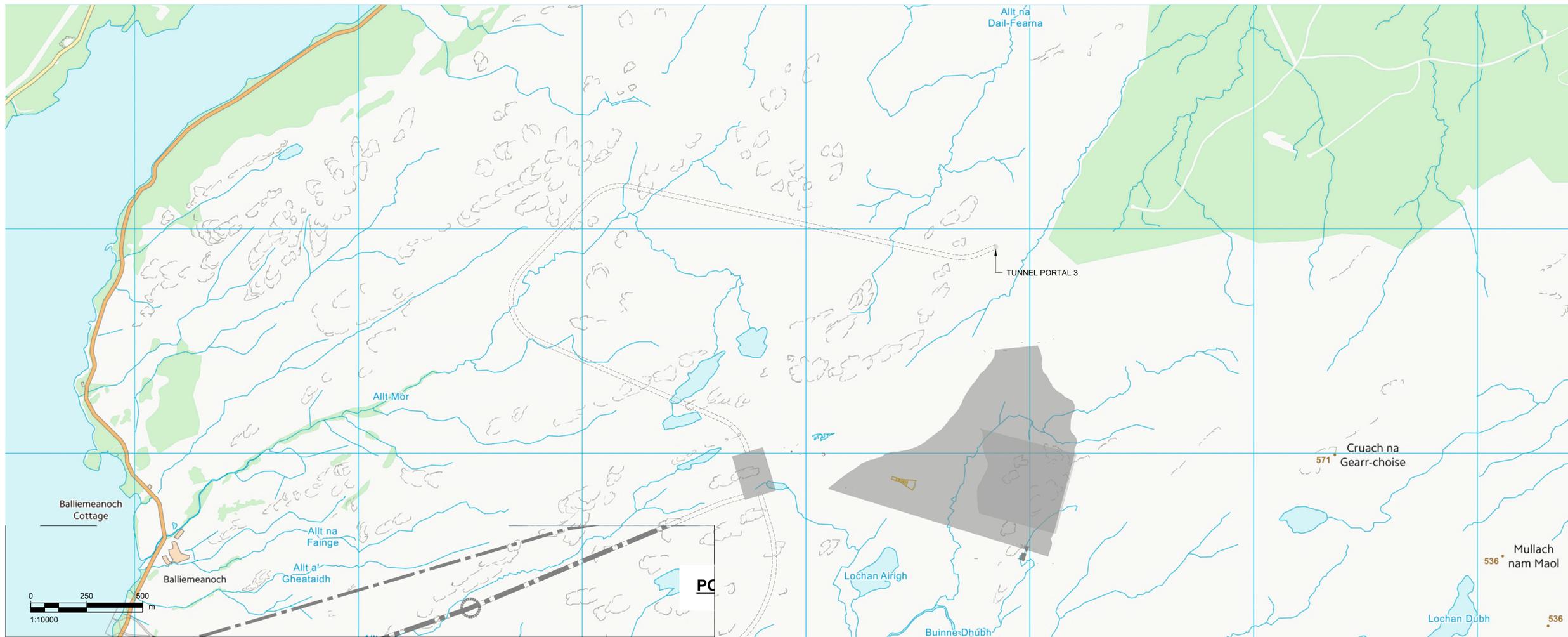


B AC JIG DL

SHEET TITLE
 BALLIEMEANOCH PSH
 CONSTRUCTION & ACCESS TUNNEL
 LAYOUT - CROSS SECTIONS

SHEET NUMBER

Figure 12

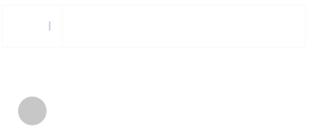


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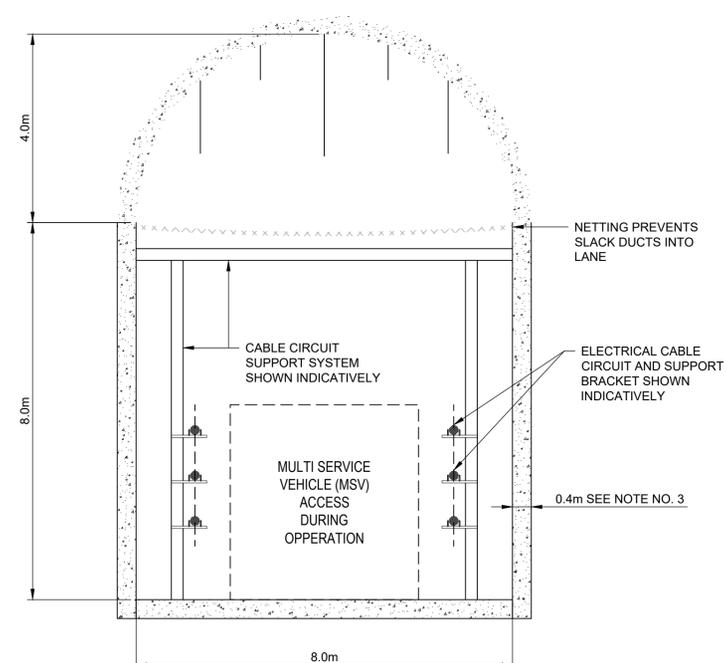
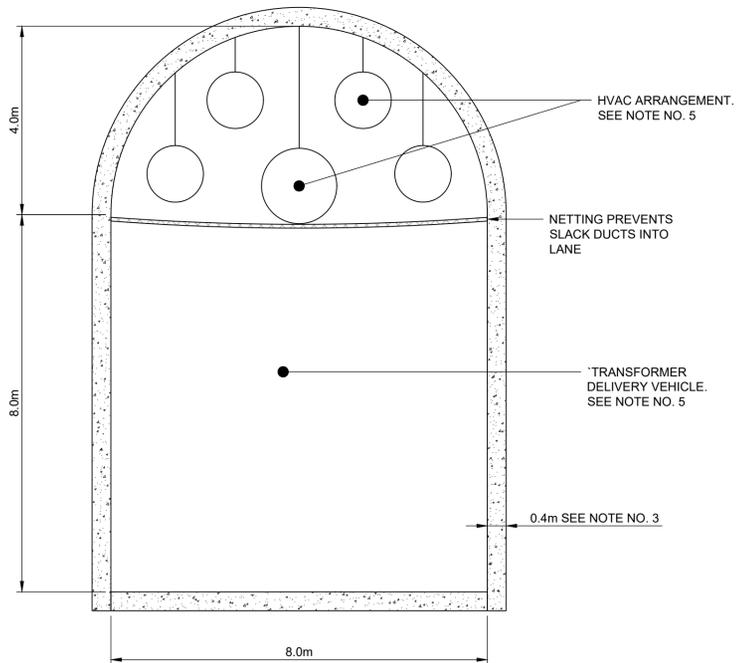
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LEGEND



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2. ALL SECTIONS ARE INDICATIVE.
3. TUNNEL TO BE USED FOR DELIVERY OF ABNORMAL INDIVISIBLE LOADS (AILs) DURING CONSTRUCTION. POST DELIVERY, TUNNEL TO BE ADAPTED INTO OPERATIONAL POWER / CABLE TUNNEL.
3. TUNNEL LINING THICKNESS IS SUBJECT TO ROCK SUPPORT DESIGN AT THE NEXT DESIGN PHASE. MINIMUM THICKNESS OF 400mm IS SHOWN INDICATIVELY.
4. UPPER HEADPOND SHOWN FOR REFERENCE.
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POWER TUNNEL - DURING CONSTRUCTION

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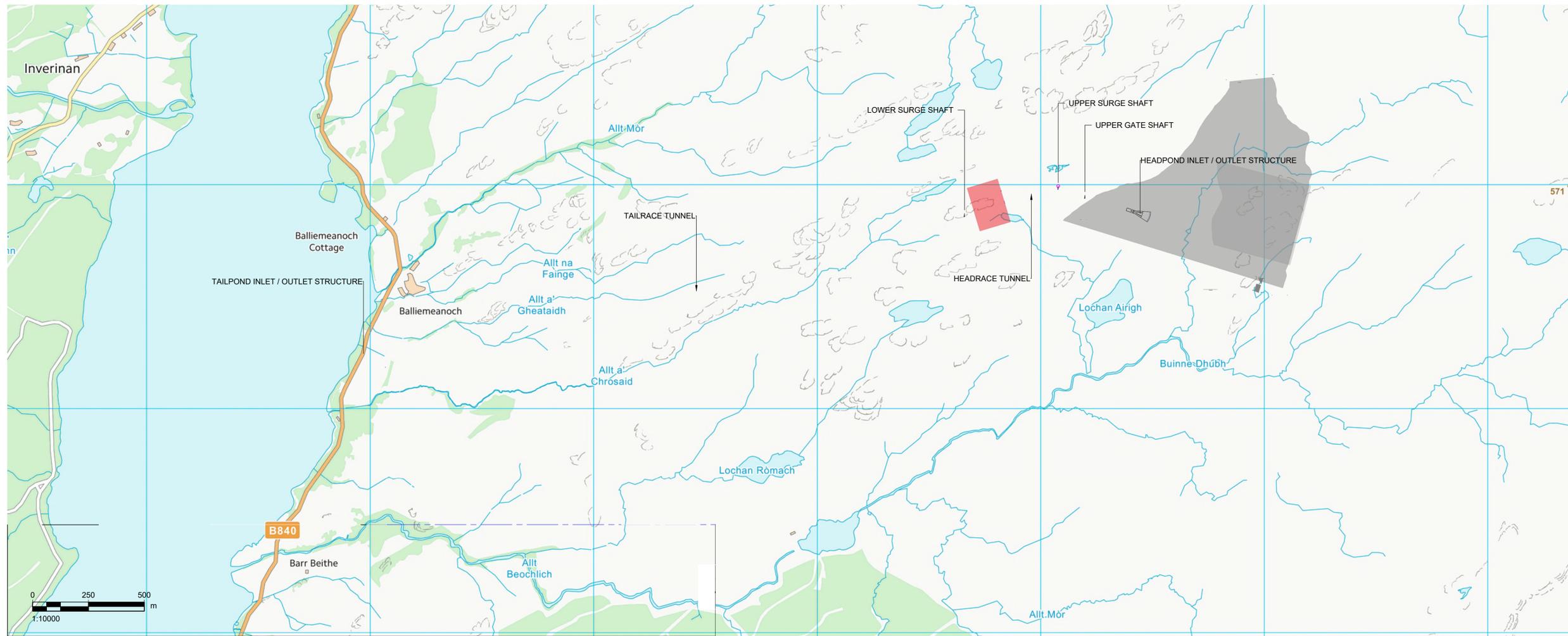


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 POWER TUNNEL LAYOUT & CROSS
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Figure 13

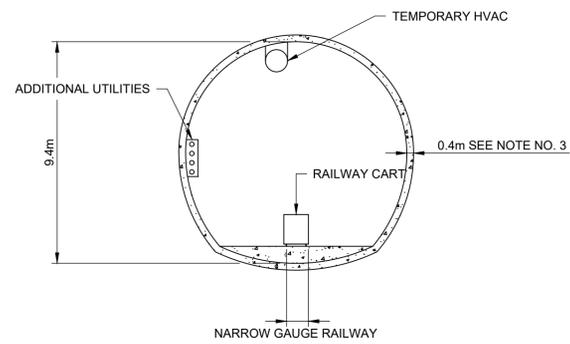


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LEGEND

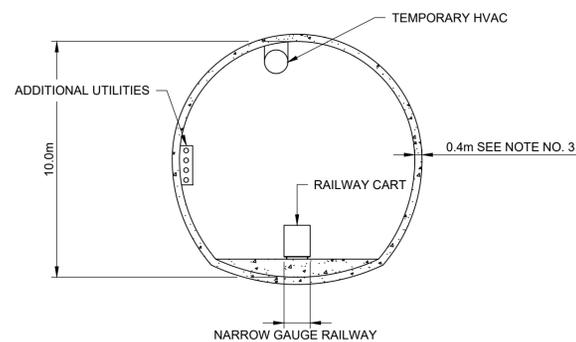
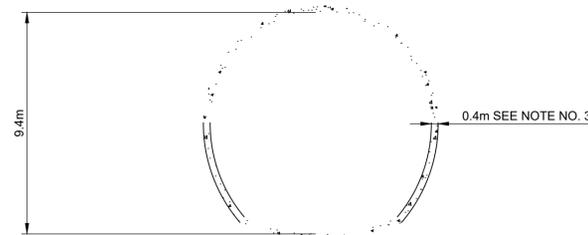
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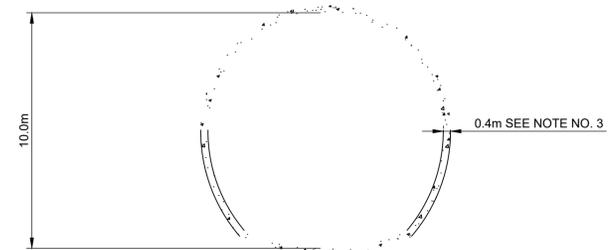
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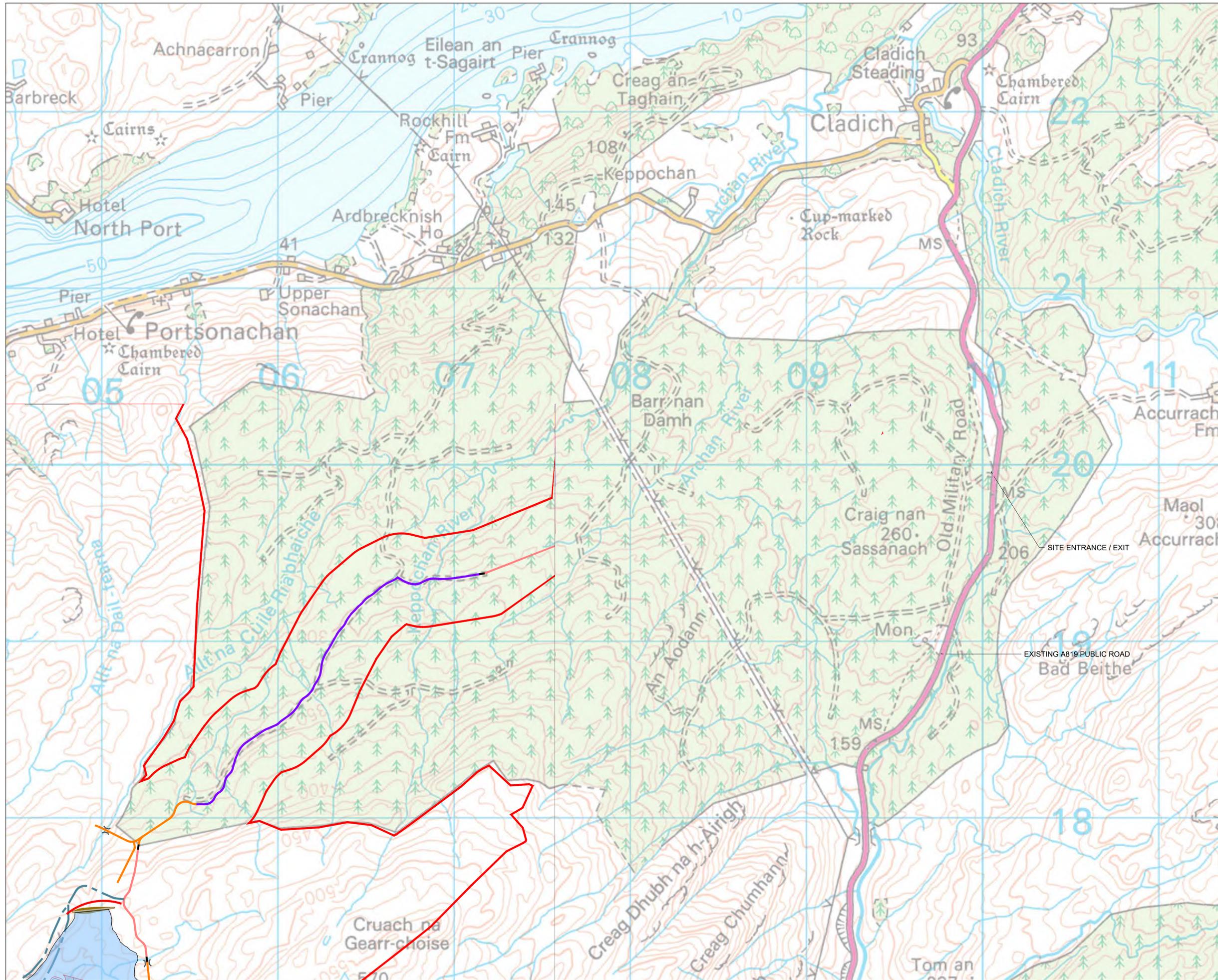
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BALLIEMEANOCH PSH
 WATERWAYS PLAN & TYPICAL
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SHEET NUMBER

Figure 14



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- LEGEND**
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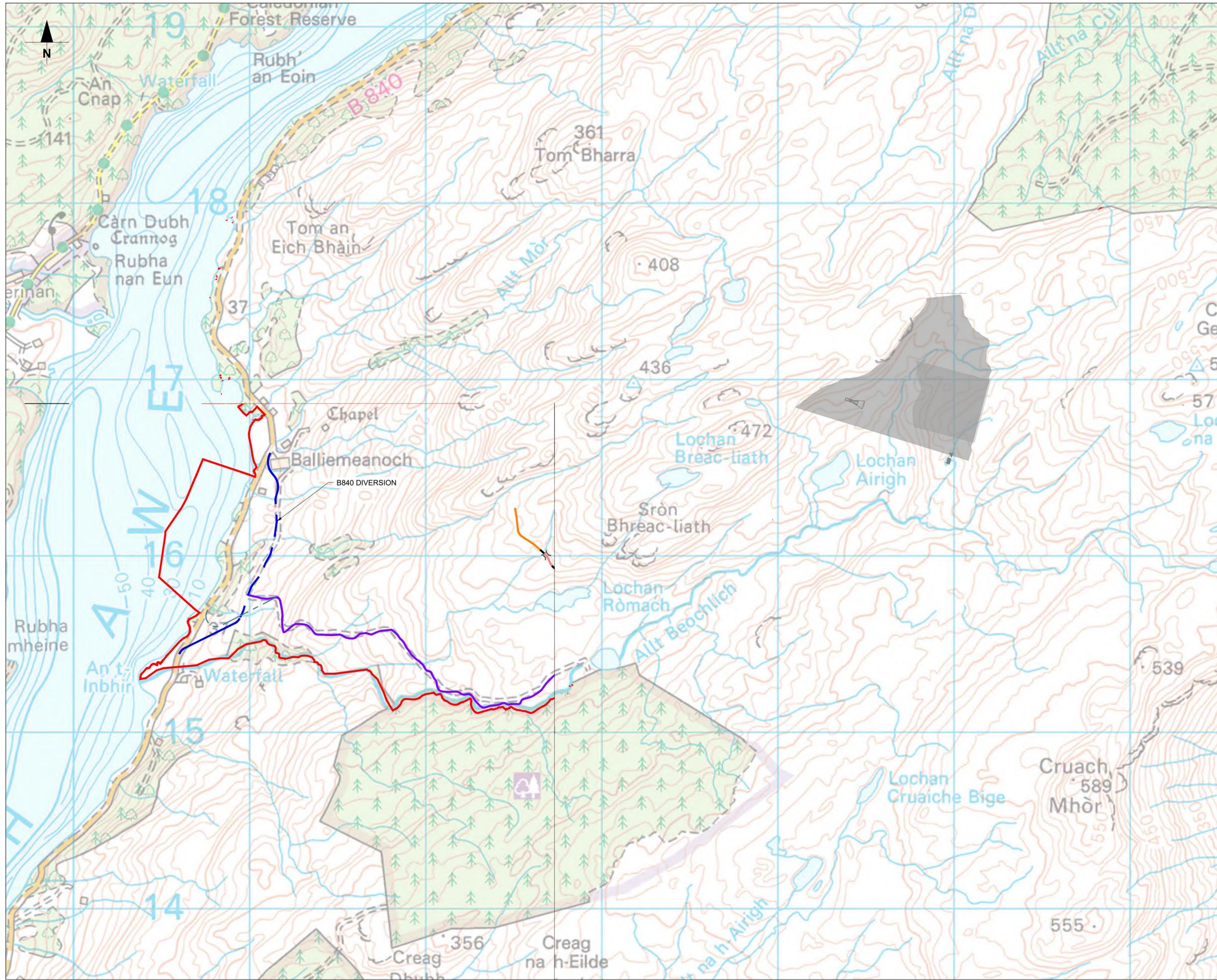
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B	05.06.2025	DESIGN REPORT ISSUE
A	27.11.2023	DESIGN FREEZE
I/R	DATE	DESCRIPTION

SHEET TITLE
 BALLIEMEANOCH PSH
 ZONE 1 GENERAL ARRANGEMENT
 ACCESS ROUTES 1 OF 3

SHEET NUMBER
 Figure 15a



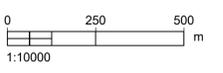
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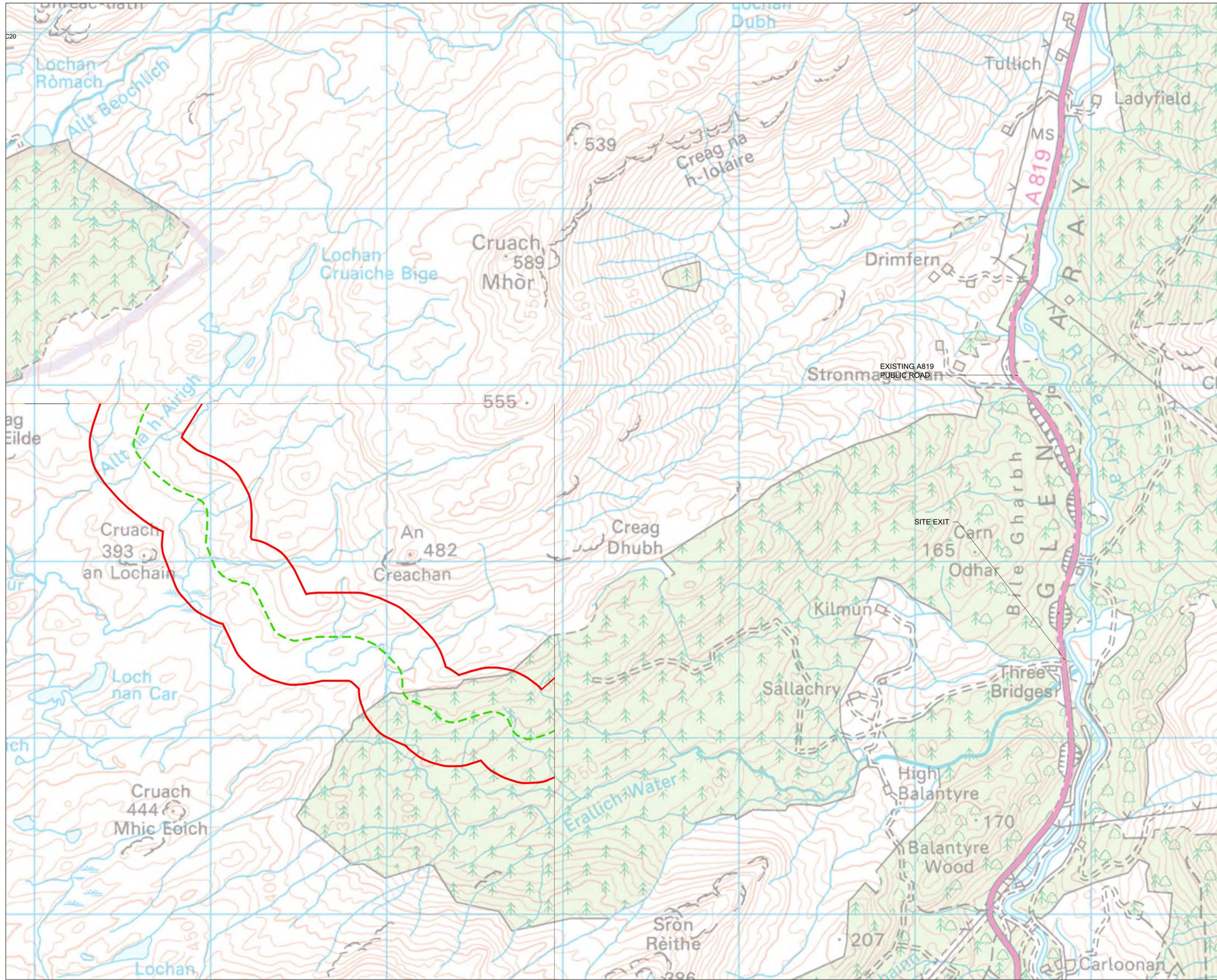
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Figure 15b



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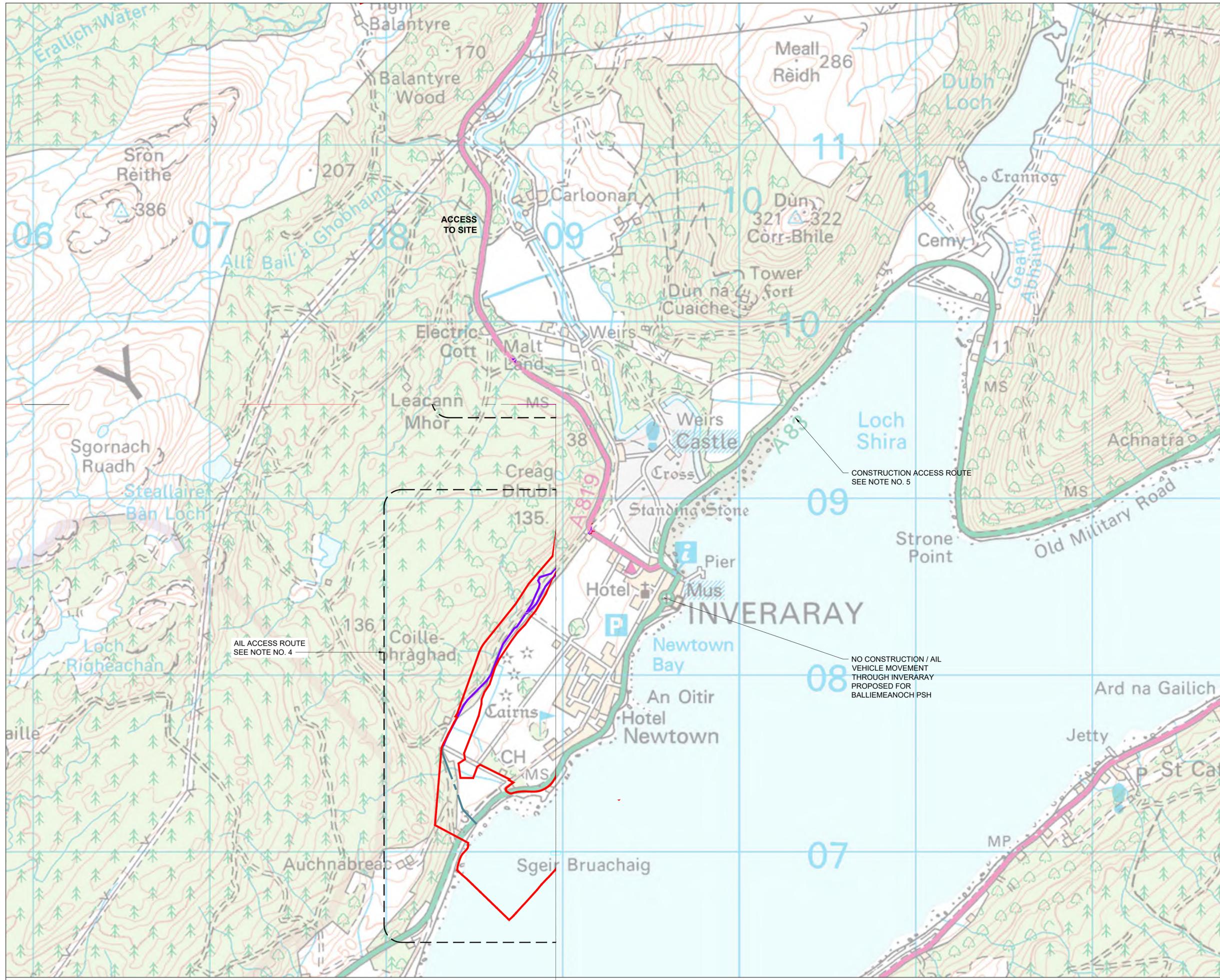
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LEGEND
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Figure 15c



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 ZONE 2 GENERAL ARRANGEMENT
 ACCESS ROUTES

SHEET NUMBER
 Figure 15d

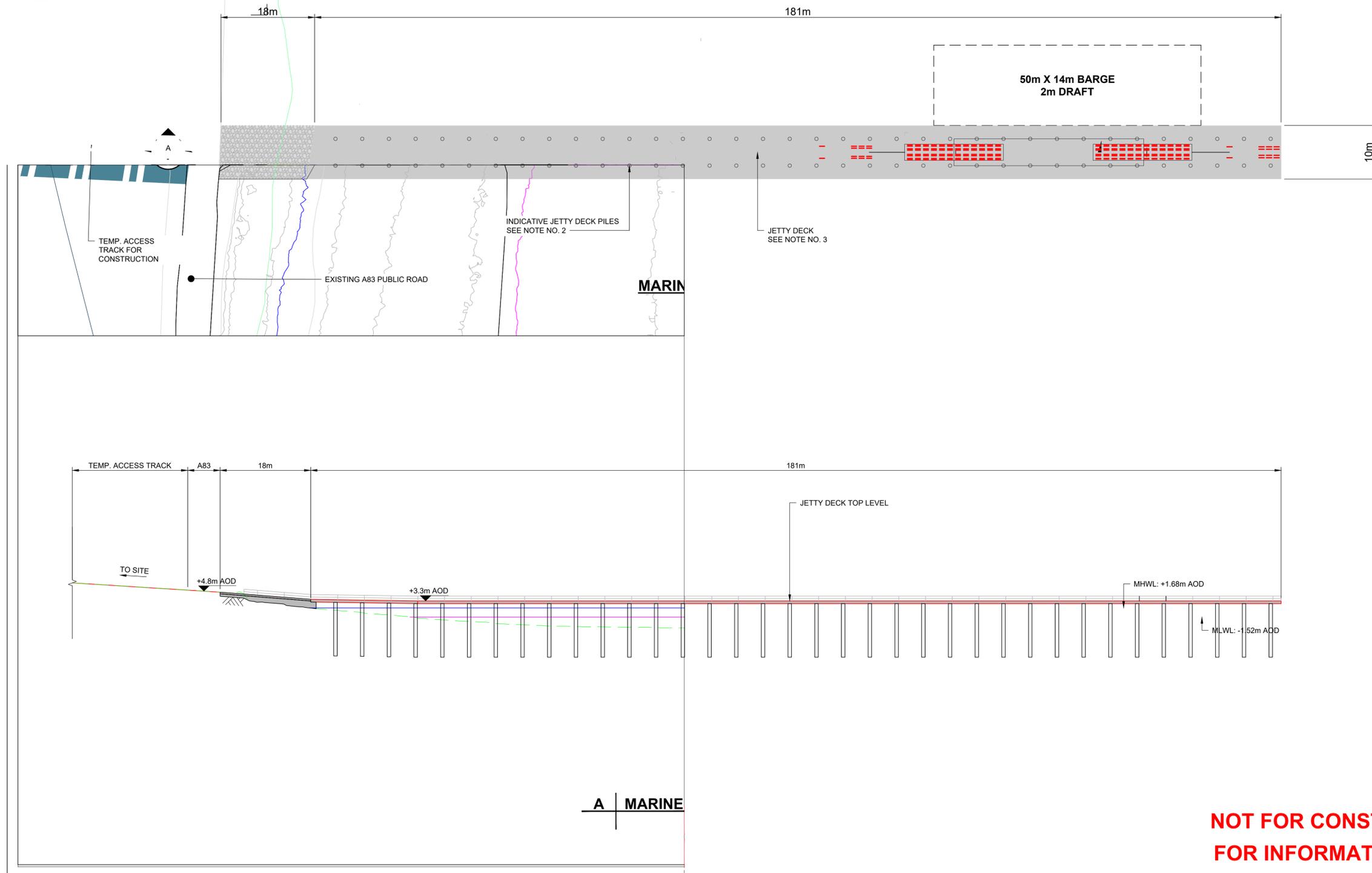


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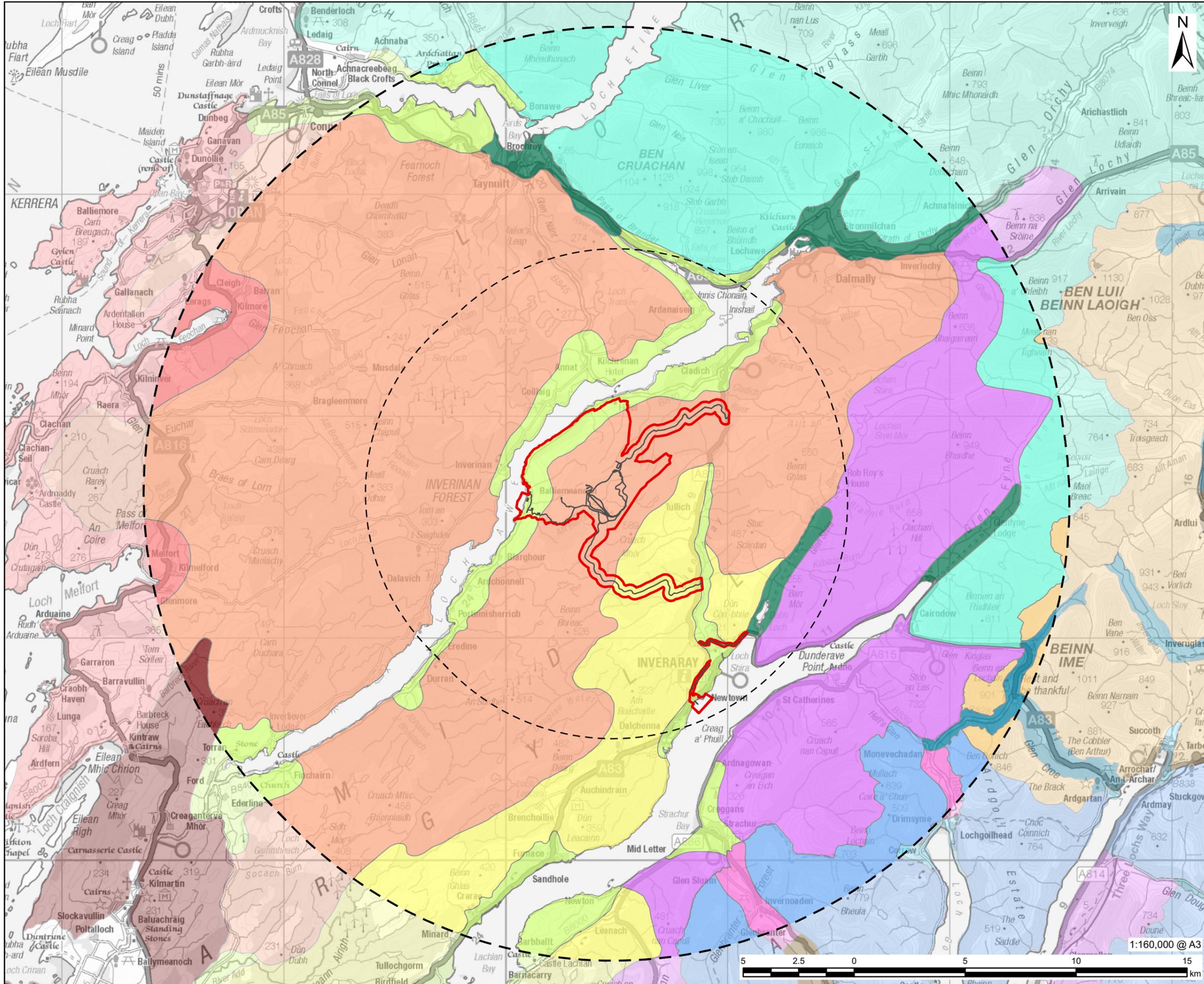
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Figure 16



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- LEGEND**
- Development Boundary
 - 10km Buffer
 - 20km Study Area
 - Permanent Infrastructure

- Landscape Character Types**
- LCT 57 Craggy Coast and Islands
 - LCT 40 Craggy Upland - Argyll
 - LCT 251 Highland Summits
 - LCT 39 Plateau Moor and Forest - Argyll
 - LCT 53 Rocky Coastland - Argyll
 - LCT 35 Rugged Mountains
 - LCT 265 Settled Coastal Fringe
 - LCT 250 Steep Ridges and Hills
 - LCT 34 Steep Ridges and Mountains
 - LCT 253 Straths and Glens
 - LCT 254 Straths and Glens with Lochs
 - LCT 37 Upland Glens - Argyll
 - LCT 252 Upland Glens - Loch Lomond & the Trossachs
 - LCT 43 Upland Parallel Ridges - Argyll

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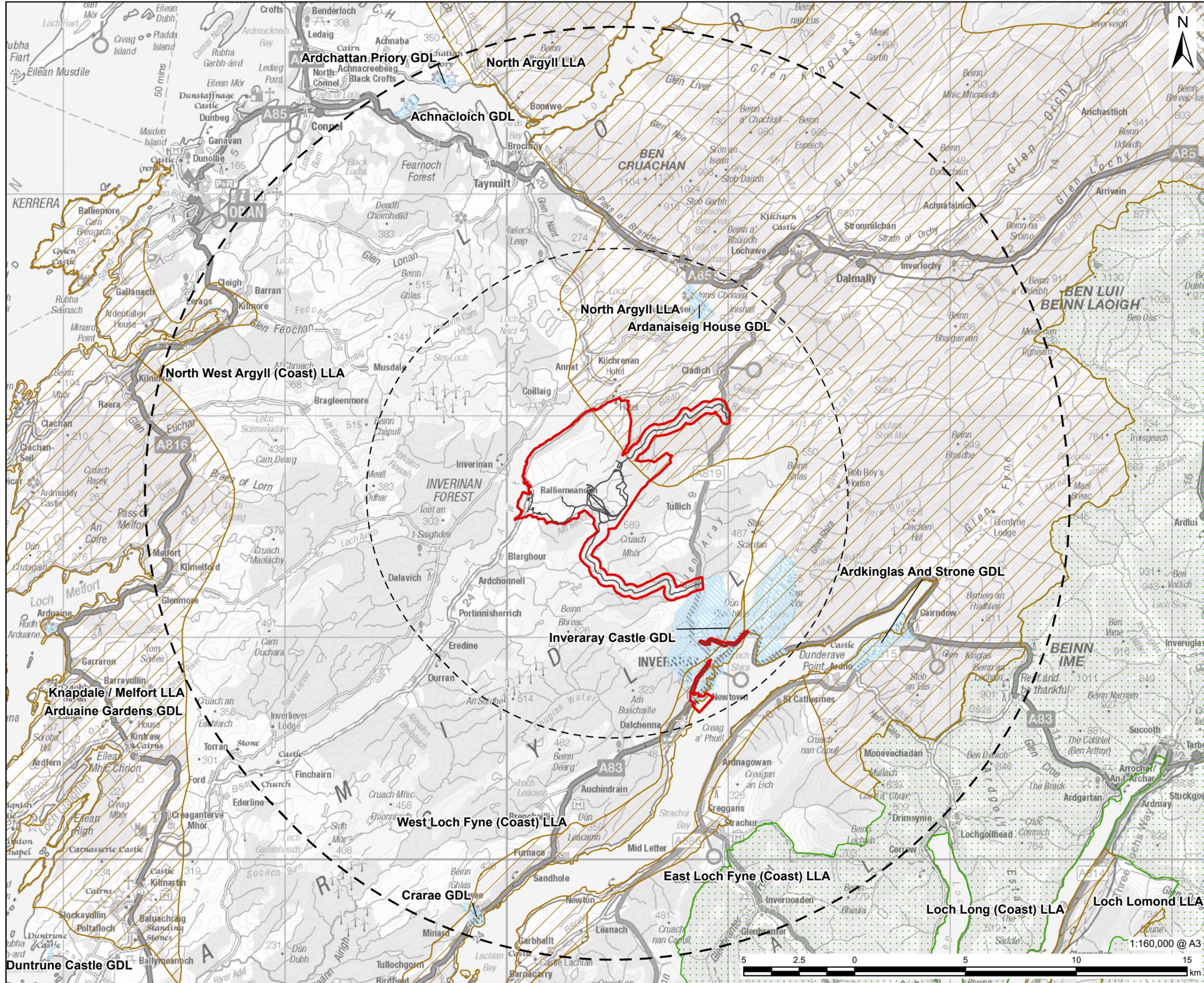
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FIGURE TITLE
 Landscape Character Types

FIGURE NUMBER
 Figure 17

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LEGEND

- Development Boundary
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- 20km Study Area
- Permanent Infrastructure
- Local Landscape Areas
- Loch Lomond and The Trossachs National Park
- Gardens and Designed Landscape

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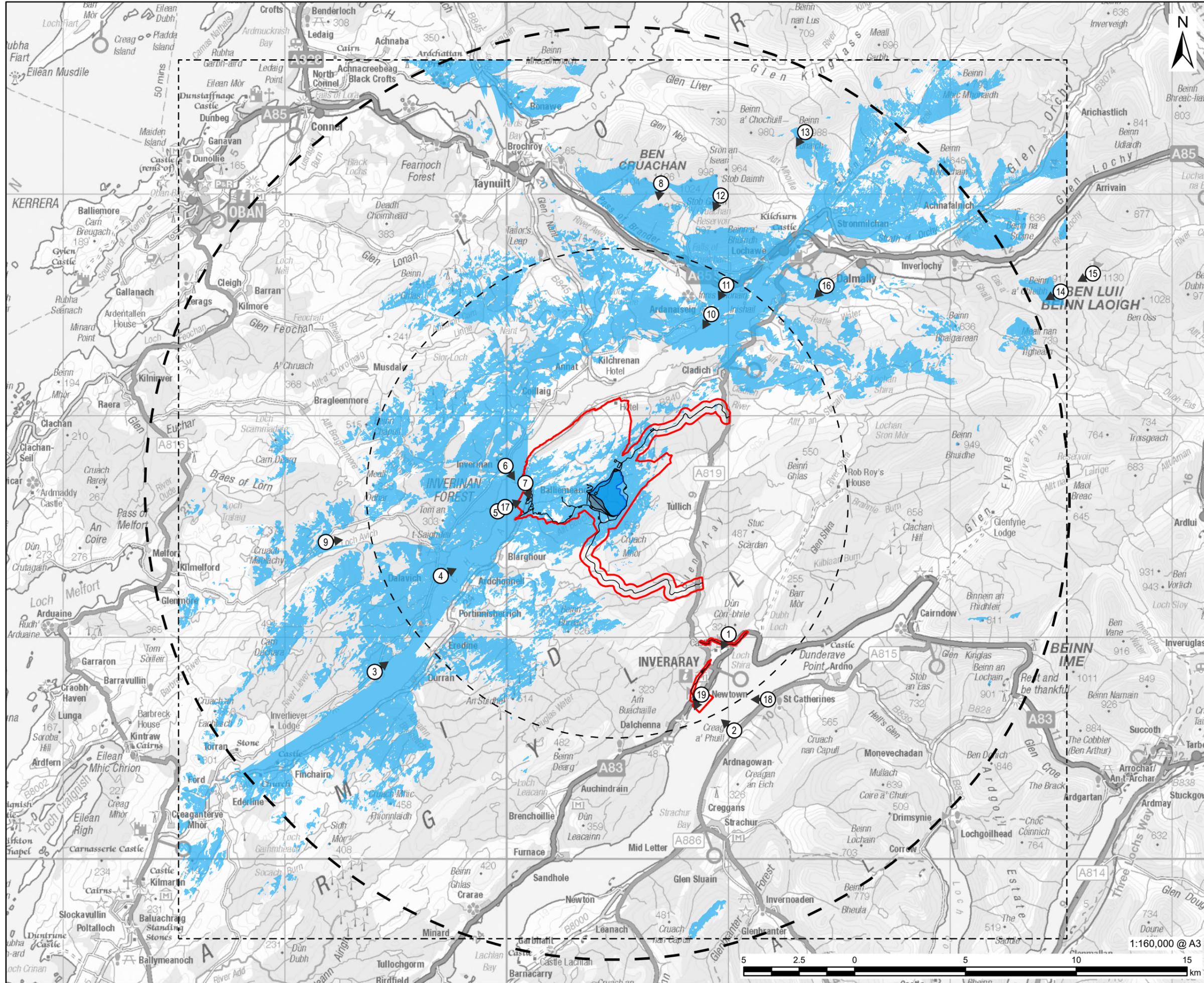
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- LEGEND**
- Development Boundary
 - 10km Buffer
 - 20km Study Area
 - Representative Viewpoints
 - Above Ground Infrastructure
 - Limits of Elevation Model
 - Headpond
 - Headpond Embankment
 - Combined (Operational) Zone of Theoretical Visibility (ZTV)

NOTES

Zone of Theoretical Visibility (ZTV) has been generated using Ordnance Survey Terrain 5 digital terrain model which does not take account of the screening effects of vegetation, buildings or other structures.

ZTV is based upon a combination of Figures 5.2A, 5.2B and 5.2C, refer to these figures for additional information.

All measurements are above ground level (AGL) unless specified otherwise.

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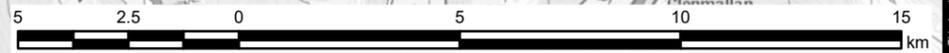
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FIGURE TITLE
 Representative Viewpoints and Operational Zone of Theoretical Visibility

FIGURE NUMBER
 Figure 19

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Appendix B Water Resource Assessment

Balliemeanoch Pumped Storage Hydro Scheme

Appendix B: Water Resources Assessment

June 2025

Quality information

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Associate Director

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Technical Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
A	June 2025	Submission	[Redacted]	[Redacted]	Project Manager

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Appendices

Appendix A Low Flow Results

Appendix B Water Balance Model

1 Introduction

1.1 Objectives

The objective of this report is to assess the following issues in relation to water resources:

- Major water resource demand within the Development proximity;
- Potential impact on water resources as a result of the Development; and
- Appropriate mitigation measures to reduce the impact of the Development on water resources.

1.2 Sources of data

To inform this study, information has been obtained from the following sources:

- SEPA Gauge data, for five rivers in the Loch Awe catchment, covering 48% of the catchment area,
- HadUK-Grid rainfall dataset, for rainfall estimates over Loch Awe,
- Hydro-PE HadUK-Grid dataset, for evapotranspiration, converted to evaporation values over Loch Awe using Environment Agency guidance¹,
- Loch Awe level data provided by Drax,
- Loch Awe Barrage operating range targets, from the Cruachan 2 expansion application.

Date range for datasets (limiting date for modelling in bold)

Data	Start date	End date
Loch level	01/01/2013	31/12/2021
Loch level (hourly)	15/06/2019	14/06/2022
Gauged inflows	01/10/1981	31/01/2025
Rainfall (model)	01/01/1862	31/01/2025
Evaporation (model)	01/01/1969	31/01/2025

1.3 Development

The Development consists of a headpond impounded by two embankments with a volume of 14.68 Mm³. This is connected to Loch Awe (the tailpond) through underground tunnels and generating station. The scheme capacity assessed in this report is 900MW.

1.4 Basis of Assessment

The operational regime of the Development is governed by both water resource availability and the electricity market. This assessment considers the impact of cyclical operation on water resources and flood risk.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/290579/sw6-043-hb-e-e.pdf

2 Baseline Conditions

2.1 Loch Awe Baseline

2.1.1 Existing Water Resource regimes

Loch Awe is a freshwater loch with an area of 38.5 km². The outflow from the loch is down the River Awe, flowing into Loch Etive near Taynuilt. The River Awe is dammed by the Loch Awe Barrage, which generates electricity off the compensation flow at the barrage and diverts water downstream to the Inverawe Power Station (25MW). Operations at the Loch Awe Barrage aim to maintain water levels within a seasonal range (see Table 1)². The barrage contains a Borland fish pass, a freshet gate and two radial gates for passing flood flows. Detailed operation of flood release and compensation system and corresponding outflows from Loch Awe were not available for this assessment, however SSER has since provided some information on the operation of the radial gates for flood releases.

Table 1. Target water levels (existing arrangement)

Period	Target minimum (mAOD)	Target maximum (mAOD)
April-November (Summer)	36.27	37.06
December-March (Winter)	35.96	36.57

The Cruachan pumped storage hydro scheme (440MW) abstracts water from Loch Awe, generally operating on a daily cycle. No data was available for the operation of the Cruachan pumped storage hydro scheme. A daily dataset of loch level measured at the Cruachan intake was available for 2013 to 2021. For the period of available loch level data the operation of the scheme is already reflected in the level duration curves. Analysis of loch levels between 2013 to 2021 shows that the winter operating range is exceeded approximately 25% of the time, while summer levels drop below the range approximately 30% of the time (see Figure 2).

Four small hydro schemes also operate using water from Loch Awe tributaries; Allt Beochlich, Allt Blarghour, River Avich and Loch Nant.

SEPA gauging stations cover just over 50% of the Loch Awe catchment, as shown in Table 2 and Figure 1.

Table 2: Loch Awe Catchment areas

Catchment	Gauge ID	Area (km ²)
Total	N/A	815.9
Orchy	89003	251.2
Strae	89004	36.2
Lochy	89005	47.7
Avich	89006	32.1
Abhain a Bhealaich	89007	24.1
Loch Awe	N/A	38.5
Ungauged	N/A	386.1

² These levels are given in the Cruachan 2 EIA report.

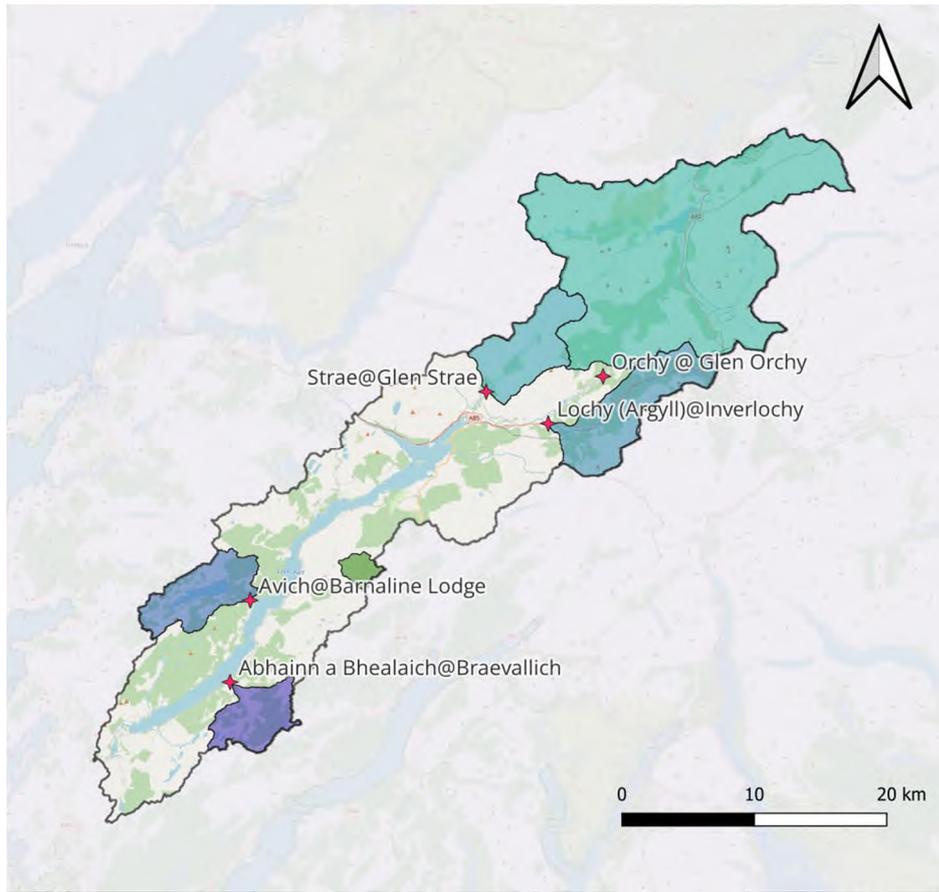


Figure 1: Location of gauges within the Loch Awe catchment.

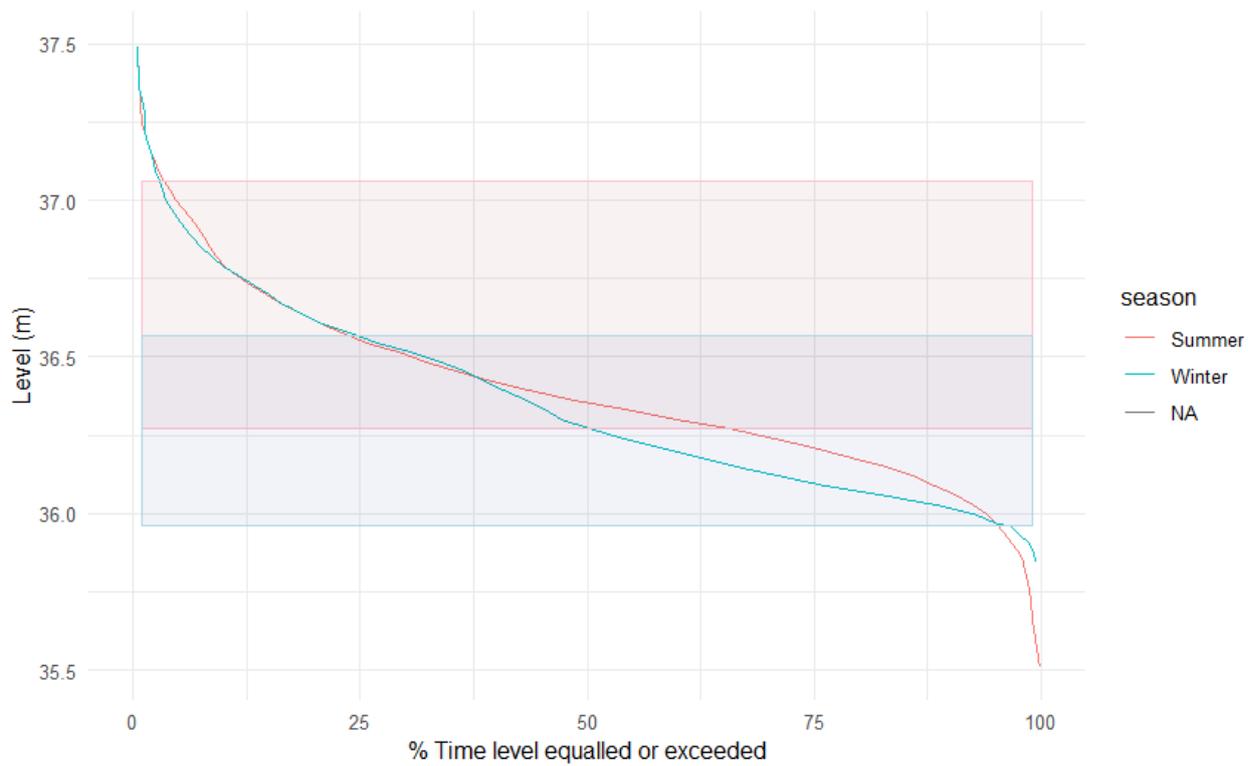


Figure 2: Water levels in Loch Awe (1/1/2013 - 31/12/2021)

2.2 Buinne Dhubh watercourse

The construction of the impoundment

No gauged data is available for the Buinne Dhubh catchment and therefore the flow duration curve has been derived using Low Flows 2 software. This flow duration curve provides an indication of the flows in the watercourse. The catchment area used to calculate the flow duration curve has been taken from the FEH webservice and has an area of 1.0 km² (catchment is shown in **Figure 3** below).

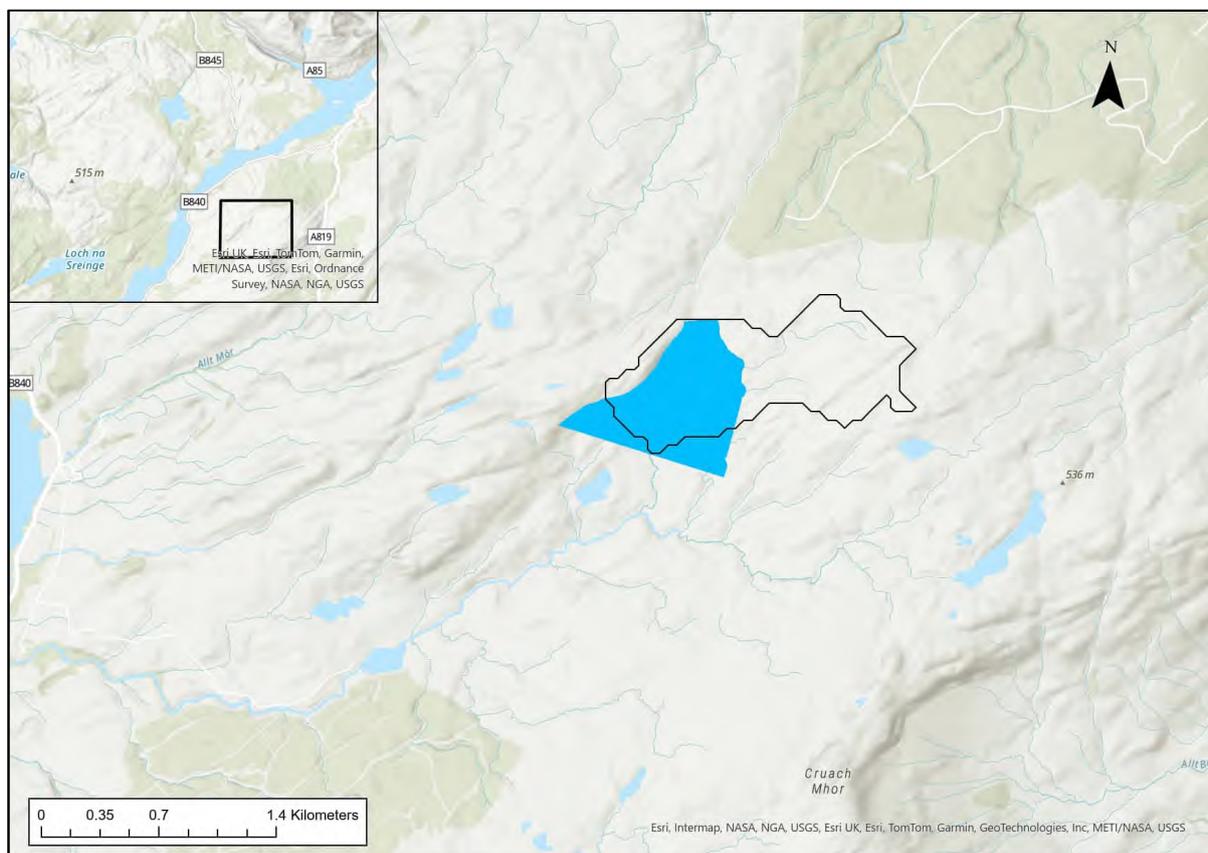


Figure 3: Buinne Dhubh Catchment Area Used in Low Flows 2

A conservative approach has been taken by estimating the flow duration curve at the confluence between the downstream watercourse of the confluence with the Buinne Dhubh.

Figure 4 shows the flow duration curve for the catchment shown in **Figure 3**. This shows that the annual Q50 flow is 0.034 m³/s, increasing to 0.120 m³/s at the Q20, and decreasing to 0.006 m³/s at the Q90.

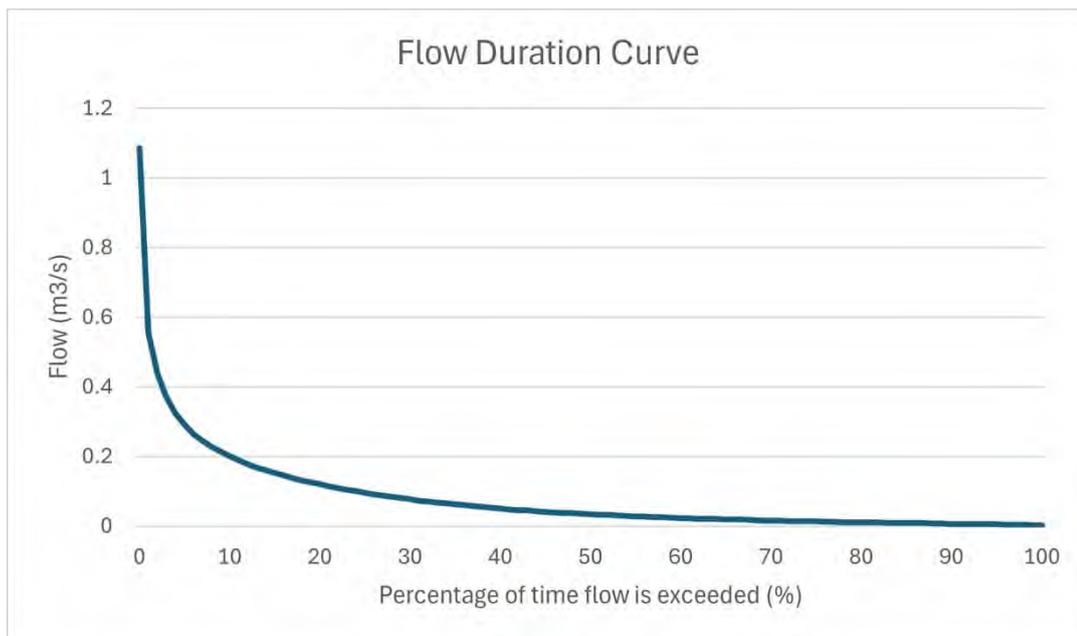


Figure 4: Buinne Dhubh Catchment Annual Flow Duration Curve

Full details of the Low Flows assessment can be found in Appendix – Buinne Dhubh Low Flow where a full set of results are presented.

3 Assessment Methodology

3.1 Loch Awe Barrage Analysis

An understanding of the relationship between water level changes and outflows from Loch Awe is needed to assess the impact of scheme operation on water resources. This relationship is determined by the operation of the Loch Awe Barrage. The barrage consists of three gates, a fish pass and two turbines. At the barrage water is abstracted to flow through pipes to Inverawe Power Station. The operation of these structures (opening or closing gates and abstracting water) determines the outflow from Loch Awe. Operation aims to keep water levels within specific ranges for the Summer (April-September) and Winter (October-March) periods. Because of these operating decisions, while higher loch levels generally correspond to higher outflow from the Loch, this is a statistical relationship rather than a definite relationship.

A water balance model was used to understand the statistical relationship between level and outflow by estimating the inflows to Loch Awe. This model provides a simplified understanding of the average outflow expected for a given water level, deriving a “rating curve” assigning an outflow for any given water level to allow the impact of the Development to be analysed.

Table 3: Water balance key terms

Change in Loch volume =	Inflows	-	Outflows
	Gauged inflows		River Awe outflow and barrage abstraction
	Ungauged inflows		Evaporation
	Direct rainfall		

The water balance model was set up using data from the period 01/01/2013 to 31/09/2021. For ungauged inflows, flow was estimated by scaling the flow at the Orchy gauge based on catchment area. The model used a daily timestep. All variables are calculated as a daily volume. Outflow is then converted to m³/s. Rearranging the water balance given in Table 3 gives the following equation for Loch Awe outflows:

$$\text{outflow} = \text{gauged inflows} + \text{ungauged inflows} + \text{direct rainfall} - \Delta \text{ storage} - \text{evaporation}$$

3.2 Water balance model results

Outflow results generated through the water balance model are plotted against loch level in Figure 3. The results are plotted for each day over the model period, divided based on the operating season. Smoothed curves produced using a generalized additive model show the average relation between level and outflow. The scatter of points around the trend line reflects model uncertainties (regarding inflows), and the control of outflows by the operation of the barrage.

The outflow from Loch Awe based on the change in volume of stored water together with inflows will take into account all outflows, including abstraction and discharges from the Cruchan PSH, the Awe Barrage hydro scheme and any compensation flows. The baseline scenario therefore captures existing hydro electric and pump storage operations linked with Loch Awe.

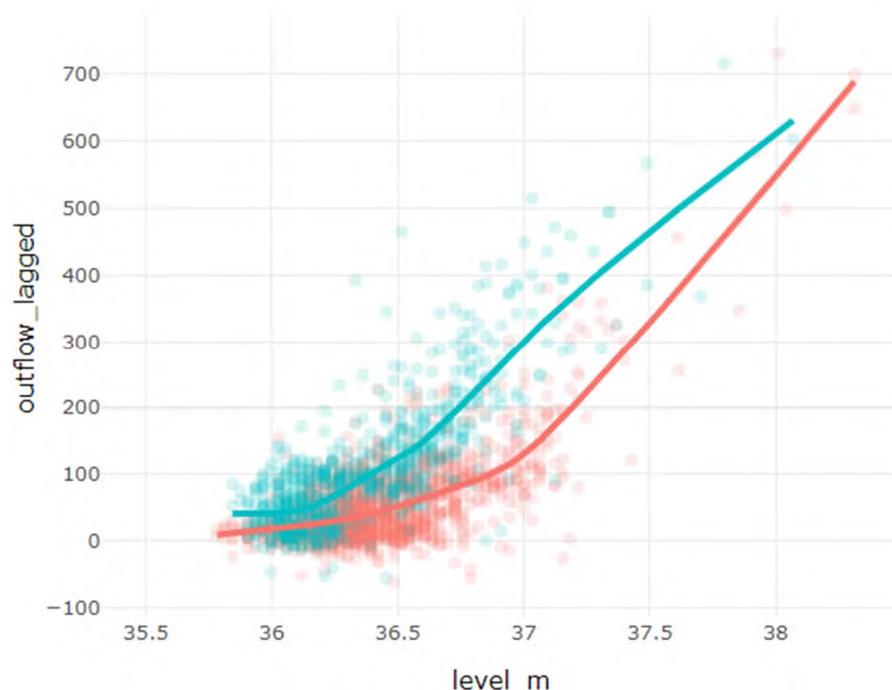


Figure 5: Loch level vs. outflow (summer in red, winter in blue)

3.3 Behaviour analysis model setup

A behaviour analysis model of Loch Awe was built. Similar to the analysis above, this is based on the principal of water balance i.e. for each time step,

$$\Delta \text{ storage} = \text{inflows} - \text{outflows}$$

Inflows and outflows are given in Table 3. A timestep of 1 hour was used. Inflows were derived for the period 01/01/2014 – 31/01/2025, based on gauged data together with ungauged inflows estimated by scaling the flow at the Orchy gauge based on catchment area, and direct rainfall added over the loch area. Evaporation is then subtracted to provide a net inflow record for the period of analysis.

Outflows from the loch are based on the rating curve derived as described in the previous section, using the loch level from the previous time step.

Change in storage is then calculated and converted to a change in loch level by dividing by the loch area to provide a new loch level at the end of the time step. The model assumes zero outflow below 35.5 mAOD as we have no information regarding the compensation outflow arrangements, although in reality there will likely be flow through the compensation outlet.

Figure 6 shows a comparison of the behaviour analysis model with observed levels. Levels tend to be slightly overestimated during the summer season, and underestimated during the winter season. Sources of error for this model include: Cruachan operation, barrage operation significantly different from assumed curve, localised inflows (at north or south of catchment), not captured by the gauge interpolation approach for ungauged catchments and inaccuracy of flow gauges. Nevertheless, it is considered to simulate the loch behaviour sufficiently closely to enable a meaningful analysis of the impact of the Development relative to baseline behaviour.

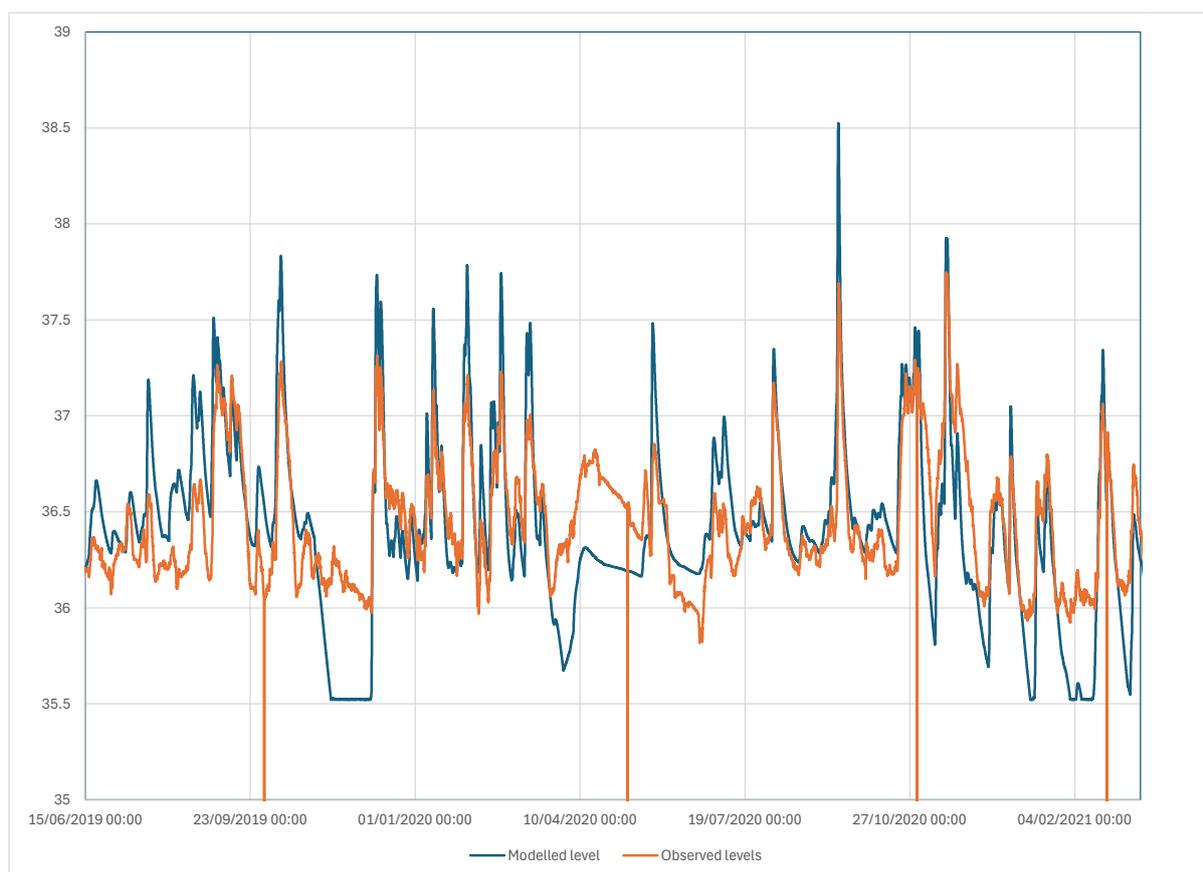


Figure 6: Comparison of modelled baseline levels vs observed loch levels

The model simulates the operation of the pump storage scheme based on the following thresholds:

Table 4: Proposed “hands off” thresholds

Season	Lower threshold (AOD)	Upper threshold (AOD)
April-Sep	35.87	37.2
Oct-March	35.56	37.2

These thresholds have been set based on the results of modelling a number of variations in threshold levels in order to balance minimising any detrimental impact during flood and drought events with reducing the curtailment of the Development.

In the absence of a more detailed generation profile linked to the energy market, a standard daily patten of generation and pumping was assumed (hereinafter 10 and10):

- 10 hours generation at 301 m³/s
- 10 hours pumping at 301 m³/s
- 2 hours pause between cycles

The generation profile is amended within the model to account for curtailment of generation either when loch levels exceed the upper threshold or when the headpond is empty, and of pumping either when loch levels are below the lower thresholds or when the headpond is full.

A theoretical weekly profile was also tested but found not to influence the results significantly.

4 Results on Loch Awe

The following section reports on the results of the behaviour analysis modelling, comparing the modelled baseline with the Development in operation for the period 01/01/2014 to 31/01/2025.

4.1 Impact on loch levels

The impact of the Development on water levels in the loch is shown in the stage duration curve in Figure 7. Note that the baseline stage duration curve is based on modelled rather than observed levels in order that it can be directly compared with the “With Development” modelled scenario.

This shows the percentage of time that the loch is at different levels. Because of the high and low “hands off” thresholds, the highest and lowest loch levels experienced are unchanged.

The mean or average loch level (i.e. exceeded 50% of the time) is slightly reduced from 36.36 to 36.33 mAOD. Lower loch levels are more affected, with a 150mm reduction in the loch level exceeded 90% of the time from 35.98 to 35.83mAOD.

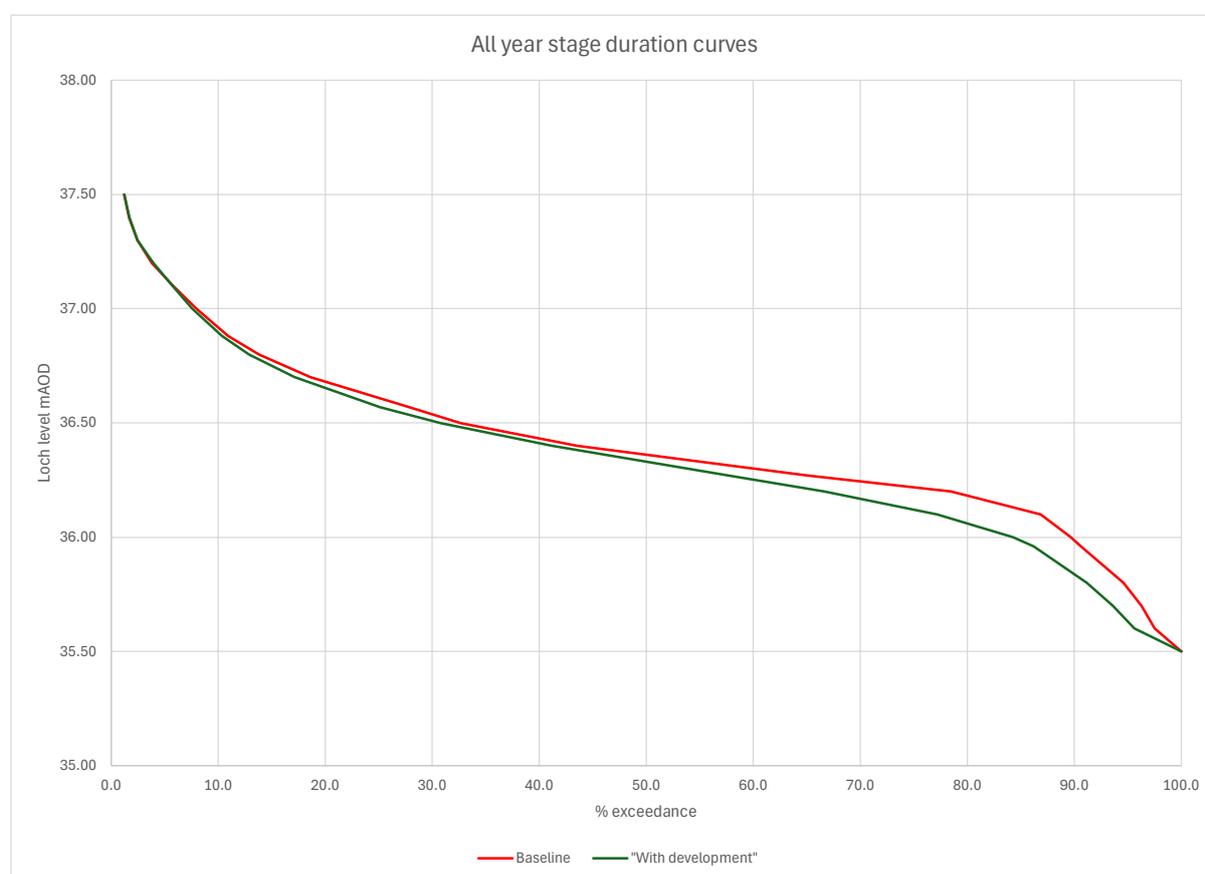


Figure 7: Stage duration curves: Baseline and with Development

4.2 Impact on flood events

The most severe 8 flood events within the period simulated were analysed. **Table 5** and **Figure 8** shows the impact on water levels in Loch Awe for each event.

It can be seen from the results in **Table 5** that with the exception of the 2014 event where levels remain the same, the impact of the Development is to reduce the peak loch level, and consequently the outflow. This is because during flood events the Development would stop generating and so is not actively adding water, and may only extract water, but also because the operation of the project creates different starting water levels before flood events occur. **Figure 8** illustrates this impact for the December 2024 flood event.

The Development therefore does not exacerbate existing flood impacts and may provide a slight flood reduction benefit for some events. As such the proposals comply with bullet point 2 in Policy 22 of NPF4.

A number of significant flood events during the modelled period were assessed to see the impact the operation of the Development would have had on flood levels if operated as set out by the operational parameters as set out in Table 4. Table 5 summarises the modelled flood levels during these events with and without the scheme and the change in flood levels. The modelled results show that the proposed scheme does not have a detrimental impact on flood risk, and in most cases would have resulted in reduced peak flood levels.

Table 5: Impact of Development operation on Loch Awe levels during historic flood events

Rank	Flood event	Modelled flood level (no scheme) mAOD	Modelled flood level (propose scheme operating) mAOD	Change in peak flood levels (mm)
1	08/10/2023	39.047	39.044	-3
2	08/10/2018	38.906	38.889	-17
3	26/10/2014	38.797	38.797	0
4	06/03/2015	38.627	38.536	-91
5	31/12/2024	38.417	38.369	-48
6	05/12/2015	38.583	38.523	-60
7	12/09/2020	38.525	38.458	-67
8	29/03/2021	38.356	38.195	-161

The Development, therefore, does not exacerbate existing flood impacts, and may provide a slight flood reduction benefit for some events. As such the proposal complies with Policy 22 of NPF4.

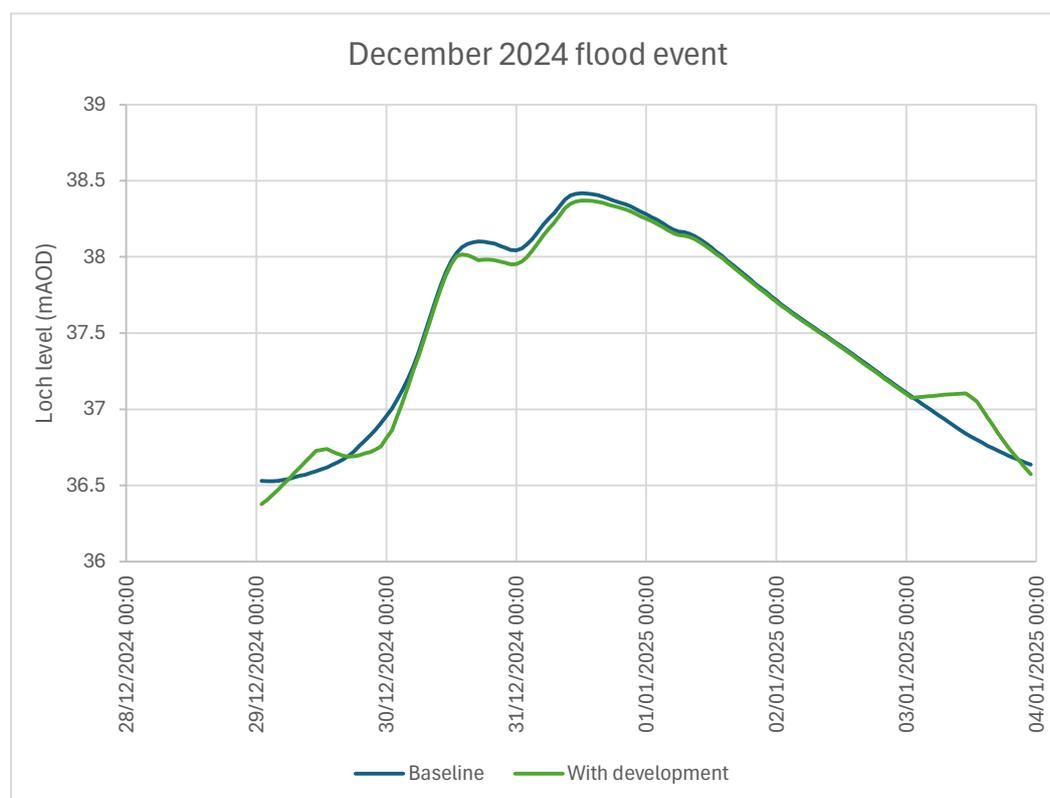


Figure 8: Loch levels during the December 2024 flood event: Baseline and With development

Further model results for the water balance model during high water scenarios can be found in the Appendix.

4.3 Impact on barrage operation

It is understood that SSER operate the flood gates at Awe Barrage to release additional flow when loch levels exceed 37.06mAOD during April to September and 36.57mAOD during October to March. The impact of the Development under the proposed operating regime (Table 6) on the frequency of operation of the gates under these rules was analysed, comparing them to the existing baseline frequency of operation.

Table 6: Percentage time barrage operates and loch levels are within operational window

	Baseline	With Development
Barrage operation	12%	12%
% time within SSE operating window	57%	54%

With the Development in operation, the frequency of barrage operation is essentially unchanged and there is therefore no impact on SSER operations with regard to the barrage. The time within the SSER operational window reduces by around 3% which amounts to a small impact on SSER commercially. The impact is negligible from an environmental perspective.

4.4 Impact on low flows

We have assessed the impact of the Development on the basis of the lower limit proposed being 35.87mAOD during April to September and 35.56mAODmAOD from October to March.

Two of the most severe historic droughts in the record in March 2018 and February 2021 were analysed for the Development. We do not have details of the compensation arrangements at the Awe Barrage and have therefore assumed a minimum outflow level of 35.5mAOD. At this level and below, it is assumed there is zero outflow from the loch, although in reality there will likely be flow through the compensation outlet. Analysing the number of days that the loch level is at or below 35.5mAOD during these drought events in comparison to the baseline highlights the impact of the Development during low flow events. As seen in Table 7, the number of days that the loch falls below 35.5mAOD is actually reduced with Development operation. This is because the last operation prior to the drought event will be generation, not pumping, which raises water levels above the baseline. The Development therefore provides a benefit to SSER in terms of maintaining compensatory and freshet releases. Overall, there is a slight reduction in the percentage of time that the loch level hits this level over the period analysed from 2% to 1.4%.

Table 7: Number of days at or below 35.5mAOD

	Baseline	With development
February 2021	7.3	6.1
March 2018	6.6	4.6

Model results for the water balance model during low water scenarios can be found in the Appendix. Simulations showed that the operation of the proposed scheme with the operational rules as set out in Table 4 does not have a detrimental impact on low flow conditions.

4.5 Impact on rate of level change

The rate of change of loch level during both pumping and generation is 28 mm/hr. Over a 10 hour pumping or generating cycle, this equates to 0.28m change in loch level. Analysis of the observed hourly level data indicates that this rate of change in loch level lies within the range currently experienced, albeit at the more unusual end of the duration curve as shown in Figure 9. A falling rate of 28mm/hr is exceeded 1% of the time and a rising rate of 28mm/hr is exceeded 4% of the time.

The total volume of storage equates to 14-hour generation cycle. A full generation cycle utilising the full available storage would be by exception and not a regular occurrence. In such an event the total change in water level at Loch Awe would be 400mm.

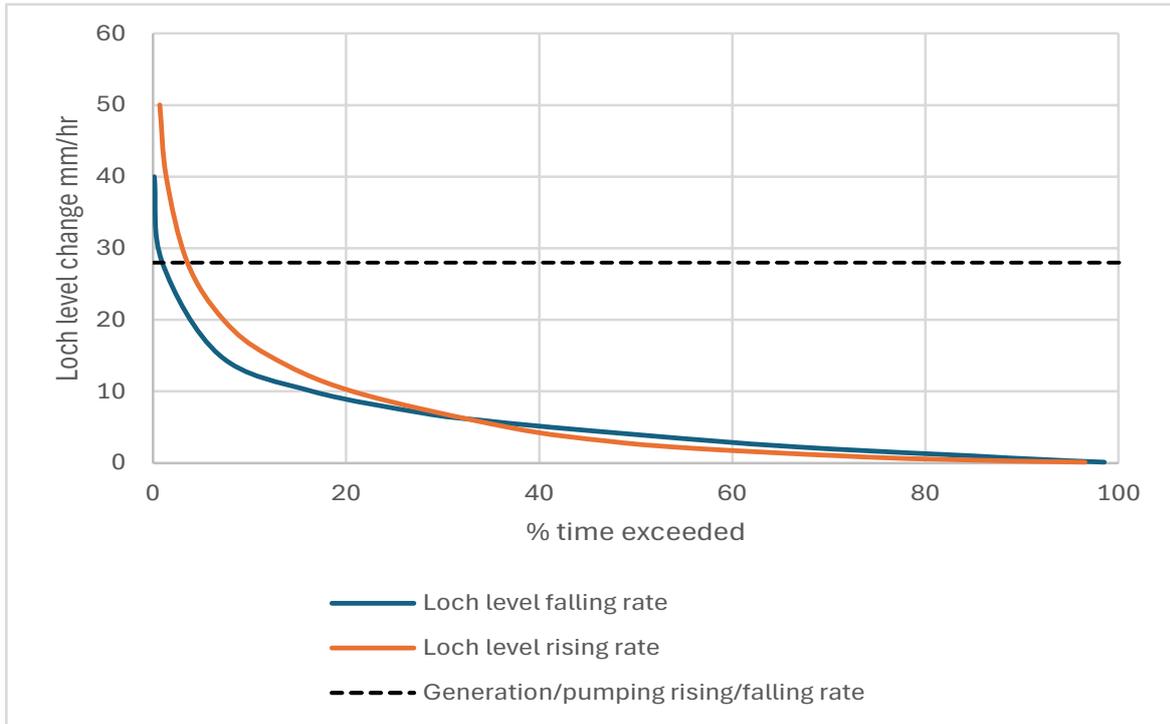


Figure 9: Rate of change of loch level duration curve (based on hourly observed level data)

The rate of change over a full generation and pumping cycle can be seen in Figure 8 below.

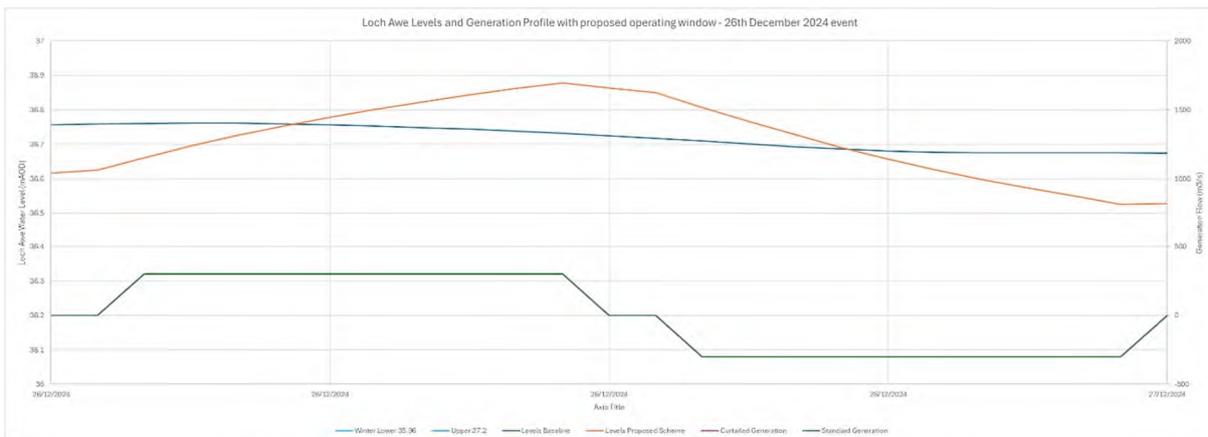


Figure 10: modelled and baseline water levels in Loch Awe based on scheme operation

5 Mitigation Measures

5.1 Introduction

The mitigation measures outlined below are required to reduce the impacts on water resources to a level which is considered to be Not Significant.

5.2 Operational Regime of Loch Awe

An effective operational regime is required to ensure the Proposed Development continues to operate effectively whilst ensuring that water resources are not impacted, and key receptors are not placed at risk.

To mitigate impacts on water resources and key receptors the operating levels for the Proposed Development, as modelled in this assessment, should be set as follows:

- Hands-off low level (stop pumping) 35.87 mAOD (April -Sept) and 35.56 mAOD (Oct-March)
- Hands-off high Level (stop generation) 37.20 mAOD

5.3 Compensation Flows

The construction of the Headpond would result in the upper part of the tributary of the Buinne Dhubh being impounded and the flow of water being impeded from passing downstream. A compensatory flow arrangement is included within the scheme as embedded mitigation and would maintain flows down this watercourse.

The compensatory flow arrangement would be based on a variable flow and head arrangement to take account of the continuous fluctuation in water levels in the Headpond and the seasonal variation in flows in the watercourse. A submerged discharge valve arrangement would provide the range of flows as calculated in the low flow assessment and for the range of water levels.

The seasonal variation would be based on the average monthly flows for each calendar month. The overall monthly volume of discharge would be maintained at the existing volume. In addition to the compensatory flow occasional higher flow would be released as part of the scour valve operation.

The assessment has been based on calculated flow parameters based on Low Flows, software widely used in the industry and by regulators. In line with good practice, flow monitoring would be undertaken over a number of years to confirm the monthly flow duration curves.

Table 8. Catchment Information

Catchment	OS NGR	Catchment (km ²)	Compensation flow (l/s)
Buinne Dhubh tributary	NN 04635 16674	1.0km ²	Monthly averaged flows (see Tables Table 9)

Table 9. Monthly Average Compensation Flows

Month	Annual	Jan	Feb	March	April	May	June
Q mean (l/s)	0.078	0.121	0.103	0.097	0.049	0.034	0.036
Month	Annual	July	Aug	Sept	Oct	Nov	Dec
Q mean (l/s)	0.041	0.054	0.081	0.101	0.1	0.116	0.041

6 Headpond

The Proposed Development includes the creation of a new Headpond through impounding of the tributary of Buinne Dhubh. As this structure will impound a significant volume of water, there is an inherent risk of flooding associated with it. However, the probability of flooding from the Headpond occurring is considered extremely low due to the high standard of design, management, and maintenance required under the Reservoirs (Scotland) Act 2011 and provided by any responsible operator.

The following Section looks at the risk associated with the creation of the Headpond and the significance of these risk.

6.1.1 Flood Risk to others from the Headpond

The Proposed Development includes the creation of a new Headpond through impounding and raising the water level along a length of the tributary of Buinne Dhubh. As this structure will impound a significant volume of water, there is an inherent risk of flooding associated with it. However, the probability of flooding from the Headpond occurring is considered extremely low due to the high standard of design, management, and maintenance required under law and provided by any responsible operator.

This section details the assessments which have been made to determine the risk associated with the Headpond and its associated Embankments and Spillway, and to provide a balanced assessment of the flood risk associated with the Proposed Development.

6.1.2 Reservoirs (Scotland) Act 2011

The Reservoirs (Scotland) Act 2011 (herein referred to as 'the Act' throughout this appendix) applies to reservoirs that hold more than 25,000 m³ of water.

The Act sets out a legal framework with regards to responsibilities and requirements for inspection and maintenance of reservoirs, in order to ensure the risk presented by such structures is acceptable.

Under the Act reservoir owners have ultimate responsibility for the safety of reservoirs. Reservoir owners must appoint a Panel Engineer to supervise the design and construction of the reservoir and to supervise inspection and maintenance of the reservoir, which is the Headpond for this Development.

The Headpond will be of a volume by which it is regulated under the Act. The proposed Embankments will be designed in accordance with the requirements of the Act. When in operation, inspection and maintenance will be undertaken in accordance with the requirements of the Act. An assessment of the areas at risk from the Headpond indicates it would be categorised as High Risk designation based on the SEPA reservoir risk designation process.

The design parameters for the conveyance of flood flows will be based on the guidance set out in the Flood and Reservoir Safety Guidance by the ICE. The Headpond will be classed as a Category A reservoir and therefore would be subject to the most stringent design standard with the capability to convey safely the Probable Maximum Flood (PMF) as a design flood.

Design, inspection and maintenance in accordance with the legislative framework of the Act will ensure that the risk of failure of the proposed Headpond remains low throughout its working life.

6.1.3 Breach Analysis and Flood Routing

The Headpond is classed as High Risk reservoir based on the consequence of an uncontrolled release of water and the effect that this could have on the surrounding area below the reservoir. As a result, the Headpond will be designed to the highest standards and regularly inspected in line with the Reservoirs (Scotland) Act 2011 to maintain that standard.

The required ability to convey flood flows for such a reservoir is significantly higher standard than those assessed with regard to planning. The flood risk to others from the Headpond overtopping is regarded as being negligible based on the extremely low likelihood of occurrence.

The probability of a breach of the reservoir is again very low and orders of magnitude below the probability of occurrence defined as a flood risk area under NPF4 and Argyle and Bute and SEPA Guidance, an annual probability of being flooded of greater than 0.5%.

The flood risk to others from such an event is regarded as being negligible. A breach assessment will be undertaken as part of the reservoir registration process under the Reservoirs (Scotland) Act 2011 to aid emergency planning.

An emergency spillway has been located at the south east corner of the Headpond. The spillway sill level has been set 600 mm above the top water level in the Headpond based on operating levels.

An assessment of the potential flood lift in the reservoir during extreme flood events has been carried out taking account of the runoff from the catchment feeding directly into the Headpond and the direct rainfall on the Headpond over a 48 hours period. Based on a conservative assessment with all rainfall falling on the catchment entering the Headpond the volume of flood water entering the Headpond in a 1 in 200 year event with a 46% uplift for climate change is 333,000 m³ based on a rainfall depth of 333mm over 48 hour. This is based on the FEH DDF model. This equates to a flood lift of 570mm with no spill. This is below the spillway level of 420.6 mAOD.

This is a conservative assessment based on no other discharge from the Headpond over this period. In addition, Water levels in the Headpond will generally sit below the operational top water level based on ongoing operation of the scheme within the operational constraints set out based on Loch Awe water levels. The spillway

The results of the flood study indicate that peak inflow to the reservoir for the SCF is nominal when compared to the expected inflow should the pumps fail to shut off based on the small direct catchment area of the Headpond. Preliminary calculations show that the inflow into the Headpond if the pumps fail to shut off would be circa 300m³/s when the water is at Top Water Level (TWL). Therefore, the overflow was sized based on passing of over pumping into the reservoir rather than for the inflows from the SCF event.

An ogee profile was selected for the overflow weir due to the high discharge rates that it will need to convey if the pumps fail to shut off. During detail design a routing exercise will be carried out to optimise the length of the spillway length

The main overflow is proposed to be a straight, broad crested weir at a fixed crest level of 420.6 mAOD.

The spill weir has been represented in the model considering the weir length and coefficient shown in **Table 10**. The software uses the weir equation below to calculate the head/discharge relationship.

$$Q = C_D L H^{1.5}$$

where: Q = flow (m³/s)
 C_D = weir coefficient
 L = effective length of weir (m)
 H = head over weir (m)

Table 10. Spillway Weir characteristics

Level (mAOD)	Length (m)	Type of weir	Weir coefficient
420.6 mAOD	85m	Ogee	2.0

The Ogee weir level is set at a level of 420.6, the dam crest level (DCL) is 423.0mAOD. Based on a discharge rate of 300m³/s a flood lift of 1.5m would be experienced over the spillway. This would provide a freeboard of 0.9m. This would be greater than the minimum flood freeboard of 0.6m recommended for the design flood in Floods and Reservoir Safety 4th Edition (ICE 2015).

During detailed design stage the spillway design would be optimised to convey the flow based on a 3 hour over pumping scenario taking account of the routing effect of the Headpond and the available flood lift above TWL. This would be in line with the methodology adopted at Coire Glas pumped hydro scheme

7 Conclusion

The Proposed Development would introduce the ability to transfer large volumes of water between the Headpond and Loch Awe. The Headpond operating volume is 14.68 Mm³ and the generation and pump flow rates are 301 and 301 m³/s respectively.

The impact on Loch Awe levels due to the Development has been assessed based on proposed upper and lower “hands off” thresholds shown in Table 4. These thresholds have been set based on the results of modelling a number of variations in threshold levels in order to balance minimising any detrimental impact during flood and drought events with reducing the curtailment of the Development.

The analysis has been conducted using a behaviour analysis model, based on the principle of water balance. The analysis concludes the following:

- The impact of the Development on water levels in the is to slightly reduce the mean or average loch level 36.36 to 36.33 mAOD. Lower loch levels are more affected, with a 150mm reduction in the loch level exceeded 90% of the time from 35.98 to 35.83mAOD.
- The Development does not exacerbate existing flood impacts and may provide a slight flood reduction benefit for some events. This is because during flood events the last operation prior to the flood event will be pumping, which lowers water levels below the baseline and also because the operation of the Development creates different starting water levels before flood events occur. As such the proposals comply with bullet point 2 in Policy 22 of NPF4.
- With the Development in operation, the frequency of barrage operation is essentially unchanged
- The Development does not exacerbate loch levels during drought events and may provide a benefit. This is because the last operation prior to the drought event will be generation, not pumping, which raises water levels above the baseline. The Development therefore provides a benefit in terms of maintaining compensatory and freshet releases during low flow periods.
- The rate of change of loch level during both pumping and generation is 28 mm/hr. This rate of change in loch level lies within the range currently experienced, albeit at the more unusual end of the duration curve as shown in Figure 9.

The construction of the Headpond will result in the impoundment of the tributary of the tributary of Buinne Dhubh. To compensate for the impact of such impoundment on flows in the downstream channel a compensatory flow regime is proposed based on the provision of a seasonally varying flow.

The compensatory flow arrangement would be based on a variable flow and head arrangement to take account of the continuous fluctuation in water levels in the Headpond and the seasonal variation in flows in the watercourse. A submerged discharge valve arrangement would provide the range of flows as calculated in the low flow assessment and for the range of water levels.

The seasonal variation would be based on the average monthly flows for each calendar month. The overall monthly volume of discharge would be maintained at the existing volume. In addition to the compensatory flow occasional higher flow would be released as part of the scour valve operation.

The assessment has been based on calculated flow parameters based on Low Flows, software widely used in the industry and by regulators. In line with good practice, flow monitoring would be undertaken over a number of years to confirm the monthly flow duration curves.

The provision of the proposed compensatory flow regime would mitigate the impact of the proposed development on flows in the downstream watercourse. Whilst current assessment are based on Low Flow numerical analysis a detailed hydrometric survey will be undertaken based on a minimum of 12 months of flow gauging to confirm the baseline flow conditions in the watercourse. The final compensation flow provision will be based on the gauged data in line with the principle established based on the Low Flow analysis.

Appendices

- Low Flows Assessment results
- Water Balance model results.
 - Flood conditions
 - Low Water Level conditions

Appendix A Low Flow Results

	Annual	January	February	March	April	May	June	July	August	September	October	November	December
Qmean	0.078	0.121	0.103	0.097	0.049	0.034	0.036	0.041	0.054	0.081	0.101	0.1	0.116
Q(0.1)	1.085	0.848	0.95	0.781	0.572	0.528	0.505	0.634	0.542	0.661	0.732	0.693	1.141
Q(1)	0.554	0.556	0.59	0.516	0.317	0.263	0.25	0.269	0.346	0.459	0.444	0.484	0.611
Q(2)	0.435	0.475	0.451	0.467	0.244	0.209	0.195	0.216	0.284	0.375	0.4	0.423	0.494
Q(3)	0.369	0.437	0.417	0.411	0.208	0.175	0.167	0.189	0.24	0.333	0.358	0.389	0.43
Q(4)	0.325	0.405	0.379	0.362	0.183	0.159	0.141	0.167	0.22	0.298	0.339	0.354	0.394
Q(5)	0.291	0.384	0.336	0.329	0.164	0.142	0.129	0.15	0.198	0.273	0.311	0.32	0.37
Q(6)	0.265	0.366	0.308	0.3	0.148	0.131	0.118	0.136	0.184	0.254	0.288	0.303	0.35
Q(7)	0.244	0.343	0.291	0.275	0.138	0.115	0.108	0.127	0.17	0.234	0.271	0.286	0.326
Q(8)	0.228	0.323	0.277	0.257	0.13	0.101	0.103	0.121	0.161	0.228	0.256	0.267	0.306
Q(9)	0.214	0.314	0.259	0.238	0.123	0.093	0.096	0.113	0.151	0.214	0.237	0.245	0.295
Q(10)	0.2	0.293	0.247	0.224	0.115	0.087	0.088	0.106	0.139	0.201	0.229	0.236	0.281
Q(11)	0.189	0.279	0.233	0.213	0.109	0.081	0.084	0.099	0.132	0.191	0.221	0.223	0.261
Q(12)	0.178	0.265	0.226	0.204	0.102	0.074	0.08	0.092	0.122	0.182	0.211	0.215	0.249
Q(13)	0.168	0.252	0.217	0.19	0.097	0.071	0.075	0.087	0.117	0.171	0.2	0.206	0.241
Q(14)	0.16	0.242	0.205	0.181	0.095	0.066	0.071	0.082	0.11	0.162	0.194	0.197	0.23
Q(15)	0.152	0.232	0.196	0.172	0.09	0.062	0.067	0.077	0.106	0.154	0.186	0.192	0.222
Q(16)	0.145	0.227	0.188	0.162	0.086	0.057	0.064	0.073	0.102	0.148	0.18	0.183	0.212
Q(17)	0.138	0.219	0.178	0.156	0.082	0.055	0.06	0.07	0.098	0.142	0.176	0.175	0.202
Q(18)	0.131	0.207	0.173	0.15	0.078	0.052	0.056	0.067	0.093	0.136	0.169	0.168	0.194

	Annual	January	February	March	April	May	June	July	August	September	October	November	December
Q(19)	0.126	0.199	0.163	0.144	0.075	0.049	0.054	0.063	0.089	0.13	0.165	0.163	0.187
Q(20)	0.12	0.193	0.158	0.139	0.071	0.046	0.051	0.061	0.085	0.124	0.16	0.156	0.179
Q(21)	0.114	0.185	0.153	0.135	0.069	0.044	0.048	0.058	0.081	0.12	0.158	0.152	0.174
Q(22)	0.109	0.177	0.145	0.132	0.065	0.042	0.046	0.055	0.077	0.116	0.154	0.147	0.166
Q(23)	0.104	0.171	0.137	0.126	0.063	0.04	0.043	0.053	0.073	0.112	0.149	0.144	0.157
Q(24)	0.1	0.165	0.134	0.122	0.06	0.038	0.042	0.05	0.07	0.108	0.145	0.138	0.153
Q(25)	0.096	0.16	0.128	0.116	0.058	0.036	0.04	0.048	0.068	0.104	0.14	0.134	0.146
Q(26)	0.091	0.155	0.124	0.112	0.056	0.034	0.039	0.046	0.065	0.1	0.135	0.131	0.141
Q(27)	0.087	0.151	0.118	0.109	0.053	0.032	0.037	0.044	0.061	0.098	0.128	0.126	0.133
Q(28)	0.084	0.147	0.113	0.105	0.051	0.031	0.036	0.043	0.058	0.094	0.125	0.121	0.129
Q(29)	0.08	0.143	0.11	0.101	0.049	0.03	0.034	0.041	0.056	0.09	0.123	0.117	0.124
Q(30)	0.077	0.137	0.106	0.098	0.047	0.028	0.033	0.039	0.054	0.086	0.119	0.112	0.119
Q(31)	0.073	0.133	0.102	0.095	0.045	0.027	0.032	0.038	0.051	0.082	0.116	0.107	0.114
Q(32)	0.07	0.127	0.097	0.091	0.044	0.026	0.031	0.037	0.049	0.078	0.111	0.103	0.111
Q(33)	0.068	0.125	0.093	0.087	0.042	0.024	0.03	0.035	0.047	0.076	0.108	0.099	0.107
Q(34)	0.065	0.12	0.091	0.084	0.041	0.023	0.029	0.034	0.045	0.073	0.104	0.095	0.104
Q(35)	0.062	0.114	0.088	0.083	0.039	0.022	0.028	0.032	0.043	0.07	0.1	0.092	0.1
Q(36)	0.06	0.11	0.084	0.08	0.039	0.022	0.027	0.031	0.041	0.067	0.096	0.089	0.096
Q(37)	0.057	0.105	0.08	0.078	0.038	0.021	0.026	0.03	0.039	0.065	0.094	0.084	0.092
Q(38)	0.055	0.099	0.078	0.075	0.037	0.02	0.025	0.029	0.038	0.063	0.091	0.083	0.089
Q(39)	0.053	0.097	0.074	0.073	0.035	0.019	0.025	0.028	0.037	0.06	0.088	0.08	0.085
Q(40)	0.051	0.094	0.072	0.071	0.035	0.018	0.024	0.027	0.035	0.057	0.085	0.077	0.082
Q(41)	0.048	0.09	0.069	0.068	0.034	0.018	0.023	0.026	0.034	0.055	0.081	0.075	0.079
Q(42)	0.046	0.086	0.066	0.066	0.033	0.017	0.022	0.025	0.033	0.053	0.079	0.072	0.076

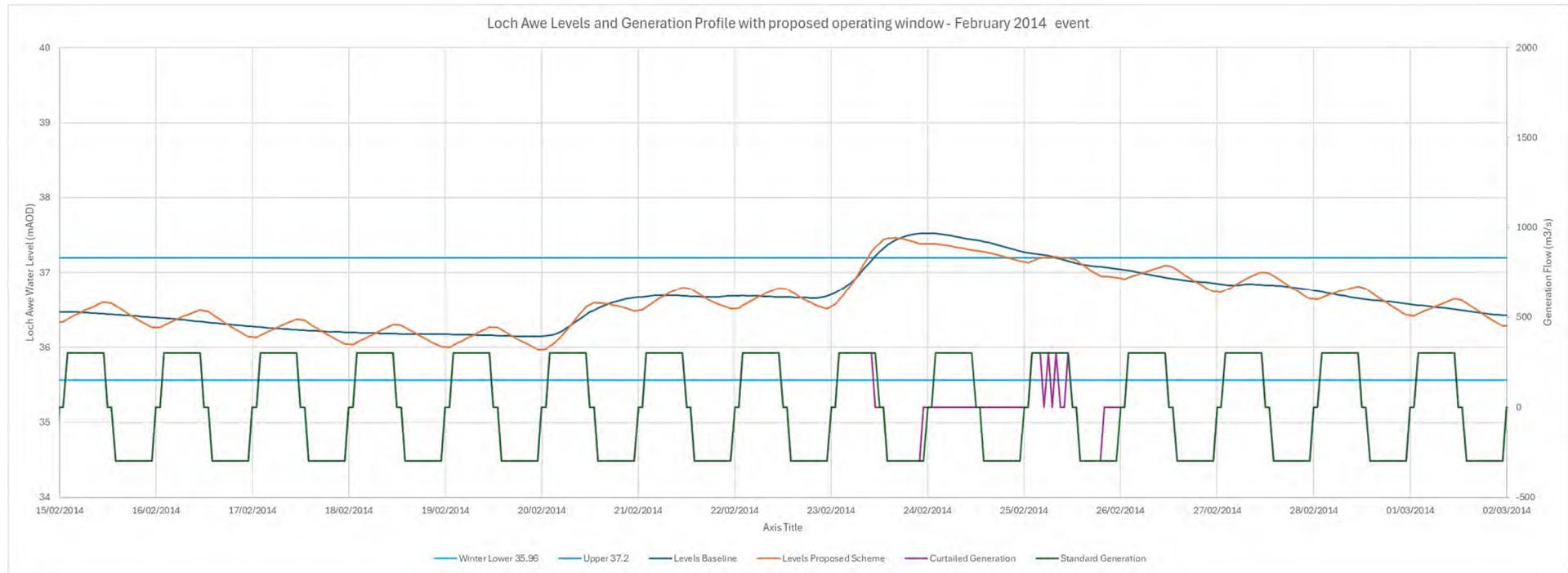
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Q(44)	0.043	0.079	0.062	0.061	0.031	0.016	0.021	0.023	0.031	0.05	0.072	0.067	0.069
Q(45)	0.041	0.077	0.059	0.06	0.03	0.016	0.02	0.022	0.029	0.048	0.069	0.064	0.068
Q(46)	0.039	0.074	0.057	0.059	0.03	0.015	0.019	0.022	0.028	0.047	0.068	0.063	0.065
Q(47)	0.038	0.07	0.054	0.055	0.029	0.015	0.019	0.021	0.027	0.045	0.066	0.061	0.062
Q(48)	0.037	0.067	0.052	0.053	0.028	0.014	0.018	0.02	0.026	0.043	0.063	0.059	0.059
Q(49)	0.035	0.065	0.05	0.051	0.027	0.014	0.018	0.02	0.026	0.041	0.061	0.057	0.058
Q(50)	0.034	0.062	0.048	0.05	0.026	0.013	0.017	0.019	0.025	0.04	0.059	0.054	0.056
Q(51)	0.033	0.06	0.046	0.048	0.025	0.013	0.016	0.018	0.024	0.039	0.057	0.052	0.054
Q(52)	0.032	0.058	0.044	0.046	0.025	0.013	0.016	0.018	0.023	0.037	0.055	0.051	0.052
Q(53)	0.03	0.056	0.043	0.045	0.024	0.012	0.015	0.017	0.022	0.036	0.053	0.049	0.049
Q(54)	0.029	0.054	0.041	0.043	0.023	0.012	0.015	0.017	0.021	0.034	0.052	0.047	0.047
Q(55)	0.028	0.052	0.04	0.042	0.023	0.012	0.014	0.016	0.021	0.033	0.05	0.045	0.045
Q(56)	0.027	0.049	0.038	0.04	0.022	0.011	0.014	0.016	0.02	0.032	0.048	0.043	0.044
Q(57)	0.026	0.047	0.036	0.039	0.022	0.011	0.013	0.015	0.019	0.03	0.046	0.042	0.042
Q(58)	0.025	0.046	0.035	0.037	0.021	0.011	0.013	0.015	0.019	0.029	0.044	0.04	0.04
Q(59)	0.024	0.044	0.033	0.036	0.02	0.01	0.012	0.014	0.018	0.028	0.042	0.038	0.039
Q(60)	0.023	0.041	0.032	0.035	0.02	0.01	0.012	0.014	0.017	0.027	0.041	0.037	0.037
Q(61)	0.022	0.04	0.031	0.034	0.019	0.01	0.012	0.013	0.017	0.026	0.039	0.036	0.036
Q(62)	0.021	0.038	0.03	0.033	0.019	0.01	0.011	0.013	0.016	0.026	0.038	0.035	0.035
Q(63)	0.021	0.036	0.029	0.032	0.018	0.009	0.011	0.012	0.015	0.025	0.037	0.034	0.034
Q(64)	0.02	0.035	0.027	0.031	0.018	0.009	0.011	0.012	0.015	0.024	0.035	0.033	0.033
Q(65)	0.019	0.033	0.025	0.03	0.017	0.009	0.01	0.011	0.014	0.023	0.034	0.031	0.031
Q(66)	0.018	0.032	0.024	0.029	0.017	0.008	0.01	0.011	0.014	0.022	0.032	0.031	0.03

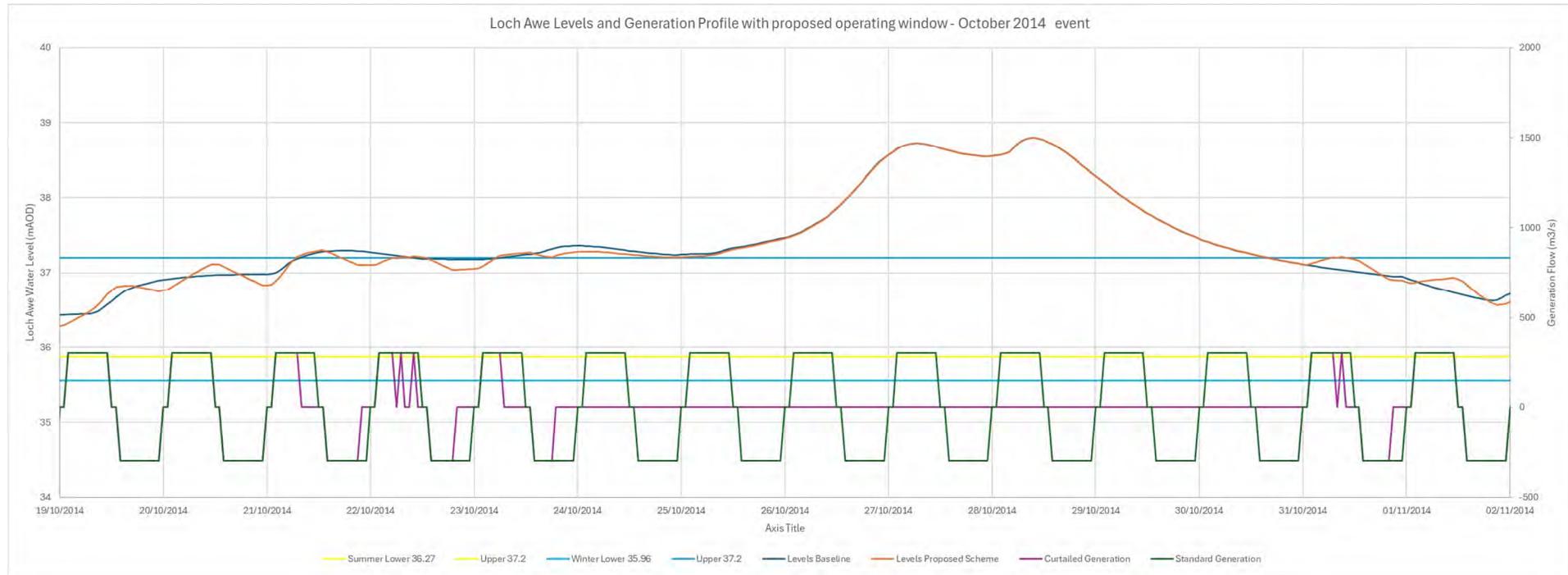
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Q(68)	0.017	0.029	0.022	0.027	0.016	0.008	0.009	0.01	0.013	0.02	0.029	0.028	0.027
Q(69)	0.016	0.028	0.021	0.026	0.016	0.008	0.009	0.01	0.012	0.02	0.028	0.027	0.026
Q(70)	0.016	0.027	0.02	0.025	0.015	0.008	0.009	0.01	0.011	0.019	0.027	0.026	0.025
Q(71)	0.015	0.025	0.019	0.024	0.015	0.007	0.008	0.009	0.011	0.018	0.026	0.025	0.024
Q(72)	0.014	0.024	0.018	0.023	0.014	0.007	0.008	0.009	0.011	0.017	0.025	0.024	0.023
Q(73)	0.014	0.023	0.017	0.022	0.014	0.007	0.008	0.009	0.01	0.017	0.024	0.023	0.022
Q(74)	0.013	0.022	0.017	0.021	0.014	0.007	0.008	0.008	0.01	0.016	0.023	0.022	0.021
Q(75)	0.013	0.021	0.016	0.02	0.013	0.007	0.007	0.008	0.01	0.015	0.022	0.021	0.02
Q(76)	0.012	0.02	0.015	0.019	0.013	0.007	0.007	0.008	0.009	0.015	0.021	0.021	0.02
Q(77)	0.012	0.019	0.014	0.019	0.013	0.006	0.007	0.007	0.009	0.014	0.02	0.02	0.019
Q(78)	0.011	0.019	0.014	0.018	0.012	0.006	0.007	0.007	0.008	0.014	0.019	0.019	0.018
Q(79)	0.011	0.018	0.013	0.017	0.012	0.006	0.007	0.007	0.008	0.013	0.018	0.018	0.018
Q(80)	0.01	0.017	0.012	0.017	0.012	0.006	0.006	0.007	0.008	0.012	0.017	0.018	0.017
Q(81)	0.01	0.016	0.012	0.016	0.011	0.006	0.006	0.007	0.008	0.012	0.017	0.017	0.016
Q(82)	0.01	0.015	0.011	0.015	0.011	0.006	0.006	0.006	0.007	0.011	0.016	0.016	0.015
Q(83)	0.009	0.015	0.011	0.014	0.01	0.005	0.006	0.006	0.007	0.011	0.015	0.016	0.014
Q(84)	0.009	0.014	0.01	0.014	0.01	0.005	0.006	0.006	0.007	0.01	0.014	0.015	0.013
Q(85)	0.008	0.013	0.01	0.013	0.01	0.005	0.005	0.006	0.006	0.01	0.013	0.014	0.013
Q(86)	0.008	0.013	0.009	0.013	0.009	0.005	0.005	0.005	0.006	0.009	0.013	0.014	0.012
Q(87)	0.008	0.012	0.009	0.012	0.009	0.005	0.005	0.005	0.006	0.009	0.012	0.013	0.011
Q(88)	0.007	0.011	0.009	0.012	0.009	0.005	0.005	0.005	0.006	0.008	0.012	0.013	0.011
Q(89)	0.007	0.011	0.008	0.011	0.008	0.005	0.005	0.005	0.005	0.008	0.011	0.012	0.01
Q(90)	0.006	0.01	0.008	0.011	0.008	0.004	0.004	0.004	0.005	0.007	0.01	0.012	0.009

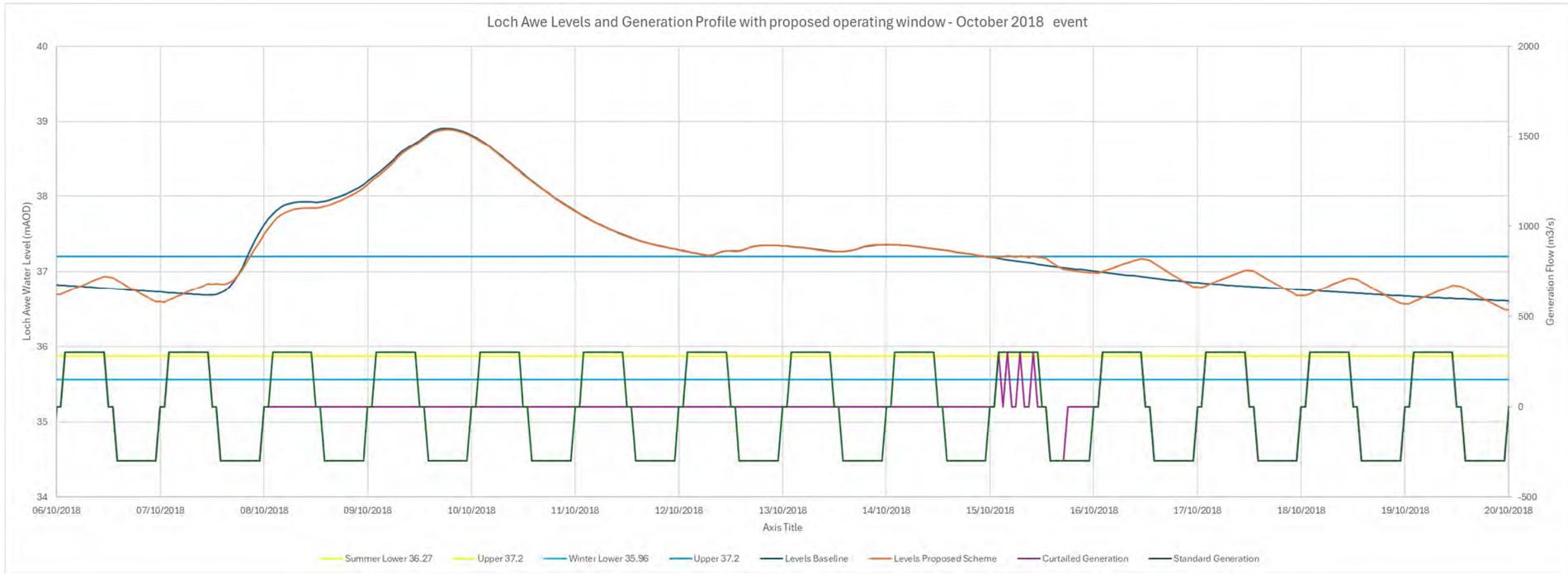
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Q(91)	0.006	0.009	0.008	0.01	0.007	0.004	0.004	0.004	0.005	0.007	0.01	0.011	0.009
Q(92)	0.006	0.009	0.007	0.01	0.007	0.004	0.004	0.004	0.005	0.006	0.009	0.011	0.008
Q(93)	0.005	0.008	0.007	0.009	0.006	0.004	0.003	0.004	0.005	0.006	0.009	0.01	0.008
Q(94)	0.005	0.008	0.006	0.009	0.006	0.004	0.003	0.004	0.004	0.005	0.008	0.009	0.007
Q(95)	0.005	0.007	0.006	0.008	0.005	0.003	0.003	0.003	0.004	0.005	0.007	0.009	0.007
Q(96)	0.004	0.006	0.006	0.008	0.005	0.003	0.003	0.003	0.004	0.004	0.007	0.008	0.006
Q(97)	0.004	0.005	0.005	0.007	0.004	0.003	0.002	0.003	0.003	0.004	0.006	0.007	0.005
Q(98)	0.003	0.005	0.005	0.006	0.004	0.002	0.002	0.003	0.003	0.004	0.006	0.006	0.005
Q(99)	0.002	0.004	0.004	0.004	0.003	0.002	0.002	0.002	0.003	0.003	0.005	0.005	0.004
Q(99.9)	0.002	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.004	0.003

Appendix B Water Balance Model

Flood Events



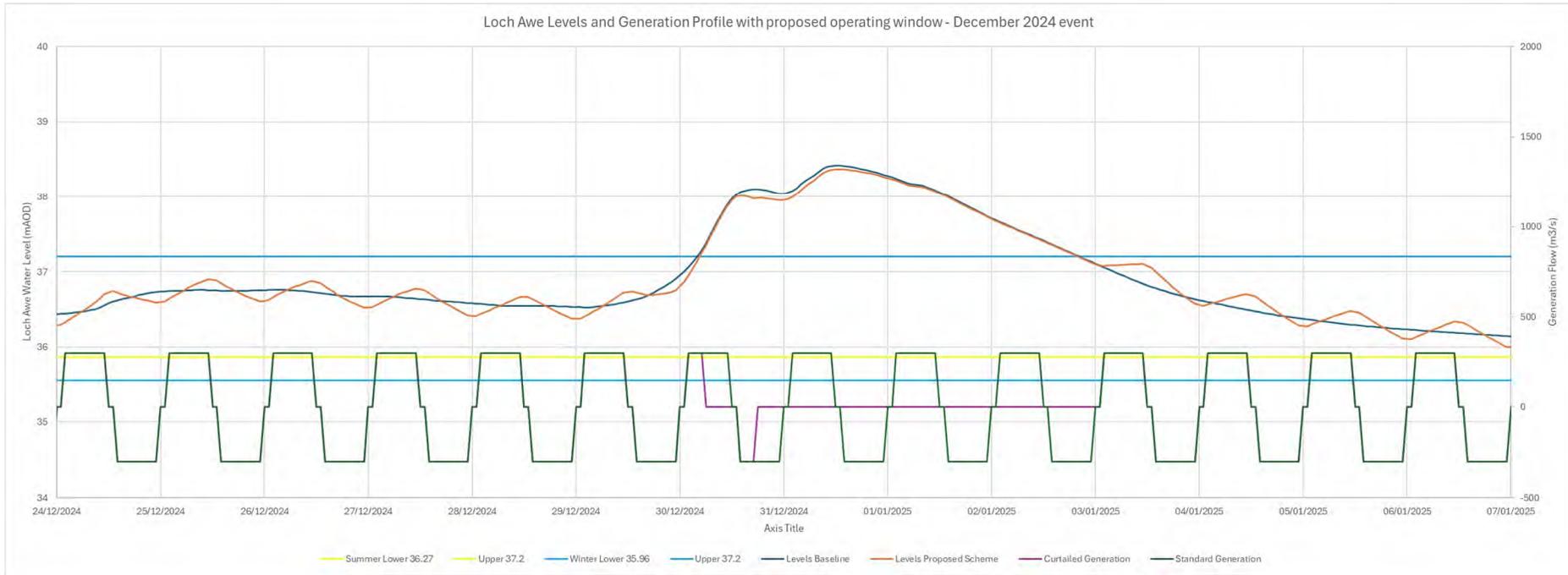




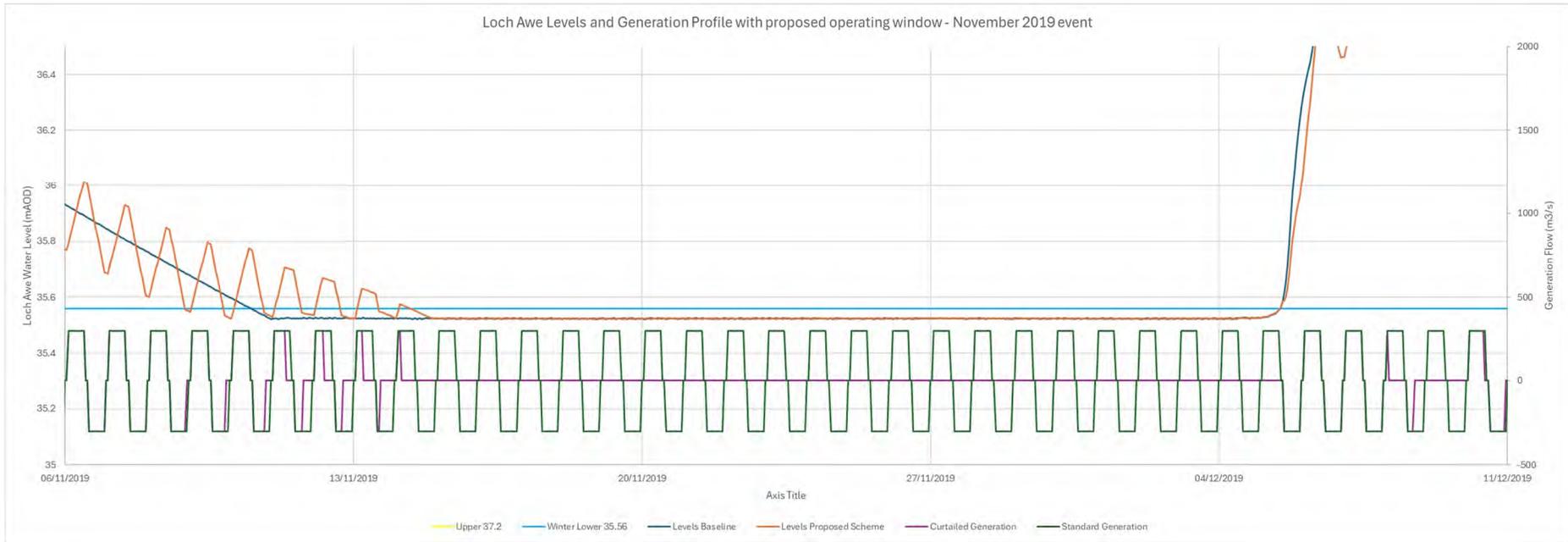
Balliemeanoch Pumped Storage Hydro



Balliemeanoch Pumped Storage Hydro

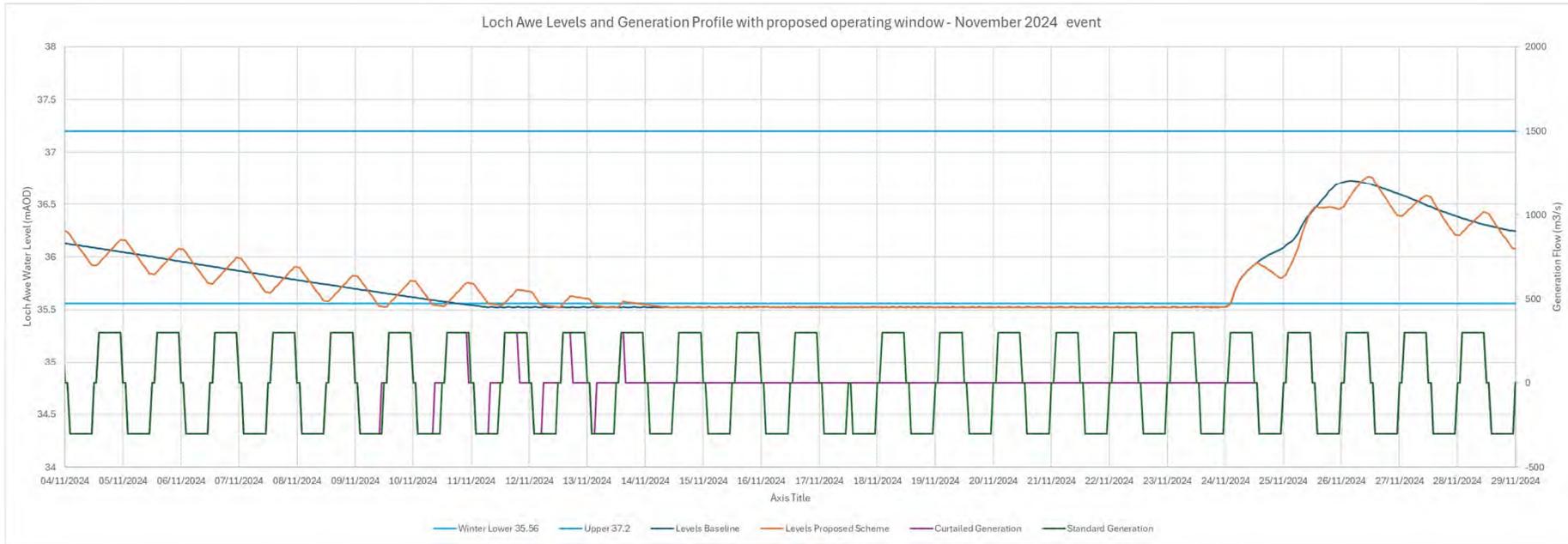


Drought Events

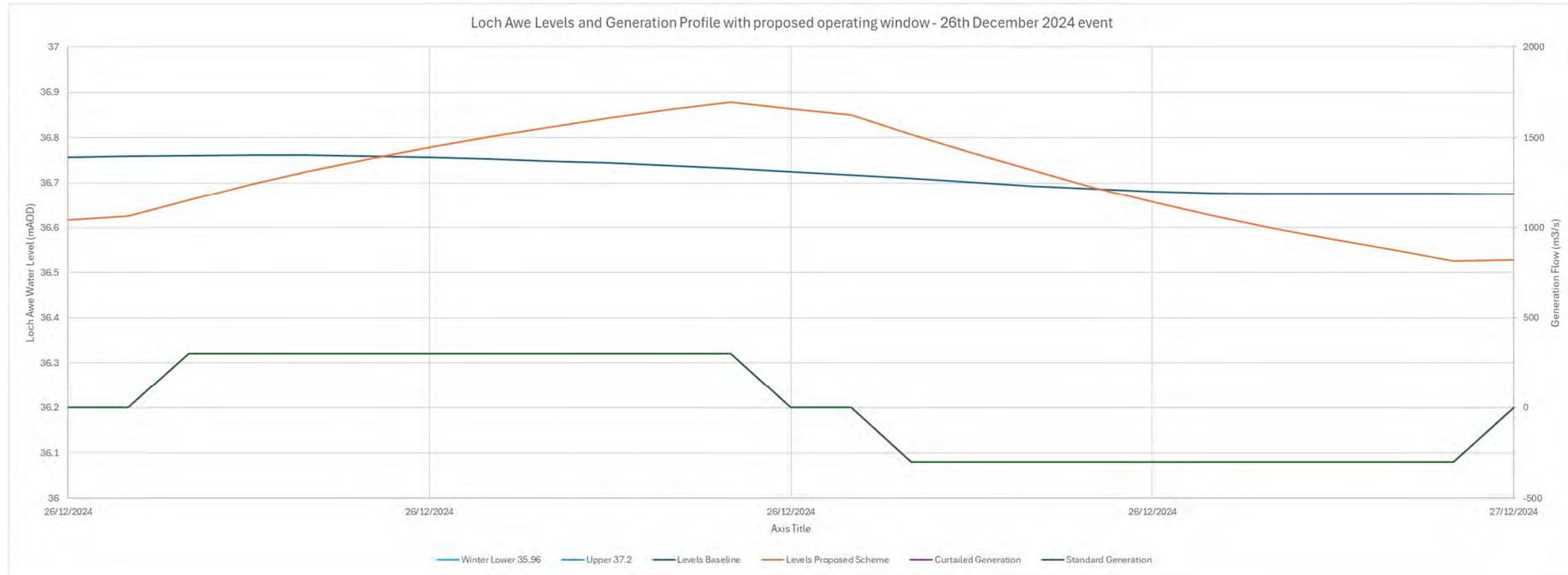




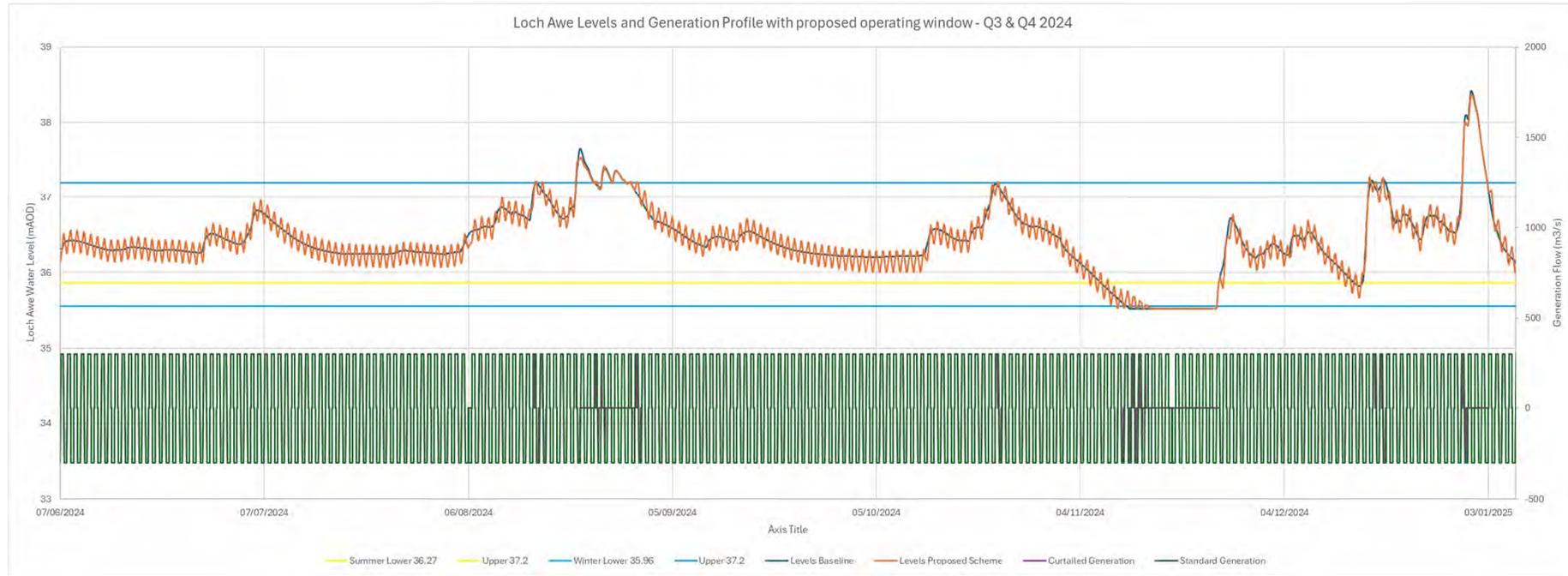
Balliemanoch Pumped Storage Hydro



Short Term Impact showing rate of change



Long Term Assessment (6 months)



Appendix C Outline Construction Environmental Management Plan from EIA (ECU00003444)

Balliemeanoch Pumped Storage Hydro

Environmental Impact Assessment
Report

Volume 5: Appendices
Appendix 3.1: Construction
Environmental Management Plan
(CEMP)

ILI (Borders PSH) Ltd

July 2024

Quality information

Prepared by

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Graduate Environmental
Consultant

Checked by

[Redacted]

Principal Environmental
Scientist

Verified by

[Redacted]

Renewables & Energy
Transition Practice Lead

Approved by

[Redacted]

Technical Director –
Renewable Energy

Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	July 2024	Submission	[Redacted]	[Redacted]	Technical Director

Distribution List

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1. Introduction

1.1 Background

Intelligent Land Investments (ILI) (Borders PSH) Ltd (hereafter referred to as the 'Applicant') are currently seeking consent under Section 36 of the Electricity Act 1989 (the 'Act') to construct and operate a pumped storage hydro scheme (PSH) to be known as the Balliemanoach Pumped Storage Hydro (referred to throughout as the 'Development'). As the Development comprises an electricity generating station with a capacity of more than 50 MW, it is required to be determined by the Scottish Government in accordance with the provisions of Section 36 of the Electricity Act 1989, as amended. The Scottish Ministers will also be requested to give a direction for planning permission to be deemed granted under Section 57(2) of the Town and Country Planning (Scotland) Act 1997.

This Outline Construction Environmental Management Plan (CEMP) is being produced to accompany the Section 36 application. The objective of this CEMP is to provide information on how potential environmental impacts will be avoided, managed and/or minimised. It is designed to ensure that the requirements of legislation, the Section 36 application, the accompanying environmental information and good practice guidance are complied with.

The Outline CEMP will be updated and finalised post consent in line with any relevant planning condition and in agreement with Argyll & Bute Council (ABC), NatureScot and Scottish Environment Protection Agency (SEPA).

The CEMP will form part of the induction which is mandatory for all employees, contractors and visitors attending the Site. All employees and Construction Contractors shall familiarise themselves with the content of this CEMP.

There are several other topic-specific Management Plans which have been prepared for this Development, and therefore should be read in conjunction with this CEMP.

The CEMP will be subject to continual review to address, for example:

- Any conditions stipulated in the Section 36 Consent;
- To ensure it reflects good practice during construction;
- To ensure it incorporates the findings of any pre-construction site investigation and surveys; and
- To accommodate the working practices of the appointed Construction Contractor(s).

It is intended that this CEMP should continue to be viewed as a live document to be updated and agreed post consent to include all final method statements and policies from the Construction Contractor.

1.2 Structure of this Outline CEMP

Section 2: Construction Environmental Management Plan, covering:

- Safety
- Security
- Construction Site Housekeeping
- Pre-Construction Enabling Works & Construction Compounds
- Welfare Facilities
- Workers Accommodation
- Crane Arcs
- Movement and Storage of Material
- Piling
- Timing of Works
- Working Hours

- Lighting

Section 3: Environmental Policies, Roles and Communication

- Environmental Policy and Management Systems
- Roles and Responsibilities
- Communication
- Environmental Training and Awareness

Section 4: Monitoring & Auditing

- Complaints Procedure
- Environmental Incident and Corrective Action Reporting
- Inspections and Audits
- Environmental Monitoring

Section 5: Topic Specific Management Plans. In addition to the above, this Outline CEMP includes the following topic-specific Environmental Management Plans which have not been duplicated within this Outline CEMP but will be included within the Contractors CEMP:

Table 1: Table of Topic Specific Management Plans

Management Plan	Status	Reference
Outline Landscape and Ecology Mitigation Plan (LEMP)	Draft	Appendix 5.4 (Volume 5 Appendices)
Forestry Waste	Outline	Appendix 5.5 (Volume 5 Appendices)
Material Management Appraisal (MMA)	Draft	Appendix 10.1 (Volume 5 Appendices)
Outline Peat Management Plan	Draft	Appendix 10.2 (Volume 5 Appendices)
Outline Surface Water Management Plan	Draft	Appendix 11.5 (Volume 5 Appendices)
Framework Construction Traffic Management Plan (CTMP)	Draft	Appendix 14.1 (Volume 5 Appendices)
Outline Access Management Plan	Draft	Appendix 16.1 (Volume 5 Appendices)
Outline Housing Strategy	Draft	Appendix 16.2 (Volume 5 Appendices)
Outline Construction Noise Management Plan	Outline in CEMP	Section 5.2
Emergency Response & Flood Risk Management Plan	Outline in CEMP	Section 5.3
Waste Management Plan	Outline in CEMP	Section 5.4
Outline Dust Management Plan	Outline in CEMP	Section 5.6
Outline Ecological Management Plan	Outline in CEMP	Section 5.7
Outline Biosecurity Management Plan	Outline in CEMP	Section 5.8
Outline Pollution Prevention Plan	Outline in CEMP	Section 5.9
Outline Landscape Working Methods	Outline in CEMP	Section 5.10

All the Management Plans, which are labelled as Draft, are provided as separate appendices to the EIAR and can be found in Volume 5 Appendices as listed above. All Management Plans which are "Outline in CEMP" have their minimum contents outlined in *Section 5 Topic Specific Management Plans* of this document.

2. Construction Environmental Management Plan

2.1 Introduction

This document has been prepared to comply with the requirements of Section 36 of the Electricity Act 1989.

All mitigation measures which have been outlined in the Environmental Impact Assessment Report (EIAR), and additional measures proposed in other Management Plans, submitted as part of the Section 36 application, have been outlined in the Schedule of Mitigation.

This document sets out the minimum standards to be adopted when constructing the Development. It also provides information about the associated Management Plans which should be read in conjunction with this CEMP.

The objective of this CEMP is to provide initial information on how potential construction stage environmental impacts are to be minimised. The document provides minimum requirements and measures to be implemented rather than construction detail, as the Construction Contractor has not yet been appointed. Once a Construction Contractor is in place the CEMP will be updated, finalised and submitted to ABC for their approval in consultation with NatureScot and SEPA, in addition any other relevant consultee.

The CEMP is designed to ensure compliance with environmental legislation, committed construction stage mitigation as reported in the EIA Report (EIAR), mitigation developed within the topic-specific management plans and the Construction Contractors own environmental policies.

The CEMP will remain a live document throughout the construction phase and will be regularly reviewed to take into account additional environmental information encountered during the construction phases; however, at all times the minimum standards identified in the CEMP will be complied with.

All personnel and sub-contractors working on the Development will perform their duties in accordance with the requirements of the CEMP. The Environmental Manager will report regularly to the Project Manager on the status and effectiveness of its implementation.

2.2 Safety

Site specific risk assessments and method statements will be undertaken in accordance with the applicable legislation prior to the commencement of construction activities; to identify any potential risks, assess their likelihood and significance, and to identify mitigation measures to be implemented to ensure the safety of workers and the general public.

Site security during the construction phase will be strict. Access to the site will be prevented by the use of temporary fencing to prevent unauthorised access. Compounds for the temporary storage of equipment or materials will be provided. These will be locked with restricted access. Security staff will be utilised as appropriate.

The Applicant will ensure that adequate arrangements are in place for the discharge of all duties under the Construction (Design and Management) Regulations 2015 (CDM).

A Health and Safety Plan (HASP) will be prepared by the Construction Contractor which will set out how all health and safety matters on site are to be managed and how risks are to be identified and managed in accordance with current good practice and legal requirements.

All vessels will follow the International Regulations for Preventing Collisions at Sea 1972 (COLREGS) and International Convention for the Safety of Life at Sea 1974 (SOLAS).

Marine coordination (e.g., the preparation of a Vessel Management Plan) and communication will be used to manage project vessel movements and minimise impact on other vessels. This will include the timing of vessel movements to not interfere with scheduled ferries and other known vessel movements.

As the jetty piles would remain partially visible above lower water levels, this may present a potential navigation hazard and therefore will require suitable marker(s).

2.3 Security

A Permit to Work system (or equivalent) will be introduced during construction to ensure that only authorised construction personnel are allowed within the construction area and that an accurate record of site-based personnel is available in case of emergency.

The Construction Contractor will ensure that the construction sites are secure. Access to the Development will be limited to specified entry points only and all personnel entries and exits will be recorded and monitored for both security and health and safety purposes.

Visitors to the Development site during construction will be required to report to the construction reception office (location to be confirmed) and will only be permitted to access the construction area under escort by appropriately authorised staff or following successful completion of specific safety induction / training.

All working areas will be appropriately fenced off from members of the public and to prevent animals from straying onto working areas.

2.4 Construction Site Housekeeping

Good construction site housekeeping practice will be applied at all times. As far as reasonably practicable the layout of the site will be designed using the following principles:

- All work areas will be secured;
- Any fuels or liquid materials will be stored and banded in compliance with the relevant regulation;
- Signage and boundary fences, where required, will be regularly inspected, repaired and replaced as necessary;
- All working areas will be kept in a clean and tidy condition;
- Wheel washing and dust suppression facilities will be provided when and where required;
- All practicable measures will be taken to minimise the risk of fire and the Contractor will comply with the requirements of the local fire authority;
- Waste will be removed at frequent intervals;
- Construction waste susceptible to spreading by wind or liable to cause litter will be stored in secure containers.
- The Construction Contractor shall take all necessary precautions as are reasonably practicable to prevent the occurrence of smoke emissions or fumes from site plant or stored fuel oils for safety reasons and to prevent, as far as is reasonably practicable, such emissions or fumes drifting into residential areas, nearby workplaces or areas of public open space. In particular:
 - Plant shall be well maintained, regularly serviced and measures taken to ensure that engines are not left running for long periods when not directly in use.
 - Plant which emits visible emissions after warm-up shall be taken out of service either repaired or replaced.
 - Vehicle exhausts should be directed away from the ground and other surfaces and preferably upwards to avoid road dust being re-suspended to the air and should be positioned at a sufficient height to ensure adequate local dispersal of emissions.
- The Construction Contractor will ensure that all construction vehicles will conform to at least Euro 4 emissions standards.
- Under the Clean Air Act (1993), open fires will be avoided on site.
- To minimise the production of black smoke particles minimum acceptable temperatures will be used e.g. when heating bitumen, avoiding heating with open flame burners where possible. Pots or tanks containing hot bitumen will be covered.

- All works, at all phases of development, will be undertaken in accordance with SEPA Pollution Prevention Guidelines¹ (PPG) and Guidance on Pollution Prevention (GPP) (which will ultimately replace PPGs). Further detail can be found within the Outline Surface Water Management Plan (Appendix 11.5 Outline Surface Water Management Plan).

2.5 Pre-Construction Enabling Works & Construction Compounds

Prior to any enabling or pre-construction works, no topsoil or subsoil stripping should be undertaken without the written permission of ABC in consultation with the appropriate stakeholders. This should include details of any storage of materials and locations of construction access tracks.

All groundworks, clearing land and reprofiling will take into consideration the Guidance contained within SEPAs Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Construction Sites (September 2021), which provides guidance on the application of environmental standards and good management practice techniques in relation to large scale construction sites and pollution control.

No access tracks should be located on unstripped vegetation or ground.

The Construction Compounds will meet standard good management practices which include but are not limited to:

- New permanent infrastructure or temporary compounds will align with distances from watercourses as per SEPA advice, being 50 m wherever possible;
- Bunds will be used where required to meet the requirements of the SEPA pollution prevention guidelines and oil storage regulations;
- Adequate parking will be provided to ensure that the safety and efficient operation of the public highway is not reduced;
- Welfare facilities will be provided to minimise the need for offsite trips by staff during the working day;
- Compound design and layout will ensure that dust emission sources are located away from sensitive receptors; and
- If compound lighting is required, it will be designed to minimise light pollution to the surrounding area.

2.6 Welfare Facilities

Workers' Safety Information Sheets and control of substances hazardous to health (COSHH) safety data sheets will be kept on site.

Where portable generators are used, industry good practice will be followed to minimise noise and pollution from such generators in addition to any measures outlined in *Section 5.2* of this document.

Temporary welfare facilities will be provided onsite during pre-construction, construction and demobilisation. These will be located at an appropriate distance from sensitive receptors such watercourses or residential properties. Prior to construction, the Construction Contractor will prepare the arrangements for welfare provision and will be responsible for the maintenance of the facilities throughout the construction of the Development. The nature and scale of facilities required will be in proportion to the size and location of the Development. Facilities will include:

- Toilets;
- Washing facilities;
- Drinking water;
- Changing rooms, drying rooms and lockers;
- Facilities for rest; and
- Canteen and kitchen facilities

¹ <https://www.sepa.org.uk/regulations/pollution-prevention-and-control/guidance/> [accessed: 20/02/2024]

All foul waste will be disposed of by an appropriate contractor to a suitably licenced facility. There is no likely connection available to foul sewer. 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 licenced waste facility.

The risk of infestation by pests or vermin will be minimised by the appropriate collection, storage and regular collection of waste, the prompt treatment of any pest infestation and effective preventative pest control measures.

Wastewater facilities will be arranged with appropriate sewerage provisions included within these facilities and all necessary consents obtained from ABC and SEPA.

The welfare and other facilities required for the personnel will be located within temporary compound 08. For some critical path activities where 24-hour working is required, it is anticipated that on-site accommodation facilities will be required for a small proportion of the workforce.

2.7 Workers Accommodation

As noted in *Section 1.2 Structure of this Outline CEMP*, an Outline Housing Strategy (Appendix 16.2, Volume 5 Appendices) demonstrates a range of plausible options for accommodating construction workers employed by the Development during the seven year construction period of the project. These options can then be developed into a detailed strategy with specific housing options that would be acceptable to ABC and meet the operational requirements of the scheme. It is anticipated that a requirement for a detailed Workers Housing Strategy will be a condition of any Deemed Planning Consent issued in relation to the project.

It is considered that a range of feasible options and locations exist for the provision of workers' housing. These include either a single site or an appropriate mix of housing options and location, examples include:

- Hybrid solution 1: small scale development of new homes at Inveraray (plus potentially other sites), small scale permanent in-migration of workers to existing settlements (limited to avoid significant impacts on housing supply for residents), use of some low season hotel capacity plus the development of temporary accommodation in a satellite settlement with shuttle bus service.
- Hybrid solution 2: small scale development of new homes at Inveraray, small scale permanent in-migration of workers to existing settlements, location of workers in 60 minute towns in existing housing/accommodation with transport provided from a park and ride in same town. Park and ride can be used by those living there as well as those travelling in from further afield e.g. Glasgow.
- Temporary Workers' Compound: A self-contained compound would allow all accommodation to be accommodate on a single site or split between a number of sites. This option would allow housing to be located in proximity to the Development, but would require additional facilities and local transport links, particularly if remote from surrounding settlements.
- Additional Options: The use of very low capacity or vacant hotels, such as the Dalmally Hotel, or other suitable commercial buildings may provide an option for adaption into worker housing. Visitor accommodation has been identified as having some capacity throughout the year. Further engagement with the visitor accommodation sector is required.

Further details can be found within *Appendix 16.2 Outline Housing Strategy* (Volume 5 Appendices).

2.8 Crane ARCs

Crane ARCs (active rotation control) will be confined within the construction areas and cranes will be operated in accordance with the requirements of BS 7121, Code of Practice for Safe Use of Cranes.

2.9 Movement and Storage of Material

Approximately 20,010,000 m³ of excavated material (bulked) will be generated by the Development, with a significant proportion of this to be reused within the Development. Details of anticipated material volumes can be found within the Material Management Appraisal (Appendix 10.1, Volume 5 Appendices). In order to demonstrate reuse and resourcing of the excavated material, a Materials Management Plan will be prepared to audit and record the movements of materials, as identified in the MMA.

Good practice measures for movement and storage of materials in relation to dust are provided in the Outline Dust Management Plan in Section 5.6 of this CEMP.

Movement and storage of materials is also covered with relation to protection of water from sediment laden run-off in the *Outline Surface Water Management Plan (Appendix 11.5, Volume 5 Appendices)*.

2.10 Piling

Works will adhere to the following measures to minimise effects of piling activities on the surrounding environment and receptors by:

- The installation of the piles during the construction of the jetty will be undertaken using vibratory piling wherever possible and impact piling only used where necessary to drive the pile toe into bedrock;
- Where impact piling is required, a quieter diesel hammer piling rig will be selected where feasible;
- Enclosure of hammer head with acoustic screen, use a resilient pad between pile and hammer head, use of sound reduction equipment, exhausts or screens on power units and base machine where possible;
- Following the appointment of a construction contractor a specific mitigation plan for temporary jetty construction would be implemented as part of the contractors CEMP;
- Where impact piling is used the project will follow the JNCC guidance to minimise the risk of injury to marine mammals (JNCC, 2010);
- Piling activities within Loch Fyne will cease on MoD trial days for circa 12 days per year with dates to be agreed with the appointed Construction contractor who will maintain in contact with the MoD throughout construction as required.

2.11 Timing of Works

Works will be phased to minimise effects on the surrounding environment and local communities by:

- Avoiding any noisy critical path activities such as no blasting to take place within 1.5 km of any active golden eagle nests during breeding season (subject to on-going monitoring of breeding attempt) to minimise ecological effects;
- Scheduling construction activities to minimise the area and period of time that soil will be exposed, particularly during wetter periods;
- Timing soil handling and overburden stripping to suit weather conditions;
- Adherence to standard construction working hours, i.e. 0700 hours – 1900 hours weekdays and 0800 hours – 1300 hours Saturdays, although this may be extended to 19.00 at critical path construction phases, with no working on Sundays or Bank Holidays (including site deliveries) unless agreed in advance with ABC.
- Timing noise, vibration and dust producing activities to avoid key sensitive times most disturbing to the local residential and noise sensitive receptors within and close to the Development Site;
- Avoidance of ground blasting in the early morning, late afternoon or evening. The local community will be given advance notice prior to any blasting.
- Drill and Blast for use of tunnel excavation could be a 24-hour operation, the anticipated blast cycle could be up to two blasts per 24 hours;
- Timing of works to avoid negatively impacting upon proposed felling plans for the forestry;
- Timing of forestry operations to avoid disturbance to wildlife present on the Development;
- Construction traffic will be managed via the requirements of the Construction Traffic Management Plan (CTMP) and will be employed to ensure that deliveries and plant movement occur at set times, avoiding peak periods. A framework CTMP is contained within *Appendix 14.1 Transport Assessment Report (Volume 5 Appendices)*. The final CTMP will be finalised following consultation with Police Scotland, ABC and Transport Scotland;
- Clyde Cruising Club and other local boat clubs will also be informed of the intended construction start date by the appointed contractor two months prior to construction commencing;

Further details can be found within Chapter 9 Ornithology, Chapter 16 Socio-economics and Tourism and Chapter 15 Noise and Vibration of the EIAR (Volume 2 Main Report)

2.12 Working Hours

Construction is expected to last up to 7 years including the pre-construction works. The construction work is anticipated to peak within Q3 year two to Q3 year three as the tunnelling construction and the Headpond construction are the two biggest operations and they are sequenced in parallel.

The tunnelling work is expected to be a 24 hour operation. Further details on timing and sequencing of activities can be found within Chapter 2 of the EIAR (Volume 2 Main Report).

Other than underground excavation and blasting works, construction activities will be limited to 0700 – 1900 Monday to Friday and 0700 – 1300 on Saturday, although this may be extended to 1900 at critical path construction phases, and at no time on Sundays and Bank Holidays. Any deviation from these working hours will be agreed with ABC in advance of the works being undertaken (where possible).

2.13 Lighting

At night and during periods of darkness, directional security lighting will be used. Lighting will be selected and sited so as to minimise visual intrusion to local communities, whilst maintaining the safe and efficient operation of the Development. The lighting will only be used when needed rather than dusk to dawn.

Site lighting will be positioned and directed to minimise nuisance to residents, walkers and vehicle drivers.

Where lighting is necessary, appropriate low glare lighting will be used to minimise the impact of lighting on ecological receptors, including nocturnal species. Lighting will be designed to minimise spillage into surrounding habitats to avoid disturbance to wildlife.

Lighting columns will be required for operating the marine facility in low light conditions, which should especially be considered if the lifting operations have tidal restrictions. Column height will be determined by the lighting design but can be up to 10 m tall.

3. Environmental Policies, Roles and Communication

3.1 Environmental Policy and Management System

The Construction Contractor will ensure that copies of their environmental policies are clearly displayed on site notice boards during the construction period. All employees are expected to comply with the requirements of the Environmental Policy and the requirements of the Environmental Management System (EMS) under a suitable accreditation such as ISO14001.

The Applicant and its Construction Contractor expects its employees and support staff (contractors, sub-contractors, suppliers etc.) to actively promote and administer a strong environmental culture. To achieve this, a number of initiatives will be implemented during the construction phase from day one. This will include the use of environmental inductions, poster campaigns to raise awareness of topical subjects (such as seasonal activities and timings) and toolbox talks involving all members of the project team and site workforce.

As part of the EMS for the site, a Project Environmental File (PEF) will be maintained. Within this PEF, a legislation register will be stored which will be reviewed periodically and updated as necessary. Any changes to relevant environmental legislation will be disseminated to project management immediately, after which the method statements of any affected construction activities will be amended as necessary.

Consents and Licences

A register of required consents and licences will be held in the PEF, including the relevant reference numbers and responsible / named competent persons.

Schedule of Mitigation

A schedule of all mitigation measures or commitments to be complied with will be kept by the Applicant and their Construction Contractor. This schedule will detail the mitigation measure or commitment, its securing mechanism and relevant management plan (if appropriate), method and timing of implementation and responsibility. This will be maintained throughout the construction phase.

3.2 Roles and Responsibilities

Project Manager

A Project Manager will be appointed as part of the Applicant's or Construction Contractor's team and shall have overall responsibility for the management of the construction phase. In terms of environmental protection and implementation of this CEMP, they will be responsible for:

- Appointing the Project Environmental Manager / Environmental Clerk of Works (EcoW);
- Appointing the Environmental Liaison Officer (ELO);
- Appointing any other environmental support staff such as clerk of works for specific ecological watching briefs or archaeological works; and
- The Project Manager will also programme any required pre-construction surveys into the construction schedule. These will then be the responsibility of the Environmental Manager / EcoW.

The Project Manager will also progress any discharge of conditions, especially those that require access agreements to be in place to allow for pre-commencement sampling or surveying to be undertaken. This includes private water supplies.

The Applicant and Construction Contractor will ensure that a suitable, independent person with appropriate knowledge and experience of similar scale or type of projects will be employed.

Environmental Manager

The Environmental Manager will be specifically appointed for this Development to assist the Project Manager and the role may be shared between more than one person. The Environmental Manager will be responsible for the following:

Ensuring all required consents are in place before work starts and compliance with consents;

- Ensuring that all mitigation measures and commitments are implemented properly and effectively;
- Undertake and / or organise any required pre-construction surveys, baseline surveys or samples as required, and continue with any monitoring to be undertaken during construction as required;
- Supervision of construction processes with potential for environmental consequences such as dredging (e.g. fish to be encountered during the works).and installation of temporary site drainage;
- Ensuring compliance with the topic-specific Management Plans by undertaking spot checks such as audits on the timing of Heavy Goods Vehicles (HGVs) and abnormal load deliveries, speed checks on the approach to site and along access tracks throughout the site, observations of works in sensitive areas (if not already undertaken by a specific Environmental Clerk of Works (EcoW));
- Maintaining the consents register and also the schedule of mitigation with the ELO (see Section 0 below);
- Undertake weekly audits / site checks and is responsible for supervising refuelling of tanks and bowsers;
- Ensuring environmental and waste requirements are included on requisitions and in subcontracts and orders;
- Ensuring oil, including diesel, is stored in properly bunded tanks / drip trays;
- Reporting incidents and non-conformances to the Project Manager and relevant stakeholders in line with the reporting procedure of this CEMP;
- Including environmental performance, review of contract objectives and targets (including environmental), review of Incidents and non-conformances at the contract review meetings;
- Ensuring employees and subcontractors implement the controls outlined in the finalised and approved CEMP and any other appropriate plans, mitigation measures or commitments;
- Ensuring employees and subcontractors receive induction training (including project environmental issues) and toolbox talks, as appropriate;
- Ensuring personnel needed for audits are available when required;
- Verifying actions resulting from corrective action requests and Observations raised during audits are completed by the deadlines;
- Liaising and working with the ELO to ensure that construction programme is effectively communicated;
- Ensuring environmental training is provided; and
- Ensuring all preconstruction checks and surveys are undertaken.

The Environmental Manager would also be responsible for coordinating and managing a marine mammal observer (MMO) during construction of the marine facility at Inveraray.

Environmental / Ecological Clerk of Work (EcoW)

The Environmental Manager will be assisted by Environmental / Ecological Clerk of Works for specific tasks where subject matter experts are required, such as archaeological watching briefs for works within Inveraray Castle and the associated Parks and Gardens, or where a specific skill set or license for a European Protected Species (EPS) is required, such as for potential disturbance to otters.

These are likely to comprise of several specific roles and will be required at various periods during the full construction phase.

The EcoWs will be led by the Environmental Manager.

Environmental Liaison Officer (ELO)

The primary objective of the ELO will be set up the Project Liaison Group and also to act as the main point of contact between the:

- Construction Contractor;
- the Applicant;
- Regulators such as ABC, SEPA and Naturescot and others;
- Local communities;
- Community Councils (CC) such Inveraray CC, Glenorchy & Innishail CC, Avich & Kilchrenan CC, Furnace CC, Dunadd CC, West Lochfyne CC, and Taynuilt CC; and
- The public and visitors to the area.

They will be the focal point for queries, comment and questions on project progress meetings, reporting and also communication on critical activities of the Development. This will include communicating when pre-construction works are likely to commence and then keeping the local communities and stakeholders aware of the continuing activities which will occur during the construction phase including regular updates on progress.

The ELO will specifically communicate the following construction activities to local communities (please note this list is not exhaustive):

- Works which involve the loss or temporary replacement of access (for example road diversions and the recreational routes);
- Works adjacent or within key sensitive areas such as watercourses and bodies including Loch Awe and Loch Fyne;
- Periods when higher levels of noise may occur during specific operations including blasting;
- Temporary closures of recreational routes and roads such as the temporary diversion of B840 which is proposed to be temporarily realigned during construction;
- Traffic management to be introduced on the A83 Lochgilphead road link at the proposed jetty, to support the delivery of plant or abnormal loads via Loch Fyne utilising the temporary Marine Facility at Inveraray;
- Progress / compliance with mitigation measures and reporting;
- Progress of any ordnance management;
- Notification of monitoring at relevant locations, including requests for permission to access third party land or property where there is a monitoring or sampling point; and
- Changes in working hours.

Once the Construction Contractor is appointed and the construction programme confirmed, the ELO will communicate this programme to the community and facilitate meetings as required. The ELO will chair the Project Liaison Group, which is outlined more in Section 3.4.

The ELO will ensure that records of communication (including verbal communication) are kept, and that regular reporting is provided to ABC, SEPA and Naturescot and also to the local communities.

It is expected that the Environmental Manager / EcoW will work very closely with the ELO.

Working with the Environmental Manager / Clerk of Works, the ELO will also be responsible for identifying private water supplies, both for existing and additional properties, and investigating any which may not have responded to previous communication.

All Staff

All site staff have a responsibility to the environment, responsibilities include but are not limited to:

- In the case of an incident, stopping work, implementing control procedures and reporting it to the Project Manager;
- Contacting the Environmental Manager / EcoW when waste needs collecting;

- Passing any queries or correspondence on environmental issues to the site manager;
- Working in accordance with the finalised and approved CEMP and associated management plans; and
- Compliance with consents.

3.3 Communication

Internal Meetings & Communication

Weekly internal construction meetings shall be held during the construction phase.

These meetings shall include Health, Safety and Environmental matters and shall be attended by the Environmental Manager / EcoW. Any issues resulting from daily or weekly audits shall be discussed with appropriate corrective actions agreed. A 'weekly look ahead' shall be provided at the construction meeting where any environmental constraints or special requirements can be discussed and agreed in advance.

The Environmental Manager / EcoW shall attend daily construction briefings alongside the Project Manager as required to ensure personnel are advised of any specific environmental requirements and constraints. The ELO will also attend for any critical path or construction activities which have the potential to affect the local community and need to be communicated.

Environmental performance meetings will be arranged as necessary. These meetings will be attended as appropriate by the Environmental Manager / EcoW, Project Manager and representatives of the workforce. Notes of the meetings will be distributed and shall assist in the environmental management of the Development.

Site Environmental Notice Boards will display the Environmental Policy of the Applicant and the Construction Contractor, Emergency Contacts List, relevant statutory and non-statutory advice and guidance; and any other relevant information. These Environmental Notice Boards will be situated in prominent positions in the main reception area of the Development construction office.

External Meetings

The ELO will arrange and attend meetings with relevant statutory bodies as necessary together with the Environmental Manager / EcoW.

Project Liaison Group

The ELO will be responsible for chairing a Project Liaison Group (PLG) and communicating information on the programme of construction activities. The Group will likely include representatives from the following parties:

- ABC;
- SEPA;
- Naturescot; and
- Community Councils (CC) such Inveraray CC , Glenorchy & Innishail CC, Avich & Kilchrenan CC, Furnace CC, Dunadd CC, West Lochfyne CC, and Taynuilt CC.

All parties will be invited although it is likely that ABC, SEPA, Naturescot and local communities will likely form the core group participants, with other stakeholders attending when relevant.

The PLG will meet on a regular basis but at least once a month during critical path activities such as start of enabling works, commencement of construction, blasting activities and works in Loch Awe and Loch Fyne and other waterbodies.

3.4 Environmental Training and Awareness

Inductions

All project personnel and sub-contractors will receive an Environmental Induction. No personnel, including sub-contractors, will be permitted to undertake any work on site without undertaking a site induction. The site induction will evolve to reflect changes in the CEMP as the project develops. Environmental topics covered in the induction shall include, but will not be limited to:

- Water Resources;
- Pollution Prevention;
- Emergency Response Procedures;
- Waste Management and Housekeeping;
- Management Structure;
- Duties and Responsibilities;
- Relevant Procedures;
- Terrestrial, aquatic and marine Ecologically and Ornithological Sensitive Areas and Times;
- Incident and non-conformance Reporting;
- Consents and Licenses and compliance;
- Legislation; and
- Environmental Good Practice.

Toolbox Talks

Toolbox talks (TBT) on specialised topics shall supplement the induction course. Toolbox talks shall be used to highlight issues of concern and to disseminate any new information or responsibilities. They will also be used as a means of providing basic environmental training to crews on a specialised topic, e.g. water management. The TBT also offer site personnel the opportunity to provide feedback.

TBTs would be provided routinely, but also when:

- There is a change to existing legislation, which requires an operational change;
- Site inspections or audits have identified corrective actions which require rolling out;
- Work is being undertaken in particularly sensitive areas; and
- There are significant changes in Environmental conditions, e.g. heavy rainfall.

Records of all TBTs undertaken, including attendance, will be kept in the PEF.

Specialist Training

Specialist training for specific members of the construction crews will be provided as required. This may include, but will not be limited to:

- Emergency Environmental Crews;
- Confined spaces;
- Working at height;
- Water management;
- Waste Representatives;
- Working near and in water; and
- Fuel Tanker Drivers and Refuellers.

4. Monitoring & Auditing

4.1 Introduction

Monitoring of the environmental effects and inspections during construction enable the effectiveness of environmental mitigation to be evaluated and also allow unforeseen environmental problems to be identified and responded to at an early stage. Monitoring and inspections/audits may also help the Applicant and the Construction Contractor to identify and implement environmental enhancement and improvements, which may contribute to the overall environmental performance of the project.

4.2 Complaints Procedure

The Construction Contractor will provide details (postal details and email address) to which all written complaints should be addressed. All complaints will be addressed by the ELO.

The Applicant will ensure that a system is introduced for the logging and recording of any complaints that will be collated and a copy made available to the Construction Contractor, ELO and the relevant department of ABC. Any complaints received will be acknowledged within 24 hours during all hours when works, including deliveries, are taking place. The ELO shall ensure that all complaints receive a written response, to include details of any action undertaken if such action is deemed appropriate. The ELO shall provide the Applicant with a monthly report that details all complaints, who they were filed by, and the actions taken.

4.3 Environmental Incident and Corrective Action Reporting

All environmental incidents and near misses shall be reported and investigated by the Construction Contractor, reporting to the Applicant. Incidents will be recorded and those that, in the judgement of the Environmental Manager / EcoW, are deemed significant, will be reported to the Project Manager as soon as possible who shall inform the Applicant. Where relevant, the appropriate statutory authority (e.g. Naturescot or SEPA) shall be informed immediately. Copies of incident investigation reports shall be supplied by the Construction Contractor to the Applicant and action taken to prevent recurrence.

All corrective action, incident and near miss report forms shall be held in a register maintained at the construction site office base.

Any incident that may result in an environmental impact, will be reported immediately to the following incident numbers, together with details of date, time, location, type, potential impact and person calling:

- SEPA – 24 hour hotline 0800 80 70 60
- Argyll and Bute Council, Environmental Health - 01546 605519

4.4 Inspections and Audits

The Construction Contractor will undertake a programme of weekly environmental inspections and monthly environmental audits to record performance and identify any corrective actions required.

Provision will be made to carry out appropriate environmental inspections and monitoring of the Construction Contractor's environmental performance in the form of monthly audits. Formal audits will be against an audit checklist which will provide a mechanism to monitor and assess legislative standards, licence conditions and any other provisions agreed with statutory undertakers.

Where problems are identified, corrective actions will be identified by the Project Environmental Manager and Construction Contractor and will be implemented by the Construction Contractor within a defined time frame.

The Environmental Manager / EcoW will inform the Project Manager of any work that they feel should be stopped in order to avoid an unacceptable impact on the environment, in particular a breach of environmental legislation.

4.5 Environmental Monitoring

Monitoring of specific environmental parameters will be carried out as necessary and requirements for environmental monitoring will be reviewed as further consents and licences are received and consultations completed.

Table 2 presents the key parameters that may require environmental monitoring and where further details will be provided post consent and on appointment of a Construction Contractor.

Table 2: Construction Environmental Monitoring Requirements

Environmental Monitoring	Phase	Purpose	Frequency	Responsibility	Where Further Details Will Be Provided
Daily Inspections	Site Pre-construction and Construction	Inspection and maintenance of routine activities including the appropriate storage of materials, litter picks and general housekeeping to ensure health and safety risks as well as environmental considerations are appropriately managed.	Daily	Construction Contractor	CEMP
Waste Monitoring	Pre-construction and Construction	Waste generated within the construction areas shall be monitored as part of its classification to ensure the appropriate treatment, handling, management and disposal measures are applied.	Daily	Construction Contractor	Waste Management Plan
Water quality pre-monitoring programme ²	Pre-construction, Construction & Operation	To ensure that mitigation measures are operating as planned and preventing pollution and in the case of a pollution event, facilitate quick identification and implementation of appropriate action in line with the Emergency Response Plan.	A combination of daily observations and monitoring and regular water quality sampling on a periodic basis or ad hoc depending on circumstances, with monitoring to continue during the initial years of operation. The exact programme is to be determined by the Construction Contractor in consultation with SEPA and other relevant stakeholders during the process of obtaining CAR licences.	Construction Contractor & Operator	Pollution Prevention Plan including a Water Quality and Flow Monitoring Plan, Water Management Plan, Emergency Response Plan and Sediment Management Plan. Operators Management Plan
Traffic monitoring	Pre-construction and Construction	To ensure the CTMP is being followed and shall enable possible refinements or alterations to be made as appropriate	Regular – to be defined by the Construction Contractor in consultation with relevant consultees.	Construction Contractor	Construction Noise Management Plan
Vibration Monitoring	Construction	To ensure compliance with the predicted limits identified in Chapter 15 of the EIAR (Volume 2) and to be agreed with ABC.	At the start of piling and tunnelling activities	Construction Contractor	Construction Noise Management Plan
A Blast Monitoring Scheme – air overpressure and vibration	Construction	All blasts at the Development Site should be monitored and records maintained so that the historical peak particle velocity from blasts can be produced as required.	During Blasting	Construction Contractor	Construction Noise Management Plan
Dust Monitoring	Pre-construction	To ensure that mitigation measures are appropriate and being applied rigorously and to provide early warning	Adequate and appropriate measures to be determined by the construction contractor in consultation with ABC.	Construction Contractor	Dust Management Plan

² Further details on water monitoring can be found within Appendix 11.5 Outline Water Management Plan (Volume 5 Appendices).

Environmental Monitoring	Phase	Purpose	Frequency	Responsibility	Where Further Details Will Be Provided
	and Construction	of increased dust emissions to inform the cessation or modification of activities prior to impacts occurring.	Likely to entail daily visual inspections and weekly recording.		
Marine, Aquatic and Terrestrial INNS Monitoring	Pre-construction and Construction	To ensure that INNS are not being spread or introduced as a result of construction activities.	Annually, for a period of five years within Loch Awe. As per Measures in the Loch Fyne Marine Biosecurity Plan (Gov Scot, 2020) in Loch Fyne ³ .	ECoW	CEMP & Construction Biosecurity Management Plan
Marine Mammal Observations	Construction	To minimise the risk of injury to marine mammals	Pre-piling search duration should be a minimum of 30 minutes or as per latest JNCC Guidelines ⁴	Marine Mammal Observer & ECoW	CEMP
Protected Species Monitoring ⁵	Pre-Construction and Construction	Any confirmed protected species presence will be monitored by an ECoW to mitigate the likelihood and extent of disturbance	Monitoring will be implemented as and when required based on good practice guidance relevant to the species confirmed	Construction Contractor & ECoW	Ecology Management Plan / Species Protection Plan
Ornithological Species Monitoring ⁶	Pre-Construction and Construction	To determine if and where sensitive bird species establish nest sites, and to therefore allow for appropriate avoidance and/or mitigation measures to be implemented	In the breeding season prior to commencement of construction and in the breeding seasons throughout the construction phase.	Construction Contractor & ECoW	Ecology Management Plan / Species Protection Plan
Fish survey of Lochan Airigh	Pre-Construction	To inform the requirement for fish rescue and translocation during the construction of the Headpond and Embankments	Include a combination of electric fishing, seine netting, and/or fyke netting as considered appropriate and in agreement with NatureScot and SEPA.	ECoW	Ecology Management Plan
Electric fishing surveys of the Allt Criche (tributary of Erralich Water): BL-01, Erralich Water: BL02, River Aray: BL-22, and Unnamed tributary of River Aray: BL-23	Pre-Construction	To inform mitigation for permanent and temporary watercourse crossings	Pre-construction	ECoW	Ecology Management Plan
Loch Awe Inlet / Outlet Monitoring	Post-construction / Operation	Monitoring and maintenance of the Inlet / Outlet on the shore of Loch Awe should be carried out to ensure the integrity of the screen and assess any potential impacts in relation to fish, in particular migratory salmon, and other species due to the potential for distraction and entrapment / impingement	Minimum once or twice weekly.	Operator	Operators Management Plan

³ <https://www.gov.scot/binaries/content/documents/govscot/publications/factsheet/2020/03/loch-fyne-community-biosecurity-action-plan/documents/loch-fyne-marine-biosecurity-plan/loch-fyne-marine-biosecurity-plan/govscot%3Adocument/Loch%2BFyne%2BBiosecurity%2BPlan%2BMay2020.pdf>

⁴ <https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCC-Piling-protocol-August2010-Web.pdf>

⁵ Further details on specific species and monitoring requirements can be found within Chapter 6 Terrestrial Ecology (Volume 2 Main Report) and Appendix 5.4 Landscape and Ecology Management Plan (Volume 5 Appendices) and will be further developed within a Species Protection Plan to be submitted to ABC and NatureScot in advance of the commencement of construction.

⁶ Further details on specific species and monitoring requirements can be found within Chapter 9 Ornithology (Volume 2 Main Report)

Environmental Monitoring	Phase	Purpose	Frequency	Responsibility	Where Further Details Will Be Provided
Permanent culvert monitoring	Post-construction / Operation	Where permanent culverts are installed in watercourse crossings, it is recommended that these are monitored to ensure that there are no lasting effects on fish passage, especially in the event that Atlantic salmon or brown trout or other protected / notable species are shown to be present in pre-commencement fish surveys	Regularly, in agreement with SEPA	Operator	Operators Management Plan
Sensitive bird species survey	Pre-construction and during construction	A full programme of survey for sensitive bird species, namely lekking black grouse, breeding waders, breeding raptors and breeding divers. To determine if and where sensitive bird species establish nest sites, and to therefore allow for appropriate avoidance and/or mitigation measures to be implemented to avoid or minimise impacts upon them.	During breeding seasons, both pre-construction and during construction	EcoW or suitably experienced ornithologist	Ecology Management Plan
Outfall Monitoring	Post-construction / Operation	Visual inspection of outfalls to check for accretion of sediment	Monthly for 5 years ⁷	Operator	Operators Management Plan
Coastline Monitoring	Post-construction / Operation	Visual inspection of coastline 500m either side of the Marine Facility to check for any localised erosion or accretion	Monthly for 5 years ⁸	Operator	Operators Management Plan
Rehabilitation Zone Monitoring ⁹	Post-construction / Operation	To ensure effectiveness of the rehabilitation zone and judge whether the initial level of livestock grazing is satisfactory, or needs adjusted. To ensure maintenance of the deer fencing. To check for any establishment of Sitka spruce within the rehabilitation zone and its removal. To ensure correct establishment of planted trees and to rectify planting failures.	30 years minimum with more frequent monitoring within the initial years	Operator	LEMP & Operators Management Plan
Safety Monitoring	Post-construction / Operation	The Marine Facility will be marked and lit as per the requirements of IALA guidance and in agreement with the NLB. To ensure safety markers denoting the presence of the marine facility pier piles are effective to avoid collision risk	Monthly	Operator	Operators Management Plan

⁷ If after 5 years it is found from the monthly inspections that there is no change in local accretion and/or erosion, there would be no requirement for continued monitoring.

⁸ If after 5 years it is found from the monthly inspections that there is no change in local accretion and/or erosion, there would be no requirement for continued monitoring.

⁹ Further details on specific landscape monitoring requirements can be found within Appendix 5.4 Landscape and Ecology Management Plan (Volume 5 Appendices)

5. Topic Specific Management Plans

5.1 Introduction

The following sections provide further information on the topic specific Management Plans to be secured through the CEMP. Some topics have been included within separate topic specific Management Plans and are therefore have not been included below. Details of all plans produced can be found within *Table 2*.

The Schedule of Mitigation provides a schedule of mitigation for all phases of the Development as reported in the EIAR. It also outlines the hierarchy of the Management Plans and the responsibility for their completion, approval, and compliance.

The Applicant and the Construction Contractor will adhere to these mitigation measures during construction of the Development.

5.2 Outline Construction Noise Management Plan

A Construction Noise Management Plan will be prepared by the Construction Contractor to control noise generated throughout the construction period. The Construction Noise Management Plan will outline measures to achieve best practical means (BPM) of minimising construction noise in accordance with the Control of Pollution act 1974.

Measures to achieve BPM may include the following provisions:

Construction Works

- Establishing and maintaining good community relations throughout the construction process to keep residents and stakeholders informed on progress and the measures put in place to minimise noise impacts;
 - One stakeholder has highlighted the potential for the diesel impact piling at the temporary jetty to affect their underwater measurements on “trial days” where noise sensitive equipment is being tested within Loch Fyne. The trial days are understood to be up to 12 days per year and would be undertaken in blocks of 2 to 4 days at a time from 2025 onwards. diesel impact piling will therefore cease on these days, to avoid any adverse impacts.
- Adherence to standard construction working hours, i.e. 0700 hours – 1900 hours weekdays and 0800 hours – 1300 hours Saturdays, although this may be extended to 1900 hours at critical path construction phases, with no working on Sundays or Bank Holidays (including site deliveries) unless agreed in advance with the local planning authority.
- Selection of quiet and low vibration equipment and methodologies in accordance with the principles of BPM;
- Locating of fixed and semi-fixed ancillary plant such as generators, compressors and pumps away from NSR locations wherever possible;
- Provision of electrical power to the appointed Contractor for the construction phase which minimises the requirement for diesel generators at the Site;
- Regular maintenance of all plant used on site, paying attention to the integrity of silencers and acoustic enclosures;
- Fitting of compressors with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Shutting down of all noise generating construction plant when not in use.
- Loading and unloading of materials away from residential properties, ideally in locations which are acoustically screened from nearby NSRs;
- Handling of materials with care and placement rather than dropping where possible. Drop heights of materials from lorries and other plant shall be kept to a minimum;
- Selection of modern plant shall which complies with the latest European Commission noise emission requirements. Electrical plant items (as opposed to diesel powered plant items) shall be used wherever

practicable. All major compressors shall be low noise models fitted with properly lined and sealed acoustic covers. All ancillary pneumatic percussive tools would be fitted with mufflers or silencers of the type recommended by the manufacturers;

- Organisation of site operations and vehicle routes to minimise the need for reversing movements, and to take advantage of any natural acoustic screening present in the surrounding topography;
- No employees, subcontractors and persons employed on the Site will cause unnecessary noise from their activities, e.g., excessive 'revving' of vehicle engines, music from radios, shouting and general behaviour etc. All staff inductions at the Site shall include information on minimising noise and reminding them to be considerate of the nearby residents; and
- As far as practicable, planning of noisier activities to take place during periods of the day which are generally considered to be less noise sensitive, i.e., not particularly early or late in the day.

Blasting Air Overpressure and Vibration

- Reduction of the air overpressure and vibration effects of blasting through good blast design, although this may come at the expense of higher drilling and detonator costs. Smaller, more frequent blasts lead to smaller but more frequent effects, and the balance between these factors will need to be discussed with ABC.
- Agreement of the methods employed to control air overpressure and vibration from blasting operations agreed with ABC prior to any blasting, as well as the frequency of blasting and a 90% confidence limit for blast PPV values at NSRs. The PPV blasting vibration limit should follow the guidance provided within BS 6472-2:2008 of between 6.0 and 10.0 mm/s during the daytime and 2.0 mm/s at night.
- Avoidance of ground blasting in the early morning, late afternoon or evening. The local community will be given advance notice prior to any blasting.
- An air overpressure limit at Noise Sensitive Receptors should follow the guidance provided within BS 6472-2:2008 (120 – 150 dB(lin)) and be agreed with ABC.
- Implementation of a blast monitoring scheme for air overpressure and vibration. Any scheme should include details on the location of monitoring points and vibration sensitive properties, and the equipment to be used. This should include a series of representative initial trial blasts at the start of the blasting to accurately identify allowable maximum instantaneous charges to prevent exceedance of the identified limits at nearby receptors.
- Monitoring of all blasts at the Development Site and maintenance of records so that the historical peak particle velocity from blasts can be produced as required.
- Maintenance of a close working relationship between the construction / blasting operator and the local planning authority to facilitate the exchange of information regarding blasting events.
- Carrying out of all blasting using 'Best Practicable Means' where available, to ensure that the resultant noise, vibration and air overpressure are minimised in accordance with current British Standards and guidelines.
- Development of blast designs with the aid of regression lines determined from a logarithmic plot of Peak Particle Velocity against scaled distances. The regression lines should be regularly updated using the blasting monitoring information. The regression lines should be made available for inspection upon request.
- Control of fly rock requirements through Health and Safety legislation.

During Operation

- Employment of the principles of best practice to minimise noise and vibration from the Development.
- Confirmation of control measures to prevent underground plant noise from exceeding appropriate operational sound limits during detailed design. These control techniques may include measures such as orientation away from NSRs, vent attenuators, acoustic lining within the vent shaft, and acoustic louvres at intake and extract terminals.
- Designing of external surface plant and buildings at the Upper Reservoir (Headpond) to limit sound emissions to 70dBA at 5m as previously discussed in the operational assessment.

- Designing out of audible low frequency noise from the Development at NSRs, by design. If required, mitigation for tonal noise and groundborne noise and vibration could include vibration isolation, mufflers, attenuators, etc. and will be considered during the detailed design stage.

Mitigation and management measures specific to the Development will include the following:

Construction Noise

- All works will be undertaken to comply with the recommendations in British Standard BS5228-1, specifically Table B.1 provides a list of specific construction noise sources, and typical noise mitigation measures that can achieve between 5 dB to 10 dB and higher in addition to the embedded mitigation, which will be applied as appropriate to reduce levels at these NSRs to within the threshold value.
- Piling works at the marine facility will utilise a quieter diesel hammer piling rig and follow mitigation measures outlined in BS 5228-1 Table B.1 i.e. enclosure of hammer head with acoustic screen, use a resilient pad between pile and hammer head, use of sound reduction equipment, exhausts or screens on power units and base machine where possible.
- Following the appointment of a construction contractor a specific mitigation plan for P2-A-T3 would be implemented as part of the contractors CEMP.

Construction Vibration

- A suitable plan of communication between the contractor and NSR440 (as set out within *Chapter 15 Noise and Vibration*) (*Volume 2 Main Report*) will be implemented.

Construction Blasting – Air Overpressure and Vibration

- A series of measurements at several locations should be taken from one or more trial blasts.
- The final design of the blasting requirements will be undertaken by specialist blasting contractor to avoid vibration and air overpressure impacts that are greater than minor adverse at NSRs.

Construction Traffic Noise

- Specific mitigation in the form of utilising the northern access for two-way access to the Site is proposed to avoid the use of the southern site access track wherever possible and therefore avoid significant construction road traffic noise impacts at these NSRs.
- Specific mitigation in the form of splitting construction traffic over the north and south routes to the site entrance would provide a reduction of the construction traffic noise levels on each link.
- A road side acoustic barrier will be installed with height and length determined to provide at least 5 dB attenuation at NSR220 (as set out within *Chapter 15 Noise and Vibration*) (*Volume 2 Main Report*) from passing construction vehicles. The location and parameters of a suitable barrier would be included in the final Contractor CEMP by the E&C contractor.

Further details can be found within Chapter 15 Noise and Vibration (Volume 2 Main Report).

5.3 Emergency Response & Flood Risk Management Plan

An Emergency Response and Flood Management Plan (ERFRMP) will be prepared by the appointed Construction Contractor for approval of ABC in consultation with SEPA and NatureScot.

The ERFRMP will detail the actions to be taken to prevent and manage a flood incident and will follow guidance published by SEPA. Its objectives will likely be as follows:

- Raise awareness of the risks of flooding associated with the Development;
- Detail the flood warning and estimated lead times where possible;
- Detail how the Plan is triggered, by who and when;
- Define any areas of responsibility for those participating in the Plan;

- Describe what actions are required by any personnel present at the Development;
- Establish a safe route to a safe location, and outline the evacuation procedure; and
- Establish procedures for implementing the Plan and the way it will be monitored.

In the incidence of a flood event, the ERFRMP will be implemented in conjunction with the PPP's incident and emergency response procedures.

All construction works will be undertaken in accordance with the Control of Major Accident Hazard Regulations (COMAH Regs).

All construction areas and associated accommodation and welfare facilities will have in place appropriate plans and management controls to prevent fires. The site fire plans will be prepared, regularly reviewed, and updated as necessary, and will have due regard to the following documents:

- Fire Prevention on Construction Sites (Joint Code of Practice on the Protection from Fire of Construction Sites & Buildings Undergoing Renovation)¹⁰; and
- Fire Safety in Construction (HSG 168)¹¹.

A project emergency plan will be developed by the Construction Contractor, providing telephone contact details for the emergency services, local authorities, and maps showing the location of local hospitals. The project emergency plan will be displayed within the construction areas and will form part of the site induction.

5.4 Waste Management Plan

A Waste Management Plan (WMP) will be prepared by the Construction Contractor. The waste management plan will set out measures to ensure compliance with the Duty of Care responsibilities as prescribed in Section 34 of the Environmental Protection Act 1990 and amended by The Waste (Scotland) Regulations 2012 including:

- Implementation of the waste hierarchy;
- Classification and segregation of waste;
- Waste storage; and
- Waste documentation and transport.

Waste Hierarchy

The waste management plan will align with the Waste Hierarchy, which promotes efficient resource use and minimisation of waste through the priority ordering of the following measures:

- Prevention;
- Preparing for re-use;
- Recycle;
- Other recovery; and
- Dispose.

Site specific waste prevention measures will be set out within the waste management plan, such as:

- Ordering of new materials will be avoided if there are existing materials available or able to be adapted to the task within the Development Site;
- Deliveries will be timely and directly placed in secure storage areas, double handling will be kept to a minimum;
- Re-usable materials will be identified on-site and removed for storage and re-sale;

¹⁰ <https://www.chsg.co.uk/wp-content/uploads/2022/09/Fire-Prevention-on-Construction-Sites-Joint-Code-of-Practice-10th-Edition-1.pdf> [accessed: 20/02/2024]

¹¹ <https://www.hse.gov.uk/pubns/books/hsg168.htm> [accessed: 20/02/2024]

- Excess materials will be returned to the supplier if possible; and
- General information on site waste management will be provided in Site Inductions and toolbox talks with feedback welcomed.

There may be deviation from the priority order if a better overall environmental outcome is recognised for a particular resource or waste.

Classification and Segregation of Waste

The waste management plan will list all the Development Site waste streams as identified and classified by the Construction Contractor in line with the methods and categories set out in the Waste Classification Technical Guidance WM3 (Ref 7).

The identified waste streams will be segregated and the storage and management of each will be set out within the waste management plan including measures for special waste and organic material.

Special Waste

“Special waste” is any waste which contains properties that might make it harmful to human health or the environment¹².

Special waste could arise during construction from the following sources:

- Maintenance of plant and machinery;
- Oily water waste; and
- Environmental spill recovery (small amounts only; larger volumes taken away directly for disposal).

Measures will be set out within the waste management plan to ensure that:

- All special waste will be segregated by type from other waste streams;
- All waste oil will be stored in a bunded facility until such times that it is collected; and
- Used filters, rags and absorbents will be stowed in the special waste container in drums or waste oil bags.

Organic Matter and Forestry Waste Management

The waste wood and foliage material resulting from site clearance will be managed in-line with the Waste Hierarchy (as detailed above), thus helping to minimise potential environmental issues pertaining to this process.

Site clearance will be conducted in line with the procedure outlined in *Appendix 5.5 Forestry (Volume 5 Appendices)*. This sets out an outline of managing forestry waste and the requirements for the production of a Forestry Waste Management Plan within the Construction Contractor’s CEMP following receipt of s36 consent and prior to commencement of construction..

Wherever feasible, the generation of tree and foliage waste will be prevented, and these features will be retained in-situ. However, the retention of trees and foliage will not always be possible; therefore, the reuse of material onsite will be explored wherever practicable, with wood material either reused in construction, or within landscaping aspects such as the use of wood chippings, or as mulch to enhance soil quality to aid the reinstatement of the Development Site.

Should this not prove to be a viable option for all generated material, then excess wood waste will be stored under cover, such as tarpaulin, to protect wood from the weather so that it may be re-used wherever possible off-site e.g. as carpentry material or offered to the local community for firewood and biomass.

Attention will also be paid to the proximity principle, with local uses for waste materials considered where this represents the best practicable environmental option. For all material that cannot be re-used on- or off- site, or recycled, then elements of the wood and foliage material can be converted into woodchip. By following this process, it will be possible to limit the volume of tree and foliage waste sent for disposal as far as practicably possible.

Any topsoil or subsoil generated will remain onsite to be reused for any landscaping. Storage of Waste

¹² <https://www.sepa.org.uk/regulations/waste/special-waste/> [24/09/18]

Storage of Waste

The WMP will outline measures regarding waste storage to minimise the risk of waste escaping, litter and / or pollution, such as:

- All waste will be stored at the location in which it is generated, or within a designated central waste storage area;
- These designated waste storage areas will be isolated from surface water drains and areas that discharge directly to the water environment;
- Waste will be stored in suitable containers of sufficient capacity to avoid loss, overflow, or spillage;
- Storage of liquid wastes will be on impermeable bunds that hold the capacity of the container;
- Waste will be segregated by waste stream and storage containers will be clearly signed with the waste that they will hold e.g. wood, metal, plastics, or other appropriate waste stream;
- Storage containers will be secure, covered, or enclosed;
- There will be separate containers for special waste;
- Skips will be monitored, and action taken if waste levels are too high; and
- Burning of waste will be prohibited.

Documenting and Transporting Waste

The site waste management plan will set out the requirements for documenting and transporting waste including that:

- Waste contractors will be checked periodically (bi-annually) to ensure they have valid licences; and
- All waste leaving the Development Site will be accompanied by a Waste Transfer Note (WTN) for non-hazardous waste or a Special Waste Consignment Note (SWCN) for hazardous waste. A copy of which will be retained for 2 (WTN) or 3 years (SWCN).

5.5 Outline Dust Management Plan

A Dust Management Plan (DMP) will be prepared by the Construction Contractor to manage any potential effect from generation of dust and fine particulate matter (such as PM10) within the boundaries of the construction areas. Although the majority of this dust would be contained within the Development Site, some may be transported in the air to the surrounding environment. Activities which have the potential to give rise to dust emissions during the construction phases include:

- Site preparation, reprofiling and establishment, including blasting;
- Construction of infrastructure and buildings;
- Materials handling including;
- Transfer to and from trucks / lorries / conveyors;
- Material spills during transportation and handling; and
- Storage / stockpiling / use of cement or other fine particulate materials.
- Vehicle/plant movements, including on unpaved haul routes;
- Tarmac laying, bitumen surfacing and coating; and
- Construction processes.

The effective mitigation will be achieved by controlling the emissions at the source through measures that prevent or reduce potential dust generation or capture it before it can travel a significant distance.

Mitigating Dust Generation

Guidance to mitigate dust generation in a way to minimise nuisance dust is given in Table 3 below.

Table 3: Dust Control

Activity	Control Measure
Design and location of dust generating activities	<p>Dust-generating activities should, where possible, be located where maximum protection can be obtained from topography, woodland or other sheltering features.</p> <p>Stockpiles, haul roads, tips and mounds, and exposed areas should be located as far away as possible from sensitive receptors. Where practicable, they should not be located directly upwind of the sensitive receptors.</p> <p>Methods and equipment should be in place for immediate clean-up of spillages of dusty or potentially dusty materials.</p> <p>Regularly inspect site for spillages.</p>
Water sprays	<p>Suitable and sufficient water sprays must be available. Spraying should be carried out prior to and during works whenever the risk of visible emissions of dust are identified.</p> <p>Use static sprinklers, bowsers, handheld over the site boundary hoses and other watering methods, as necessary to prevent dust dispersing.</p> <p>Consultation with SEPA may be necessary to discuss the control of surface water run-off</p>
Earthworks, excavation and digging	<p>Vegetation and cover should be removed in discrete sections and not all at once.</p> <p>Earthworks, excavation and digging activities should be kept damp and, if possible, be avoided during exceptionally dry weather periods.</p>
Completed earthworks	<p>Stabilise surfaces and/or re-vegetate where practicable, as soon as possible.</p>
Storage and stockpile locations	<p>Store materials and stockpiles away from the boundary and sensitive areas, wherever possible.</p>
Building stockpiles / storage mounds	<p>Ensure slopes of stockpiles, tips and mounds are at an angle not greater than the natural angle of repose of the material.</p> <p>Avoid sharp changes of shape.</p> <p>Where possible, ensure stockpiles are screened and/or under sheeting.</p> <p>Wind barriers (protective fences) of similar size and height to the stockpile may be used.</p> <p>Long-term stockpiles /storage mounds can be capped or grassed over or surface with vegetation that has previously been removed from the site.</p>
Transitory soil mounds	<p>Soil mounds may be treated with surface binding agents, or covered with appropriate materials to reduce wind erosion.</p> <p>Consultation with SEPA is necessary before employing any binding agent due to potential water run-off.</p>
Storage of Fine, dry materials (less than ~3 mm in particle size)	<p>Store inside buildings or enclosures or with adequate protection from the wind e.g. by using sheeting.</p>
Storage of Dry materials (greater than ~3 mm in size)	<p>Store materials in banded areas.</p>
Storage of Bulk cement, bentonite and similar materials	<p>Some materials must be kept dry, and so they may be delivered by tanker and stored in silos or sealed bulk containers.</p>
Accidental spills when filling / operating silos	<p>Methods and equipment for cleaning should be in place. If necessary, include the use of audible and visual alarm systems.</p> <p>Silo ventilators should be fitted with particle filters.</p>
Landscaping	<p>Soils may be landscaped into suitable shapes for secondary functions, such as screening temporary stockpiling areas from wind.</p>
Processing sandstone, crushing, and screening	<p>Material to be crushed should be dampened. Crushers should be sited as far away as possible from sensitive receptors or the site boundary and should be sited to use the landscape for screening wherever practicable.</p> <p>Mobile plant for crushing, screening, and grading of materials may require authorisation by the relevant competent authority.</p>
Blasting using explosives	<p>Blasting will only be undertaken following communication with stakeholders, and only be carried out within defined working times.</p>

Activity	Control Measure
Cutting, grinding, drilling, sawing, trimming, planning, sanding.	<p>Cutting on-site should be avoided by using prefabrication whenever possible.</p> <p>Fans and filters should be serviced and maintained to ensure correct operation.</p> <p>Dust extraction / minimisation systems should always be used.</p>
Loading materials onto vehicles	<p>Use material handling methods that minimise the generation of airborne dust e.g. Enclose chutes and skips.</p> <p>Regular water spraying and damping down should be carried out. Material drop heights should be minimised.</p>
Conveyors	<p>Enclose transfer points and conveyor discharges where visible dust emissions occur.</p> <p>Installation on an even alignment with no abrupt changes in grade.</p> <p>Return belt cleaners, with arisings collected into a bin or cleaned up. Maintenance of the structures and rollers to minimise spillages.</p> <p>Shrouding of feed hoppers, transfer points and discharges.</p> <p>Fixed sprays where required.</p> <p>Clearance of any spillages to minimise accumulations of loose dry material around the structures.</p> <p>Minimisation of drop heights at feed hoppers and discharges.</p> <p>Screening material to remove dusty fractions prior to external storage. Design hopper load systems to ensure a good match with truck size and enclose fully on all sides.</p>
Removal of materials from site	<p>Waste materials should be removed from the site as soon as is practical to avoid prolonged storage on site.</p>
Transport of materials	<p>Vehicles removing dry materials must have their loads effectively enclosed or sheeted. Fine powdery materials will be transported in closed tankers.</p> <p>There is the potential for conveyor belts to be used as semi-permanent haul routes within the Development Site in preference to haulage vehicles.</p>
Material handling operations	<p>Always keep the number of handling operations to a minimum by ensuring that dusty material isn't moved or handled unnecessarily.</p> <p>Keep all handling areas clean and free from dust.</p>
Vehicle routes	<p>As far as practical, routes should be located away from residential and commercial properties.</p> <p>Install permanent surfaces where possible, with regular inspection and maintenance</p>
Construction and maintenance of unsurfaced roads and verges	<p>Grade unsurfaced haul roads.</p> <p>Keep in compacted condition using static sprinklers, bowsers, commercially available additives and binders (subject to SEPA requirements).</p>
Vehicle and wheel washing	<p>Washing facilities, such as hosepipes and ample water supply should be provided at site exits, including mechanical wheel spinners where practicable.</p> <p>All vehicles should be washed down before moving between construction areas and exiting the Development Site. This is to minimise dust, but also as an INNS control.</p>
Site traffic management and speed control	<p>Restrict general site traffic to watered or treated haul roads.</p> <p>Keep vehicle movements to a minimum.</p> <p>Limit vehicle speeds – the slower the vehicle speeds as per Framework Construction Traffic Management Plan</p>
Road cleaning including vehicle waiting areas and hard standing	<p>Approved mechanical road sweeper should be readily available, with circular brush commonly fitted to side for leaning kerbs, removed.</p> <p>Frequency of cleaning will depend on site size, location and operation.</p> <p>However, cleaning should be carried out as frequently and appropriately as required.</p>

5.6 Outline Ecological Management Plan

The Ecological Management Plan sets out the general good practice and site-specific measures that have been identified through the EIAR as being relevant to the development.

Appendix 5.4 Outline Landscape and Ecology Management Plan (Volume 5 Appendices) describes the principles of the Outline Landscape and Ecology Management Plan (oLEMP) and embedded mitigation measures that would be implemented prior to and during the construction phase of the Development, as well as the outline management and monitoring measures to be implemented once the Development is operational. Set out below are additional mitigation measures that will be required during construction.

It should be noted that the implementation of mitigation does not negate the requirement to comply with relevant wildlife legislation. Therefore, any works which could result in an offence being caused must necessarily be avoided or only undertaken under a valid protected species licence, issued by NatureScot. It will be the responsibility of the Construction Contractor, in consultation with the ECoW, to ensure that the need for protected species licence(s) is identified and that licence(s) are in place.

Habitat Protection

The following measures will be implemented to minimise the disturbance of habitat within the Development Site during construction and constrain effects to the areas being developed:

- Where practicable, works near or at any retained trees or woodland will follow guidance detailed in British Standard 5837:2012 Trees in relation to design, demolition, and construction – Recommendations (British Standards Institution, 2012);
- Sightings of protected or notable species within the Site during the construction period will be recorded. If any evidence or sightings of protected or notable species occur within 30 m of works (or 500 m in respect of great crested newts), then works in that area will stop immediately and the ECoW will be contacted for further advice;
- Sightings of protected and / or notable bird species within the Development Site during the construction period will be recorded. If any evidence or sightings of specially protected bird species listed on Schedule 1 of the WCA suggest that a nest site may be present within 1 km of works, then works in that area will stop immediately and the ECoW will be contacted for further advice.
- Wherever possible, tree felling and works which will directly impact upon areas of vegetation which could be used by nesting birds will be undertaken outside of the breeding season, this being between March and August, inclusive. Should felling occur in this time period, a pre-works check for the presence of nesting birds will be conducted by the ECoW or other suitably experienced ornithologist.
- Each new construction / felling area should be checked for the presence of nesting birds not more than 72 hours prior to commencement of works as nests can be quickly established. Where any active nest sites are identified, suitable species-specific exclusion zones should be implemented, and these must be maintained until the breeding attempt has concluded;
- All Compounds, Access Tracks and other works areas will be of the minimum size required for the safe construction of the Development. Compounds will be fenced to prevent encroachment of Site personnel, machinery and materials onto adjacent habitats. The temporary stockpiling of materials will be restricted to predetermined locations such as the Compounds and will not be done on undisturbed adjacent habitats;
- All site compounds, access tracks and other works areas will be of the minimum size required for the safe construction of the Development;
- Site Compounds will be fenced to prevent encroachment of Site personnel, machinery, and materials onto adjacent habitats;
- The temporary stockpiling of materials will be restricted to predetermined locations such as the construction compounds and will not be done on undisturbed adjacent habitats; and
- Construction works will take place within a clearly demarcated works area.

Protected Species

The following good practice measures are proposed to minimise effects on protected species at the Development Site:

- Sightings of protected or notable species within the Development Site during the construction period will be recorded. If any evidence or sightings of protected or notable species occur within 30 m of works (or 500 m in respect of great crested newts), then works in that area will stop immediately and the ECoW will be contacted for further advice;
- To minimise the risk of mortality to protected species during construction, a 20mph speed limit will be applied to all construction traffic on all roads within the Development Site Boundary and a 30 mph speed limit will be applied to all construction traffic using the highway;

- Any excavations will be left with a method of escape for any animal that may enter overnight, and will be checked at the start of each working day to ensure no animals are trapped within them;
- Any pipes will be capped or otherwise blocked at the end of each working day, or if left for extended periods of time, to ensure no animals become trapped;
- As far as possible, works will be carried out in daylight to minimise the risk of disturbing protected species outside the Site such as foraging / commuting bats, badger, or pine marten.
- Any artificial lighting, such as security lighting or lighting for construction works during the winter, will be directional to avoid or minimise light spill outside the Development Site.
- All watercourse crossings, both temporary and permanent, will be designed so as to be passable to otter.

5.7 Outline Biosecurity Management Plan

This section provides an overview of what will be included within the Biosecurity Management Plan (BMP). Post-consent the BMP will be prepared by the Construction Contractor and agreed with ABC, SEPA and NatureScot. This will support the contractors CEMP.

The GB Invasive Non-Native Species (INNS) Strategy provides guidance for the prevention, detection, eradication, and management of INNS, including marine species (NBN, 2021). Best practice measures will be adopted in compliance with the relevant IMO guidance regarding ballast water, should it be present, and biofouling. These measures will reduce the overall risk of introduction of INNS, resulting in a low magnitude of change. Best practice biosecurity measures should be implemented and adhered to throughout construction, operation, and decommissioning.

It is anticipated that BMP will be implemented throughout the Development Site following 'Check, Clean, Dry' principles. These measures will include, but are not limited to:

- Vigilance for the presence of INNS, including pre-commencement surveys, supervision, and monitoring by the ECoW;
- Vehicle washing facilities, including washing plant and vehicles before transferring between the Development Site and different construction sites;
- Disinfection of Plant, PPE, and materials after works in aquatic habitats;
- Ensuring where possible that materials are retained in the habitats where they originated;
- Drying facilities should be provided for equipment and PPE – some INNS can live, or seeds remain viable, in moist conditions for long periods; and
- Avoid the transfer of water between aquatic habitats on-site.

Biosecurity Pre-commencement Checks

Prior to construction pre-commencement checks for INNS will be conducted by the ECoW with particular attention to:

- Areas of woodland affected by the Development;
- The areas for the Compounds and areas for material storage;
- Watercourse crossing points;
- The Tailpond work area; and
- The location identified for implementation of SUDs / drainage.

As part of the pre-commencement checks, any identified INNS will be accurately mapped so that a baseline at the start of construction is available and easily referenced.

Development Works

Given the known presence of INNS within the Development site the following measures should be adopted during the Development works to reduce the potential spread and/or introduction of INNS:

Material excavated or dredged from Loch Awe must be retained in the immediate area, i.e., stockpiled on the loch shoreline, to prevent the spread of INNS, including *Elodea* sp., which is known to be present in Loch Awe.

- The Aquatic ECoW will supervise all excavation and dredging works in Loch Awe to check for the presence of INNS and ensure that appropriate biosecurity measures are implemented.
- Biosecurity measures should be implemented throughout the development, following 'Check, Clean, Dry' principles as set out in the CEMP. These measures will include, but are not limited to:
 - Vigilance for the presence of INNS, including pre-commencement surveys, supervision, and monitoring by the ECoW;
 - Vehicle washing facilities, including washing plant and vehicles before transferring between this and different construction sites;
 - Washing and disinfection of Plant, PPE, and materials after works in aquatic habitats, especially in Loch Awe where INNS are known to be present;
 - Ensuring where possible that materials are retained in the habitats where they originated, especially where INNS are known to be present, i.e. Loch Awe;
 - Drying facilities should be provided for equipment and PPE – some INNS can live, or seeds and propagules remain viable, in moist conditions for long periods; and
 - Avoid the transfer of water between aquatic habitats on site.

Water Transport

The following management measures are proposed to minimise the risk of spreading INNS from vehicles, by water, to the Development site:

- Local vehicles should be sourced, where possible, to reduce the potential to introduce INNS from other waterbodies. This would preferably be vehicles in existing usage on Loch Awe;
- All project vessels will adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments with the aim of preventing the spread of INNS (IMO, 2022). In addition, vessels will be required to adhere to the IMO guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines) (resolution MEPC.207(62)). These measures lower the probability of INNS transmission from vessels to the benthic habitat;
- Where possible, vehicles should be inspected prior to arrival on-site and between deployments for the presence of INNS;
- Biosecurity measures implemented as considered necessary, according to check, clean, dry principles.

Specific Species Plans

Sphagnum austinii and Sphagnum fuscum

The ECoW will supervise installation of an exclusion zone covering the habitats around the *Sphagnum austinii* and *Sphagnum fuscum*, extending out to the limits of the nearest infrastructure or as otherwise appropriate;

The exclusion zones will be appropriately marked out (e.g. with rope tied to stakes) and signposted, and no plant, vehicles, materials, or personnel will be permitted to enter them;

The ECoW will monitor the exclusion zones to ensure compliance and to take action in the event of non-compliance.

Monitoring

The following surveys are required to reduce the potential spread or introduction of INNS:

- Annual monitoring surveys for the presence of aquatic INNS, to be combined with surveys for terrestrial INNS, in watercourses within the Site and assessed as receptors in relation to INNS above. Due to the potential for INNS to be transferred to the Headpond, it is recommended that the Headpond and these receptors are monitored for INNS for a period of five years.
- Survey of the extent of the proposed cofferdam and temporary works in Loch Awe for the presence of INNS, notably *Elodea* sp. (Nuttall's waterweed and/or Canadian pondweed).

- Walkover survey of watercourse crossing locations for INNS, both aquatic and riparian species (to be combined with pre-commencement surveys for terrestrial INNS: refer to Chapter 6: Terrestrial Ecology)

5.8 Outline Pollution Prevention Plan

The section provides an overview of what will be included within the Pollution Prevention Plan (PPP). Measures relating specifically to water pollution from particulates and sediments in run-off are addressed within the Outline Water Management Plan (Appendix 11.5 (Volume 5 Appendices)).

Post-consent the PPP will be prepared by the Construction Contractor and agreed with ABC, SEPA and NatureScot. This will support the contractors CEMP and will include agreed emergency procedures in the event of a pollution incident. The PPP will take into consideration the Guidance contained within SEPAs Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Run-Off from Construction Sites (2021), which provides guidance on the application of environmental standards and good management practice techniques in relation to large scale construction sites and pollution control.

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. The contractor will ensure that all permits/consents are obtained in advance of any relevant works in, over, under or near watercourses.

The design of surface water drainage systems, incorporating appropriate attenuation and treatment measures, will be undertaken post-consent as part of a Detailed Design Strategy.

A temporary drainage system will be implemented during construction using sustainable drainage systems where possible to manage the risk of flooding and to treat run-off. Measures may include temporary ponds / settlement lagoons, ditches, silt fences, the use of silt busters or lamella clarifiers, dewatering / sediment bags (e.g. silt tubes), silt curtains; and measures to manage pollution risks such as designated bunded refuelling areas. Further details can be found within the Outline Surface Water Management Plan (Appendix 11.5 Outline Water Management Plan (Volume 5 Appendices)).

Works in the Headpond area will be supervised by the EcoW to ensure that water management measures, including SuDS, drainage ditches and attenuation ponds, will be effective in preventing the runoff of silt-laden water to adjacent watercourses and waterbodies.

To minimise the risk of chemical spillages, a cut off drain will be installed at the toe of the new Embankments to collect water run-off during construction and prevent it, and any chemicals that may have been spilled, propagating from the Development Site without treatment.

Plant and Machinery

All plant and machinery shall be regularly maintained to ensure good working order. Checks for leaks of fuel and lubricants will be conducted before works with plant and machinery is allowed to commence and maintenance and servicing records will be reviewed and updated as required.

A suitable quantity of pollution control equipment, e.g. spill kits containing absorbent pads, absorbent granules, absorbent booms etc. will be kept on site in the event of an emergency. The Environmental Manager will check pollution control equipment on a weekly basis to ensure that it is adequately maintained (for example ensuring equipment is within date) within the construction areas, "Emergency Grab Packs" or spill kits to be carried in site vehicles and mobile plant and larger kits with fuel bowsers and emergency vehicles.

Static plant such as pumps and generators will be self-bunded or placed on drip trays wherever practicable to prevent leaking materials, from contaminating the ground or surface waters.

Mobile plant to be in good working order, kept clean and fitted with plant 'nappies' at all times.

No washing out of concrete and cement delivery vehicles will take place on-site without suitable provision for the washing out water and provision of a suitable location that is lined with a geotextile to prevent infiltration to ground. Such washing would not be allowed to flow into any drain and the CEMP would contain a methodology for dealing with any washing out water, or wheel wash. Wash water would be adequately contained, prevented from entering any drain, and removed from the Development Site for appropriate disposal at a suitably licenced waste facility.

If on-site batching facilities are required, they will be operated under the conditions of the appropriate authorisation. Where possible, batching will be conducted at least 50 m from any watercourse, on flat ground, and suitable impermeable hardstanding so that surface water run-off can be intercepted for either treatment or disposal off-site at an appropriate licence waste facility.

The Site is to be secure to prevent any vandalism that could lead to a pollution incident.

Further details of arrangements for dealing with spills, leaks and unplanned emissions, unplanned damage to the environment and other environmental incidents will be provided in the PPP.

Vessels

All vessels will be in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations and will therefore be equipped with waste disposal facilities onboard. The discharging of contaminants is not permitted within 12 NM from the coast to preserve bathing waters.

Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels.

Ballast water discharges from all vessels will be managed under International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (Ballast Water Management Convention).

Storage and Handling

Fuel and Lubricants

All fuels will be stored in designated fuel storage areas that will satisfy the requirements of Schedule 3 of The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003 (Ref 3).

All fuels shall be stored in integral bunded fuel bowsers, designed to hold at least 110% of the contents of the tank. All connections shall be situated within the bund. Fuel shall be stored at least 20 m away from any watercourse, where reasonably practicable. Refuelling within the construction areas shall be undertaken at least 20 m from any watercourses. An impermeable bunded area for the storage of drums shall be constructed in accordance with SEPA guidelines.

Oils and lubricants used within the construction areas will also be stored in temporary impermeable bunded areas or sealed bunded tanks designed to hold 110% of the container volumes. No oil or fuel shall be stored within 50 m of a watercourse.

Construction waste / debris are to be prevented from entering any surface water drainage or water body.

Further details will be provided in the PPP.

Herbicides

Only trained sub-contractors shall apply herbicides, and only where their use is essential.

Certificates of competence shall be inspected before application is allowed and a record of application made in accordance with the Control of Pesticides Regulations 1986. Where herbicide use is essential a glyphosate herbicide, suitable for use in or near watercourses and approved by SEPA, shall be used.

Control of Substances Hazardous to Health (COSHH)

All COSHH materials will be stored and handled in accordance with the COSHH Regulations 2002 (Ref 4). A secure COSHH store will be set up within one of the Development Site Compounds. COSHH assessments and Material Safety Data Sheets shall be held with the COSHH materials. A COSHH register shall be created and maintained on-site. All site personnel and subcontractors will be made aware of the COSHH requirements through site inductions and specific toolbox talks. Daily site inspections will be used to review and monitor the storage and issue of materials.

Pollution Incident Response

As part of the PPP, the Construction Contractor will incorporate incident response measures. These measures are likely to include:

- A suitably trained emergency environmental crew will be provided by the Construction Contractor to deal with pollution incidents in conjunction with other safety-related incidents as required; and
- An emergency contact list and spill response flowchart shall be displayed on notice boards and on fuel bowsers.
- Proposed incident response triggers and actions are provided in *Annex 3.1.1* at the end of this CEMP.

5.9 Outline Landscape Working Methods

The ECoW or Environmental Manager will be supported by a Landscape Architect to advise on the implementation of the Landscape and Ecology Management Plan proposals (Appendix 5.4, Volume 5 Appendices). Summarised below are the key measures that will be undertaken during implementation of the proposed landscaping.

Landscape and Visual Measures

General good practice measures that will be implemented during construction in order to limit impacts on the landscape and visual resource include:

- Land and vegetation clearance and occupation although relatively extensive will be limited to the minimum area necessary for the works;
- Good housekeeping measures will minimise unsightly waste and secure storage will be provided for materials at risk from displacement by wind;
- Temporary stockpiles will be located in defined storage areas within the identified compounds, and sited away from sensitive visual receptors;
- All boundary fences will be maintained in a neat and tidy condition;
- Any temporary fencing will be removed as soon as reasonably practicable after completion of the works; and
- Temporary lighting will be selected and sited so as to minimise visual intrusion to residents, whilst maintaining the safe and efficient operation of the work site. At night and during periods of darkness, directional security lighting will be used where required.

Protection of Retained Trees

The following good practice measures will be adopted and implemented for the protection of trees retained onsite:

- Where practicable, works near or at any retained trees or woodland will follow guidance detailed in BS 5837:2012 (Ref 7).
- A Root Protection Area (RPA) will be set up around trees to be retained onsite prior to commencement of construction;
- The RPA will be demarcated by 'Netlon' fluorescent mesh fencing or similar physical barrier. The protective fencing will be maintained for the duration of the construction phase and checked on a regular basis;
- In the event that an RPA cannot be maintained at 12 times the diameter at breast height (DBH) mitigation such as bog matting, flotation tyres and hand digging will be utilised;
- No machinery or material will be stored within the RPA;
- To ensure retained trees do not become hazardous, the condition of trees will be checked by the Environmental Manager or ECoW at an appropriate frequency and following storm events where there may be damage from wind throw;
- Where a tree is damaged or diseased advice will be sought from an Arboriculturalist (unless the ECoW is appropriately qualified) for appropriate treatment measures;
- Where hazardous branches or trees require to be felled this will be done by a qualified tree surgeon in line with BS 3998: 2010 (Ref 9);
- Before felling trees, surveys for potential bird nest or bat roosts will be undertaken by the ECoW; and

- The waste hierarchy will be applied to vegetation and biomass arising and alternative onsite uses will be sought before disposal is considered.

6. References

British Standards Institute (BSI). (2014). BS 5228 -1: 2009+ A1:2014. Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise.

SEPA (February 2018) Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Construction Sites.

SSI 2003 No. 531. Water Resources. The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003.

SI 2002 No. 2677. Health and Safety. The Control of Substances Hazardous to Health Regulations 2002.

Natural Resources Wales, SEPA and Northern Ireland Environment Agency. (2017). Pollution Incident Response Plans, GPP 21.

Scottish Government. (2017). Guidance on Applying the Waste Hierarchy. [Online]. Available: <https://www.gov.scot/Resource/0052/00528402.pdf>. [Accessed 24/09/18].

NRW, SEPA, NIEA and EA. (2015). Waste Classification. Guidance on the Classification and Assessment of Waste (1st Edition 2015). Technical Guidance WM3. [Online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf The Waste (England and Wales) Regulations 2011. S.I. 2011/988. Environmental Protection, England and Wales. [Accessed 24/09/18].

BSI. (2012). BS 5837:2012 Trees in Relation to Design, Demolition and Construction – Recommendations.

BSI. (2010). BS 3998: 2010 Tree Work. Recommendations.

Annex 3.1.1 Pollution Incident Response

It is proposed that the four-point risk scale of the Common Incident Reporting System is adopted to define the severity of a pollution incident or emergency. Under the Common Incident Reporting System an incident is defined as a specific event or occurrence, in a single location or multiple sites, that has had or has the potential to cause environmental harm, pollution of surface and groundwater, an impact on human health, or nuisance to the local community.

Table 4 presents the four incident categories with a description of the likely effects that may occur. The descriptions of each category are indicative and do not represent specific risks from the Development.

Table 5 sets out the triggers and proposed actions for each of the four classes of incident in the event that monitoring identifies anomalous or unusual results when compared to the baseline data and/or Environmental Quality Standards.

Table 4: Incident Categories

Incident Category	Indicative Incident Description
Category 1 – major, serious, persistent and/or extensive impact or effect on the environment, people and/or property	<ol style="list-style-type: none"> 1. Persistent impact on water quality lasting at least 7 days and affecting an extensive area over several kilometres of a watercourse or large area of a water body (e.g. 1 to 2 km's). 2. Pollution of a water body by levels of dangerous substance(s) exceeding Maximum Allowable Concentration, Environmental Quality Standards or other standards known to define conditions when serious harm/death to aquatic life or dissolved oxygen levels at critical levels may occur. 3. Necessary closure of a strategically important potable water supply to prevent contamination or further contamination. 4. Deterioration in ecological status or potential of a water body or prevention of reaching its objective (including physical impacts). 5. Damage to a statutorily protected site or species. This may include an impact on SSSI insofar that it may prevent them from reaching or maintaining their favourable conservation status; or damage to a European protected species or its habitat that has a significant adverse effect on reaching or maintaining its favourable conservation status. 6. Gross and extensive contamination or coverage of the bed of the watercourse, water column or surface by fungal / bacterial / algal growths, sewage debris or particulate matter. 7. Fatality or serious effect on human health from direct contact/exposure to pollutants in surface waters, or through the supply of contaminated potable water following an incident affecting surface water or groundwater. 8. Public exposed to concentration levels over a widespread area giving rise to serious and known health risks as a result of contamination of surface waters or groundwater following a pollution or algal incident. 9. Supply of contaminated drinking water with levels of pollutants/pathogens exceeding toxicological limits known to cause serious health problems. 10. Major adverse effect on an important recreational activity or national event such as the cancellation, partial or full suspension of recreational bathing, fishing activity or an organised water sports event. 11. Incidents that cause extensive damage to the physical habitat of a water body that would fall under the Environmental Damage Regulations. 12. The destruction of a large or important area of fish habitat (particularly spawning areas), sustained damage to fish spawning, such as by actively digging or removing bed material used by spawning fish, and / or the illegal construction of an obstruction to fish migration.
Category 2 – significant impact or effect on the environment, people and/or property	<ol style="list-style-type: none"> 1. Significant effect on the quality or use of that water but normally localised. 2. Typically include fine sediment (>500 mg/l compared to background levels), low dissolved oxygen levels or high ammonia along hundreds of metres to potentially kilometres of a watercourse or area of a water body. 3. Precautionary closure of a strategically important potable water supply to prevent contamination of source. 4. Necessary closure of a minor un-licensed potable water supply. 5. Significant action / treatment by operator to address deterioration in water quality (e.g. blending with uncontaminated water). 6. Significant but localised or temporary deterioration in ecological status or potential of a WFD water body or delaying the water body reaching its ecological objectives (including physical impacts). 7. Damage to a statutorily protected site or species, but no significant effect on favourable conservation status. 8. Significant damage to BAP species or habitats, which affects the viability of the species locally and / or extensive / significant damage to non-statutory protected site or BAP habitat that affects the nature conservation status of the site or habitat. 9. Gross but localised contamination or coverage of the bed of the watercourse, water column or surface by fungal/bacterial/algal growths, sewage debris or particulate matter. 10. Significant effect on human health from direct contact/exposure to pollutants in surface water or groundwater, or through the supply of contaminated potable water following an incident. 11. Public exposed to concentration levels giving rise to minor health problems due to contamination of surface waters or groundwater following a pollution or algal incident.

12. Supply of contaminated drinking water with levels of pollutants or pathogens known to cause minor health problems.
13. Significant adverse effect on a recreational activity or event appropriate to the surface water body such as the cancellation of a local event or short-lived disruption (e.g. less than one week).
14. Significant but localised destruction of fish habitats, interference with spawning fish by creating disturbance, such as by sustained paddling / moving through a spawning area, and / or incidents involving the illegal obstruction to fish migration, including illegal alteration to a fish pass.

Category 3 – minor or minimal impact or effect on the environment, people and/or property	<ol style="list-style-type: none"> 1. Limited and localised effect (around point of discharge but could include lower magnitude effects over a few kilometres) on a water body which has a minimal impact on the quality or use of that water. 2. Precautionary closure of a minor un-licensed potable water supply. 3. Minor action / treatment by operator to address deterioration in water quality (e.g. blending with uncontaminated water). 4. Very limited or no significant effect on the status or objectives of a WFD water body. 5. Bed, column or surface of watercourse only marginally contaminated around point of discharge or in localised area. Such as a limited growth of sewage fungus around an outfall pipe. 6. Very limited impact upon nature conservation sites. 7. Reversible small-scale, short-term damage to non-statutorily protected sites or BAP habitats or species. 8. Minor effect on human health from direct contact to pollutants in surface waters or groundwater, or through the supply of contaminated potable water following an incident (e.g. a few individuals with temporary sore throats). Public exposed to concentration levels that present no known or minimal risk to health. 9. Minor impact on amenity value, recreational fishing activity and/or aesthetic quality (e.g. small amount of litter, thin oil film, non-harmful colour changes). 10. Minor loss of fish habitat and / or interference with spawning fish resulting in localised, limited damage, such as by paddling / moving through a spawning area.
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Category 4 – substantiated incident with no impact. No measurable adverse impacts.

Table 5: Incident Category, Monitoring Evidence and Actions

Incident Category	Monitoring Outcomes	Examples	Proposed Actions
Categories 1 & 2	Significant pollution incident evident by Visual Inspection and / or water quality monitoring.	Spillage of significant volumes of fuel, construction runoff containing high levels of fine sediment or powder cement into a watercourse.	<p>Fully implement Incident and Emergency Response procedure.</p> <p>Immediately stop all relevant works (that may reasonably be the source of the pollution) until investigation completed and corrective actions agreed with SEPA / ABC.</p> <p>Inform SEPA / ABC immediately and seek advice regarding pollution containment and remediation.</p> <p>Notify any relevant third parties immediately (e.g. PWS).</p> <p>Prepare Incident and Lessons Learned Report and issue to SEPA/ABC. Report should detail actual impacts, outcomes of actions taken, and proposals for additional monitoring of affected site and receptors.</p>
Category 3	Visual Inspections and / or water quality monitoring results deviate from baseline or now exceed EQS	Moderate elevation in total suspended sediment levels, fine sediment deposits across river bed gravels or some minor evidence of oil sheen / odour on the surface of water.	<p>Investigate likely causes and pause relevant construction works.</p> <p>Confirm Construction Method Statements are being implemented correctly and mitigation measures operating as required. If yes, review Construction Method Statements and adequacy of mitigation measures.</p> <p>Prepare Incident and Lessons Learned Report and issue to SEPA / ABC to agree any remedial action if required.</p> <p>Consider making additional Visual Inspections and water quality sampling.</p>
Category 4	Water quality monitoring results slightly deviate from baseline.	No obvious visual impacts.	<p>No immediate actions.</p> <p>Continue to monitor in accordance with monitoring plan.</p>

Appendix D Outline Water Management Plan from EIA (ECU00003444)

Balliemeanoch Pumped Storage Hydro

Environmental Impact Assessment
Report

Volume 5: Appendices
Appendix 11.5: Outline Water
Management Plan

ILI (Borders PSH) Ltd

July 2024

Quality information

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Revision	Revision date	Details	Authorized	Name	Position
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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 smother 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, dewatering 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

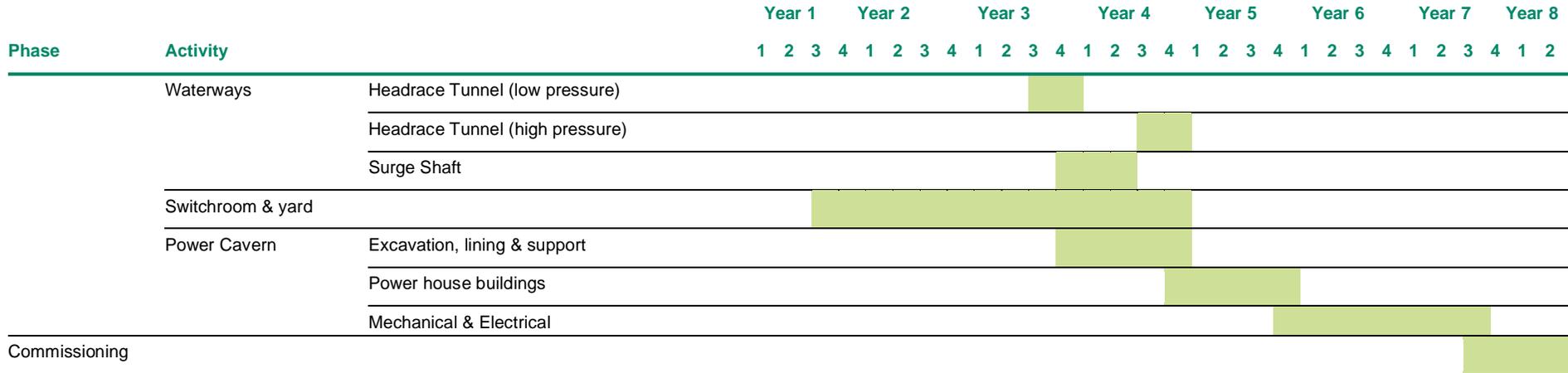
Contamination of surface waters and soil could result from leakage and spills of fuels, oils, chemicals, and concrete during construction affecting watercourses indirectly via site runoff or directly where works are close to and within a water feature. The use of cementitious products, such as the mixing 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.



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	<i>“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.”</i>
Policy 30 – The Sustainable Growth of Renewables	<i>“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”</i>
Policy 59 – Water Quality and the Environment	<p><i>Proposals for development that could affect the water environment will be assessed with regard to their potential impact on:</i></p> <p><i>a) Water quality and quantity, ecological status including morphology and hydrology (i.e. flow rate) chemical and biological status;</i></p>

Policy Number	Description
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- 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 <i>Figure 6.5 (EIAR Volume 3)</i> .	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 Beochlich Lochan (LA8) with approximately eleven tributaries flowing into LA6 including the tributary sourced from LA8. From Beochlich 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 CaCO3	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 bowzers, 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

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.

Management of Impacts

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 mats, 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.



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 bowers 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 or 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.

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- Ref 53. SEPA (2020) Environmental Quality Standards and Standards for Discharges to Surface Waters

Appendix A Silt Management Options

<p>Fabric silt fences</p>  <p>These are geotextiles installed in the path of sheet flow runoff to filter out sediments. They are often installed around water bodies, below the crest of a cleared slope or around temporary earth stockpiles. Silt fences detain sediment (silt and sand) and promote settlement, and may remove 95-99% sand, 50-80% silt/clay, and up to 20% silt/clay from runoff (CURIA648, 2006).</p>	<p>Measures to control rate of temporary discharge</p>  <p>If the rate and energy of temporary discharges are not controlled there is a risk of eroding the bed and banks of the receiving water body. The use of earth pads or boulders below the outfall are both ways in which the energy of the water can be dissipated to avoid bank and bed erosion.</p>	<p>Silt bubble barriers</p>  <p>Bubble barriers are essentially tubes deployed on the bed of the watercourse which vent bubbles. They can control movement of silt with the additional advantage of delivering an oxygen enriched environment. Without this, silt plumes can create oxygen demand in the waterbody. Thereby causing stress to aquatic organisms. They can also be used for general aeration of lakes and ponds.</p>	<p>Silt mats and silt check dams</p>  <p>Silt mats are used to capture sediment as it drops out of suspension and should be located in areas of natural deposition where water energy is low. They are typically placed to the bed and have a natural fibre mat to contain sediment effectively and prevent resuspension. Silt check dams are also available (e.g. wood waste filter media or rocks within matrix). They are used to reduce speed of flow in ditches and swales, and distribute flows across the channel.</p>																																																																
<p>Earth bunds</p>  <p>These are temporary barriers to conveyance of construction runoff and can be used to create temporary storage lagoons or barriers between construction works and water bodies. Care needed as earth bunds may themselves be a source of fine sediment, although this can be minimised by covering with a suitable geotextile or seeding. If they are to be in place for a longer period of time and not part of topsoil storage.</p>	<p>Drainage grips (option to include check dams / sumps)</p>  <p>Drainage grips (otherwise known as cut off or temporary drains) are temporary drains installed to intercept runoff from slopes above construction works to prevent it entering the site or cleared slopes within the site itself. They are an effective way to temporarily manage surface water runoff and convey flows contaminated with fine sediment to storage and treatment areas. Gravel and stone baffle check dams can be created at regular intervals to encourage fine sediments to settle during conveyance.</p>	<p>Pumps, settlement tanks and lamella clarifiers</p>  <p>Pre-treatment of construction site runoff can be provided by first pumping runoff through a settlement tank. These are gravity to encourage fine particulates to settle out and become trapped at the bottom of the tank. Greater levels of treatment can be achieved by using Lamella Clarifiers that include a series of inclined plates to provide a larger effective settling area for a small footprint. There are a range of products depending on application and flow rates and these can also be deployed in series and with chemical dosing tanks, if required.</p>	<p>Chemical treatments and dosing tanks</p>  <p>Chemical dosing tanks provide a way in which high concentrations of metals in runoff can be precipitated out before the treated water is discharged from the site. Chemical dosing tanks are often contained, partly to reduce the risk of chemical spillage. Chemical flocculation treatments are also available, often in truck form that allow release into the water. Flocculation is the process by which negatively charged particulates bind together in the presence of a positively charged flocculant.</p> <p>Tanker for off-site disposal</p>  <p>Where it has not been possible to adequately treat construction site runoff there remains the option to pump the runoff out to a tanker for disposal off-site at a suitably licensed waste facility.</p>																																																																
<p>Sand bags / straw bales</p>  <p>Sand bags provide a flexible way to prevent sediment laden runoff entering a watercourse by creating temporary dams and barriers to runoff. This is most effective on the face of temporary excavations, cuttings and short length land possessions where there are preferential flow pathways. Like fabric silt fences and sand bags, straw bales are a multipurpose way to manage construction site runoff to prevent untreated ingress to water bodies and to support the filtration of fine particulates from runoff.</p>	<p>Vegetated buffer zone</p>  <p>Vegetated buffer zones protect water bodies by providing a separator between the water body and the area of construction works and a means by which any sediment that can be treated before it drains to the water body. When sowing the works, a Contractor should minimise the area of vegetation clearance, especially around water bodies to maintain natural buffer zones.</p>	<p>Temporary settlement lagoon</p>  <p>Temporary settlement lagoons are an effective way to remove suspended fine particulates from construction site runoff by changing water and allowing the fine particulates to settle out. Where high concentrations are expected, a long retention time is required for significant settlement (due to the very fine nature of the sediment), or space is limited, a series of lagoons may be required with increasing gravel vents, or the use of a flocculant could be considered. The storage required depends on site requirements, character of the sediment, and the duration of works.</p>	<p>Measure: Primary & Secondary Purpose</p> <table border="1"> <thead> <tr> <th>MEASURE</th> <th>SOURCE CONTROL</th> <th>CONVEYANCE</th> <th>TREATMENT</th> </tr> </thead> <tbody> <tr> <td>Fabric silt fences</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Earth bunds</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Sand bags / straw bales</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Silt curtains</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Temporary discharge control</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Drainage grips</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Vegetated buffer zones</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Conveyance swales</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Silt bubble barriers</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Pumps, tanks, lamella clarifiers</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Temporary settlement lagoons</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Steps in series</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Silt mats and check dams</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Tanker for off-site disposal</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Chemical treatments & dosing tanks</td> <td>●</td> <td>●</td> <td>●</td> </tr> </tbody> </table> <p>● Primary Purpose of Measure ● Secondary Purpose of Measure</p>	MEASURE	SOURCE CONTROL	CONVEYANCE	TREATMENT	Fabric silt fences	●	●	●	Earth bunds	●	●	●	Sand bags / straw bales	●	●	●	Silt curtains	●	●	●	Temporary discharge control	●	●	●	Drainage grips	●	●	●	Vegetated buffer zones	●	●	●	Conveyance swales	●	●	●	Silt bubble barriers	●	●	●	Pumps, tanks, lamella clarifiers	●	●	●	Temporary settlement lagoons	●	●	●	Steps in series	●	●	●	Silt mats and check dams	●	●	●	Tanker for off-site disposal	●	●	●	Chemical treatments & dosing tanks	●	●	●
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<p>Silt curtains / nets</p>  <p>Floating silt curtains are designed to control and manage sediment flow within standing waters. It consists of a top filtration pocket below which is a suspended vertically an impermeable curtain, and then a ballast at set intervals to hold the curtain in place. It is typical for a barge-like curtain to be created for the particular water body (i.e. changes in bathymetry, flow conditions can be taken into account). Similar products used for use in low river flows, although they are generally less effective than when deployed in calmer water.</p>	<p>Conveyance swale (option to include check dams / sumps)</p>  <p>Similar to drainage grips, conveyance swales provide a way in which construction site runoff can be directed to storage and treatment areas. The water cross-sectional area of a swale when compared to a drain encourages greater settlement of fine particulates. Settlement can be enhanced by the inclusion of check dams and sediment traps, although the build-up of deposited fine material will need to be monitored and regularly cleared out.</p>	<p>Skips in series</p>  <p>Where there are constraints on space that prohibit the use of construction SuDS (i) in settlement lagoons an alternative option might be to use skips in series to filter runoff through a series of skips filled with clean aggregate filtration and settlement of suspended fine particulates.</p>																																																																	

