Cruachan Expansion Project – Environmental Impact Assessment Scoping Report

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About this Document

Document – Overview

This document describes the Applicant's proposed scope of and approach to the Environmental Impact Assessment which will form part of the application(s) for the Cruachan Expansion Project. This Environmental Impact Assessment Scoping Report provides information on Cruachan Expansion Project, including the assessment methodologies to be used and the likely significant environmental effects which will be considered in the EIA in order to seek a scoping opinion from the Scottish Ministers.

Where can I find help with this document?

If you have any comments or questions about this procedure, please contact the Project Team at :
Email: getintouch@cruachanexpansion.com
Phone: 0141 352 2360

1 Introduction

1.1 Background

1.1.1 This Environmental Impact Assessment ('EIA') Scoping Report has been prepared by Stantec UK Ltd (Stantec) on behalf of Drax Hydro Ltd. ('Drax') (referred to hereafter as 'the Applicant') for the proposed 'Cruachan Expansion Project' a pumped storage electricity generating station, (referred to hereafter as the 'Proposed Development'). This EIA Scoping Report is submitted to the Scottish Ministers in accordance with Regulation 12 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

1.1.2 The application site ('the Site') is focussed on land around and to the east of the existing Cruachan Power Station ('Cruachan 1'), west of Dalmally and Lochawe on the northern banks of Loch Awe in Argyll. A Site Location Plan (Figure 1.1) is provided in Appendix A. Full descriptions of the Site and existing Cruachan 1 Power Station are provided in Chapter 2.

1.1.3 The Proposed Development seeks to optimise use of the existing Cruachan Reservoir and Dam through development of a new underground power station and associated infrastructure. The existing Cruachan Power Station pumped storage facility has a maximum generating capacity of 440MW and the proposals will provide up to 600MW new generating capacity, resulting in a combined generating capacity of up to 1,040 MW. A full description of the Proposed Development is provided in Chapter 3.

1.2 Purpose

1.2.1 The purpose of this EIA Scoping Report is to seek a formal EIA Scoping Opinion from the Scottish Ministers on the Proposed Development. Understanding and, where possible, addressing likely significant effects on the environment is an integral part of the current design process as well as being required to enable the determination of relevant applications and authorisations.

1.2.2 The EIA Scoping Opinion will form the basis of an EIA which is being undertaken for the Proposed Development. Full details of the EIA process and findings will be presented within an EIA Report which will formally accompany the applications made to the Scottish Ministers to authorise the construction and operation of the Proposed Development, which are likely to include:

- Application under section 36 of the Electricity Act 1989 ('a S36 Application') for consent to construct and operate the Proposed Development and a request for deemed planning permission to be granted;
- Application for Acquisition of Water Rights under Schedule 5 of the Electricity Act 1989;
- Controlled Activities Regulations ('CAR') licence under the provisions of the Water Environment (Controlled Activities) (Scotland) Regulations 2011; and
- Listed Building Consent under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997

1.2.3 Other consents, including planning permissions under the Town and Country Planning (Scotland) Act 1997 and technical consents such as environmental licenses and approvals for works in the road network may also be required for elements of the project.

1.2.4 The EIA process will consider the potential for likely significant environmental effects to result from the Proposed Development, as well as the cumulative effects with other approved developments in the local area. This approach will provide comprehensive and robust environmental information on the likely significant effects of Proposed Development.

1.2.5 The purpose of this EIA Scoping Report is to identify the nature and extent of the likely significant environmental effects of the Proposed Development which require to be assessed in the EIA report and to set out the methodologies proposed for that. Accordingly, this report details how the environmental issues are being examined and how it is proposed they are progressed as part of the EIA for the Proposed

Development. The aim is to ensure that the Proposed Development has due regard for the environment, and to support a proportionate EIA that focuses on key environmental issues.

1.2.6 This report provides information regarding the Proposed Development pursuant to the EIA Regulations and sets out the intended scope of the EIA and content of the EIA Report. In accordance with the EIA Regulations, this EIA Scoping Report comprises the following:

- A description of the location of the development, including a plan sufficient to identify the land (see Chapter 2 and **Error! Reference source not found.**);
- a brief description of the nature and purpose of the development and of its likely significant effects on the environment (see Chapter 3, Chapter 5 and Chapters 7-15); and
- such other information or representations as the developer may wish to provide or make (see Chapters 7-0)

1.2.7 Based on this report and in accordance with Regulation 12 of the EIA Regulations, the Applicant therefore requests that the Scottish Ministers adopt an EIA Scoping Opinion in respect of the Proposed Development.

1.3 Project Team

1.3.1 Stantec has co-ordinated the production of this Scoping Report and is acting as EIA Co-ordinator for the Applicant. This report also contains inputs from relevant technical experts, as detailed below in Table 1-1

Table 1-1 - EIA Project Team

Role	Organisation
EIA Co-ordination, Planning, Ground Conditions, Hydrology, Transport and Access, Noise & Vibration, Socioeconomics, Waste Management, Climate Change, Risk Management.	Stantec
Ecology	Applied Ecology Ltd
Landscape and Visual	ASH
Cultural Heritage	RPS

1.3.2 Reflecting the information requirements prescribed by Regulation 5(5) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of the authors of this report is provided in Appendix B . Further details to demonstrate that the individual EIA project team members have the necessary qualifications and expertise to satisfy the "competent experts" requirement within Regulation 5(5)(a) of the EIA Regulations will be provided within the EIA Report for the Proposed Development.

1.3.3 Stantec has also prepared initial conceptual designs for the infrastructure and provided input to define the basis of the planning design which has been used to inform the EIA Scoping Report and will be used to help inform the EIA going forwards.

1.4 Report Structure

1.4.1 This report continues with the following:

- Chapter 2: The Site and Surrounding Area;
- Chapter 3: The Proposed Development;
- Chapter 4: EIA Process;
- Chapter 5: Proposed Scope of the EIA;
- Chapter 6: Legislative and Planning Policy Context;

- Chapter 7 - 15: Topics Included in the EIA Scope;
- Chapter 0 -
-
- Topics to be Scoped out of the EIA
- Chapter 17 - Summary and Next Steps and
- Appendices.

2 The Site and Surrounding Area

2.1 Introduction

2.1.1 This chapter outlines the key environmental characteristics of the Site of the Proposed Development and the surrounding area. This chapter is supported by the Indicative Site Location Plan (Figure 1.1) provided in Appendix A.

2.2 Site Location

2.2.1 The Proposed Development will be focussed on land around and to the east of the existing Cruachan 1 Power Station on the northern banks of Loch Awe in Argyll and Bute (National Grid Reference for Cruachan Reservoir: NN 080 282). The Site is located within the administrative boundary of Argyll and Bute Council (ABC).

2.2.2 The Site, shown on the indicative Site Location Plan (Figure 1.1) in Appendix A, comprises all areas required for construction and operation of the Proposed Development. Given the scale and nature of the Proposed Development, the Site covers a broad area and includes a corridor of land running from Cruachan Reservoir, extending into Loch Awe, a corridor along the access road which currently connects Cruachan Reservoir with the A85, and a separate parcel of land located to the east of the Site where a temporary construction compound is anticipated to be located. The EIA Scoping Boundary as shown in Appendix A is approximately 419.82 hectares (ha) in size, although this is likely to be reduced in area as the design and EIA process evolves.

2.3 The Site and Surrounding Area

2.3.1 The Site encompasses the existing Cruachan 1 facilities, including Cruachan reservoir, underground power station and visitor centre (see Section 2.3 below for further details). Existing private and public roads which connect the A85 to Cruachan Reservoir (including St Conan's Road), the A85, Falls of Cruachan railway station, part of the Oban to Glasgow railway line, and Loch Awe also lie within the boundaries of the Site.

2.3.2 Potential areas for lower construction compounds are also shown on the Indicative Site Location Plan (Figure 1.1) and include areas of agricultural land located to the north east of the Site at Stronmilchan (near the junction of the A85 and B8077). In addition, it is anticipated that may will be some off-site storage requirement for the storage and transhipment of equipment being prepared for barging to the proposed outlet works (this likely to be at existing storage sites and is not part of the Site for the purposes of the EIA and is not shown on the EIA Scoping Boundary in Figure 1.1.

2.3.3 Most areas of the Site are accessed from the A85, which provides access to the nearby villages of Loch Awe (~4.5km to the east), Dalmally (~8km to the east), Bridge of Awe (~6km to the north west) and Taynuilt (~8.5km to the north west). The A85, which is designated as a Trunk Road by the Scottish Ministers, continues to Tyndrum in the east where it meets the A82 and continues to Oban in the west where it meets the A816. The lower construction compounds at Stonmilchan will be accessed via the B8077.

2.3.4 Cruachan Reservoir, which provides the upper reservoir of the existing Cruachan 1 pumped storage facility, is located within a natural coire on the southwest facing slope of Ben Cruachan. The reservoir is impounded by a concrete mixed gravity and buttress dam across the natural outlet to the Cruachan Burn. A path around the reservoir is part of the route used by the public to access the summit of Ben Cruachan.

2.3.5 A range of habitats are present on site, including unimproved acid grassland, wet heaths, bogs, and marshy grasslands. Woodland habitats are present along the access track corridor. Parts of the Site falls within the boundaries of Glen Etive and Glen Fyne Special Protection Areas (SPA), Coille Leitire Site of Special Scientific Interest (SSSI) and Loch Etive Woods Special Area of Conservation (SAC). Additionally,

Loch Etive Mountains Wild Land Area (WLA) is located immediately to the north of Cruachan Reservoir and the Site (see Chapter 9 for further details).

2.3.6 In relation to built heritage, the Category A listed Ben Cruachan turbine hall and the Category B-listed dam, form part of a Category A listing group with the power station. Adjacent to the power station visitor centre is the Category A-listed Falls of Cruachan Railway Viaduct. There are also listed buildings located in the villages along the A85, including in Loch Awe and Bridge of Awe. Ardanaiseig House (Gardens and Designed Landscapes) is located on the opposite side of Loch Awe, approximately 0.8km south east of the Site (see Chapter 13 for further details).

2.3.7 The underlying geology of the Site is complex, with four main rock types including quartz, andesites, basalts and diorites. The majority of the Site is free from superficial deposits, with the exception of the area of Coire Cruachan to the north of the existing reservoir, and an area to the north east of the A85 site access junction (see Chapter 9 for further details).

2.3.8 SEPA Flood Maps indicate that the area has a Low-High likelihood of fluvial flooding. High Likelihood indicates a 10% annual probability of flooding, whilst Low Likelihood indicates a 0.1% annual probability

2.4 Cruachan 1 Power Station

2.4.1 Cruachan 1 Power Station is located to the west of Dalmally. The power station is one of four large-scale pumped storage facilities in the UK and currently operates with a nominal maximum output of 440 MW in full generation mode with an average annual generation output from 2014 to 2020 of circa 255 GWh/year.

2.4.2 The existing Cruachan 1 facility comprises the following main components:

- Cruachan Reservoir (upper head pond); Gross storage 11.1 million m3; live storage 8.47 million m3.
- Energy storage in upper head pond of 6.7 GWh per cycle.
- Twin 4.6 m diameter headrace tunnels that bifurcate to four steel-lined unit penstocks.
- Underground cavern power station housing 2 x 100 MW and 2 x 120 MW reversible Francis pump-turbines and motor-generators.
- Single 6.8 m horseshoe shaped tailrace tunnel and inlet/outlet structure on the bank of Loch Awe.

3 The Proposed Development

3.1 Introduction

3.1.1 This chapter provides an overview of the design strategy and the key characteristics of the Proposed Development.

3.1.2 This chapter is supported by the following Figures, presented in Appendix A:

- 1.1 EIA Scoping Boundary
- 3.1 Indicative Schematic of the General Arrangement Plan
- 9.1 Environmental Constraints
- 11.1 Noise monitoring locations
- 12.1 Landscape and visual constraints
- 12.2 Landscape character areas
- 12.3 Indicative Zone of Theoretical Visibility

3.2 Description of the Proposed Development

3.2.1 The Proposed Development seeks to optimise use of the existing Cruachan Reservoir and Dam through development of a new underground power station and associated infrastructure adjacent to Cruachan 1 to provide up to 600MW new generating capacity. The Proposed Development may be variously referred to as the Cruachan Expansion Project and will be operated independently of the existing 440 MW Cruachan 1 Power Station. Both power stations will use Loch Awe as the lower reservoir and Cruachan Reservoir as the upper reservoir.

3.2.2 The Proposed Development will comprise the following main elements:

- **Upper Control** Works – An additional intake structure including tower, screens, gate and gate shaft would be located within or adjacent to Cruachan reservoir to direct water into a new headrace tunnel and surge shaft underground waterway system;
- **Underground Waterway System** – A series of underground shafts and tunnels carrying water between the upper reservoir and lower reservoir, through the underground cavern powerhouse;
- **Cavern Powerhouse** - A series of underground caverns containing reversible pump-turbines and motor-generators together with associated equipment such as transformers and switchgear. The construction process will require various interconnecting tunnels to allow construction;
- **Substation** –an above ground substation to provide the connection to the existing 275KV circuit that connects to Dalmally sub-station.
- **Ventilation** Shaft – A ventilation shaft will be required to circulate fresh air through the underground access tunnel and cavern power station complex. It is noted that this may also include a cable shaft for the 400kV oil filled cable from the transformers to cable sealing ends/sub-station;
- **Lower Control Works** – Comprising two screened inlet / outlet structures and stop logs, positioned in Loch Awe at the end of the tailrace tunnel below minimum water level. These structures would channel water in and out of Loch Awe;
- **Quayside** – Constructed on the shore of Loch Awe to facilitate use of the Loch for the transport of heavy equipment and materials, and the temporary storage of tunnel spoil prior to its off-site removal;
- **Administration building** - above ground administration and workshop buildings required for day to day operational and maintenance tasks – located close to the upper reservoir;

- **Access Tunnels** – A main access tunnel would be provided for accessing the underground power plant, close to the shore of Loch Awe. This will cross connect to the existing Cruachan 1 power station to allow personnel to easily move between the plants and provide a further means of access/egress; and
- Existing service roads will be used as far as possible to facilitate the long-term operation of the generation station. Some upgrades of these roads may be required to facilitate access by heavy machinery and the removal of spoil.

3.2.3 The following temporary works will also be required for the Proposed Development:

- **An upper site compound** would be established in the vicinity of the existing dam. Once construction work for the Upper Control Works and sub-station is complete, this compound would be removed and the land restored;
- **A lower site compound** including workers welfare and accommodation will be established to the North East of Lochawe village, with access from the Stronmilchan Road. Once construction work is complete, this compound would be removed and the land restored;
- **A section of the proposed Quayside** may be temporary in nature depending on the final scheme design. If so, any temporary sections of the jetty will be removed following completion of construction works and the loch shore reinstated;
- A **temporary diversion of the A85 onto the quayside** may be required in order to facilitate construction of the initial sections of the main access tunnel, although work is being undertaken to avoid this need The A85 would revert to its current alignment once the initial access tunnel works at Loch Awe are complete;
- A railhead or rail sidings may be established in the vicinity of Lochawe Village in order to facilitate removal of spoil by rail. Location and required land take are currently being considered and the temporary or permanent nature of such works would be finalised following discussion with Network Rail. For the purposes of the EIA Report, a worst-case scenario will be assessed, which may be different for different EIA topics.

3.3 Maximum Design Parameters

3.3.1 The Scottish Ministers are requested to provide an EIA Scoping Opinion for the Proposed Development based on the following maximum development parameters within the Site:

- 600MW powerhouse (anticipated to consist of either 4 x 150 MW generating units, 3 x 200 MW generating units or 2 x 300 MW generating units)
- The upper inlet-outlet structure will be located on the south eastern reservoir rim, approximately 200 m upstream of the main dam axis.
- The lower inlet-outlet works will be located immediately to the east of the existing Drax operational area on the Loch Awe foreshore.
- A new lochside structure in Loch Awe to allow access for the development of the inlet outlet structure as well as operational access to the Proposed Development (see below). The quayside is likely to be a maximum size of 300m x 50m.

3.3.2 Whilst the design process is still ongoing and will be informed by the adoption of an EIA Scoping Opinion, these maximum development parameters represent a ceiling which the level of development would not exceed. The maximum development parameters have therefore been used in this EIA Scoping Report to identify the range of reasonable worst case likely environmental effects which, at this early stage, have the potential to be considered significant in the context of the EIA Regulations and thus require further assessment.

3.3.3 An indicative schematic of the layout is shown in Figure 3.1 in Appendix A.

3.4 Construction Process

3.4.1 The construction process will take place over an estimated 65-month programme to achieve commercial operation of the first unit. Surface work is expected to take place Monday - Saturday 7am7pm and Sundays 7am - 12pm with underground works expected to take place 24 hours a day. Some construction activities may need to be undertaken outside these hours, for which agreement would be sought from ABC.

3.4.2 Key construction activities will include the following:

- Mobilisation, site set up, camps, batching plant and haul roads.
- Construction of a working quayside platform on the foreshore of Loch Awe.
- Temporary diversion of A85 onto temporary quayside platform on Loch Awe.
- Construction of the main access and tunnel, various underground construction and access tunnels, tailrace gate chamber, ventilation tunnel, a tailrace surge shaft, and a tailrace tunnel under A85.
- Construction of the water inlet and outlet structure within loch Awe to connect to the tailrace tunnel, including gates, screens and stoplogs
- Re-divert A85 back onto permanent alignment.
- Drive and support main access tunnel to powerhouse complex.
- Excavation and support of powerhouse complex.
- Excavation and support of the high-pressure tunnel system connecting the Cruachan reservoir and the powerhouse.
- Excavation and construction and installation of a headgate to manage water flow to the powerhouse.
- Construction of the upper control works within the Cruachan reservoir to allow water in and out of the new tunnel system.
- Installation of powerhouse overhead crane.
- Installation of powerhouse electromechanical and hydromechanical equipment.
- Installation of powerhouse balance of plant (mechanical and electrical).
- Dry & Wet commissioning of turbines.

3.4.3 Mobilisation will be required at the upper reservoir area and as close as possible to the lower foreshore area. Access to the upper reservoir already exists but it is likely that the existing road will need to be widened in places to accommodate construction traffic. There will also be various other road diversions and temporary works required to establish the working area at the lower foreshore area.

3.4.4 The first phase would be to establish two site offices and staging areas – one for the upper reservoir, a second for the underground works and outlet works and a third for where the main works infrastructure will be put together – where the rock disposal is – or where the concrete batching and steel yard will be. An office complex for the contractor and owner's representative would be established, together with parking and lay-down space for equipment and materials at an appropriate location within the site boundary. Initial equipment needed for constructing project site access would be staged at this area. The second phase would establish access to the main construction areas, with access roads to be completed prior to commencing construction.

3.4.5 . The main camp and office sites would be decommissioned on completion of the works and the land returned to the owners at the end of the construction phase Where required on a temporary basis, land will be restored to a suitable standard in agreement with the relevant landowner(s). ,

3.4.6 All underground works are assumed to use drill and blast methodology. It is assumed that suitable concrete aggregates can be produced from tunnel spoil on the site.

3.5 Operation

3.5.1 The Proposed Development will be designed to be operated 24/7 whenever called upon apart from planned and unplanned outages. It will have a design life of 100 years, after which the need for re-powering or decommissioning will be considered at the time. Repowering and decommissioning are not considered in this scoping report.

4 EIA Process

4.1 Introduction

4.1.1 This section of the Scoping Report explains the proposed approach to the EIA process and the overall assessment methodology in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations').

4.2 Screening

4.2.1 The Proposed Development falls within the definition of a "generating station"[1] set out in Schedule 2 of the EIA Regulations, meaning that the EIA Regulations are engaged in the preparation and determination of relevant consenting applications.

4.2.2 Having regard to the nature of the Proposed Development and known environmental sensitivities within and surrounding the Site, the Applicant is of the view that it is appropriate for an EIA to be undertaken in relation to consenting applications for the Proposed Development. A prior EIA screening request has therefore not been made, and the Applicant will be undertaking an EIA to accompany the s.36 and associated consenting applications for the Proposed Development in accordance with Regulation 6(b) of the EIA Regulations.

4.3 Scoping

4.3.1 The purpose of EIA Scoping is to identify the nature and extent of the likely significant environmental effects of a development. It also allows for the issues identified to be subject to the appropriate level of assessment. Scoping also gives relevant stakeholders an opportunity to express their views the scope of the EIA.

EIA Report

4.3.2 Full details of the EIA being undertaken for the Proposed Development will be reported within an EIA Report which will form part of the relevant consenting applications.

4.3.3 Regulation 12(4) of the EIA Regulations prescribes the information which must be included within an EIA Report and requires any of the additional information listed in Schedule 4 of the Regulations to be included in an EIA Report where relevant. The EIA Report for the Proposed Development will be based on the terms of an EIA Scoping Opinion to be adopted by the Scottish Ministers in response to this EIA Scoping Report and will include appropriate and proportionate consideration of all relevant information requirements prescribed within the EIA Regulations. The proposed approach to undertaking the EIA and providing all of the required information is set out below.

4.4 Consultation

4.4.1 The design of the Proposed Development is being progressed through an iterative process of design, assessment, and review. The proposals submitted for planning consent will, where possible, incorporate measures in the design to mitigate potential adverse environmental effects, and to enhance environmental benefits.

4.4.2 Consultation with relevant statutory and non-statutory bodies has informed some elements of this scoping report and will continue to inform the iterative design and EIA processes which will be reported in the EIA Report.

[1] As the Proposed Development includes an underground power station which will be capable of operating on a standalone basis

4.4.3 Specific consultation relating to those topics proposed to be scoped into the EIA, undertaken to date, is set out within discipline specific details in Chapters 7-15. An overview of consultation undertaken is provided within Table 4-1 below.

Table 4-1 - Schedule of Consultation

Consultee	Relevant Discipline	Purpose of Consultation	Date
Energy Consents Unit	EIA wide	Briefing to ECU on project	March and April 2021
Nature Scot	Biodiversity	Agree scope of ecological surveys	April 2021
Nature Scot	LVIA	Briefing on potential landscape and visual impacts	June 2021
Argyll and Bute Council	EIA wide	Briefing to ABC on project	May 2021
Argyll and Bute Council	Hydrology	Data requests for water abstractions and hydraulic modelling	May 2021
Transport Scotland	Traffic and Transport	Describing approach and methodology for transport assessment.	May 2021

4.4.4 Consultation with statutory and non-statutory consultees, along with the local community, will continue to inform both the EIA and the design of the Proposed Development. At present it is anticipated that there will be three separate community consultation events, taking place in:

- July 2021 (to coincide with the publication of this Scoping Report),
- September 2021 and
- November 2021.

4.5 Key issues

4.5.1 Having regard to the characteristics of the site, the existing Cruachan pumped storage hydro station and findings from preliminary work for Cruachan 2 including the pre-FEED Study led by Stantec UK, the main environmental issues to be addressed in this project include:

- Climate change, including carbon balance across construction and operational periods;
- Socio-economic effects from the construction workforce, inward investment and the supply chain;
- Construction transport effects and logistics;
- Effects on hydrological regimes, geomorphology and the water environment;
- Disturbance of ornithological and ecological species, habitats and designated sites;
- Suitability of tunnel arisings and geomorphology to facilitate land reclamation; and,
- Impacts on landscape character, visual amenity and heritage interests.

4.5.2 The Applicant's approach is focused around using the EIA process to deliver a robust and proportionate EIA.

4.6 Assessment

4.6.1 In general terms, the main stages in the EIA are as follows:

- Data Review – draw together and review available data;

- Scoping – identify significant issues, determine scope of EIA;
- Baseline Surveys – undertake baseline surveys and monitoring;
- Assessment and iteration – assess likely significant effects of development, evaluate alternatives, provide feedback to design team on adverse effects, incorporate any necessary mitigation, assess residual effects of mitigated development; and
- Preparation of the EIA Report.

4.6.2 The proposed scope of the EIA and approach to the assessment of likely significant effects is set out in Chapters 7 –15.

4.6.3 The EIA Report will include an assessment of cumulative effects, as outlined in Section 5.4.

4.7 Mitigation

4.7.1 One of the most important functions of the EIA process is to identify ways to mitigate likely adverse environmental effects and to identify opportunities that the Proposed Development may have for environmental improvements. The EIA Regulations require the EIA Report to contain: "*A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment".*

4.7.2 A hierarchy of methods for mitigating significant adverse effects will be followed; these are, in order of preference:

- **Avoidance** – designing a Proposed Development in such a way that avoids effects on the environment (e.g. imposing a maximum height restriction on new development);
- **Reduction** – design the development or employ construction methodologies such that significant effects identified are reduced (e.g. employment of sustainable drainage to mitigate effects of development in flood prone areas);
- **Compensation** – providing off-site enhancement in order to compensate for where onsite mitigation has not been possible (e.g. financial contributions towards local infrastructure); and
- **Enhancement -** opportunities that The Proposed Development may provide to enhance the local and wider environment (e.g. allow greater appreciation of heritage assets).

4.7.3 It is anticipated that a framework Construction Environmental Management Plan (CEMP) will be submitted in support of the consenting applications, which will outline methods to avoid, reduce and mitigate construction effects on the environment. This document will be updated as the Proposed Development progresses to enable the plan to be effective and account for any changes that occur during construction works.

4.7.4 The EIA Report will identify mitigation measures for the construction and operation the of the Proposed Development to avoid, minimise and reduce adverse environmental effects. Residual environmental effects remaining after mitigation measures have been incorporated will be fully described in the EIA Report.

4.7.5 A collated schedule of mitigation would be included in the EIA Report, setting out mitigation to be delivered as part of the Proposed Development and how this will be secured.

Embedded Mitigation

4.7.6 There is a distinction between mitigation that is incorporated or 'embedded' into the design of the development (embedded mitigation) and mitigation that is subsequently identified in order to prevent, reduce, or offset any remaining significant adverse effects (secondary mitigation). Embedded mitigation may include, for example, reducing the maximum height of buildings to mitigate visual effects, or incorporation of biodiversity net gain.

4.7.7 Embedded mitigation evolves through the iterative design process and early consideration of the likely significant impacts is essential to incorporating suitable embedded mitigation measures.

Secondary Mitigation

4.7.8 The EIA Report, within each of the topic chapters as appropriate, will also document the secondary mitigation that is required to complement the embedded mitigation. Secondary mitigation includes topic and project specific measures which have been developed to limit particular impacts, e.g. additional noise attenuation on loud items of plant to reduce impacts to nearest sensitive receptors, adoption of methodologies or controls to avoid or reduce effects.

4.8 Monitoring

4.8.1 The EIA Regulations require "*the monitoring of any significant adverse effects on the environment of Proposed Development*". The EIA Report will therefore ensure that it is clear which, if any, likely effects are both adverse and significant and may therefore require monitoring. In the event that any residual significant adverse effects are predicted to occur, consideration of the potential need for and proportionality of monitoring arrangements in respect of such effects, and how it could be carried out will be set out within each technical assessment chapter of the EIA Report. A consolidated schedule of any proposed monitoring will also be provided within the EIA Report.

4.9 The EIA Report

4.9.1 Regulation 5 of the EIA Regulations prescribes the information which must be included within an EIA Report which accompanies an application for development consent or other authorisations made under the Electricity Act 1989. This Regulation also requires any of the additional information listed in Schedule 4 of the Regulations to be included in an EIA Report where it is "*relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected*". The EIA Report for the Proposed Development will include appropriate and proportionate consideration of all relevant information requirements. The proposed approach to providing this information is set out within this EIA Scoping Report.

4.10 Consideration of Reasonable Alternatives

4.10.1 Regulation 5(2)(d) of the EIA Regulations requires EIA Reports to include "*a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*". Whilst a full description of alternatives and an assessment of their likely environmental effects are not required, sufficient detail should be provided to allow for a meaningful comparison between alternatives and development proposal being subject to EIA.

4.10.2 The EIA Regulations do not expressly require an EIA Report to consider alternatives if none have been identified, although it is considered best practice to do so. The EIA Report will fulfil these statutory requirements through identifying the reasonable alternatives considered, including with respect to the implementation of the revised design strategy and the associated iterative design process, and will explain the main reasons for the choices made. It is anticipated that such reasons for choosing between reasonable alternatives may include policy requirements, viability, engineering constraints, site topography and likely environmental effects.

5 Proposed Scope of the EIA

5.1 Technical Scope

5.1.1 The technical scope describes the environmental topics that should be addressed by an EIA, in accordance with the requirements of Regulations 4(2) and 18 and Schedule 4 of the EIA Regulations. Schedule 4 sets outs that the EIA Report must include a description of the aspects of the environment, which are likely to be significantly affected by the Proposed Development.

5.1.2 This requirement and the broad categories set out in Schedule 4, along with others which are considered to have the potential to lead to significant environmental effects, have been interpreted and applied in the context of the Proposed Development. Table 5-1 therefore sets out those topics that it is proposed to both scope into and out of the EIA.

5.1.3 Section references are provided to where these categories have been included within the EIA Scope. Chapters 7 –15 of this report provides a detailed analysis of the proposed technical scope of the EIA, while Chapter 0 identifies those topics which it is proposed to scope out of the EIA as it has been shown that significant environmental effects are unlikely to occur.

Table 5-1: Technical Scope

EIA Regulations Topic	Scoped in (√) / Scoped out (x)?	Explanation within this Scoping Report
Population	✓	Chapter 14 Socio-economics Chapter 10 Transport and Access
Human Health	✓	Section 16.2 Air Quality Chapter 14 Socio-economics Chapter 11 Noise and Vibration
Biodiversity (for example Flora and Fauna)	✓	Chapter 9 Ecology
Land (for example land take)	✓	Chapter 7 Ground Conditions
Soil (for example organic matter, erosion, compaction, sealing)	✓	Chapter 7 Ground Conditions
Water (for example hydromorphological changes, quantity and quality)	✓	Chapter 8 Hydrology
Air	X	Section 16.2 Air Quality
Climate (for example greenhouse gas emissions, impacts relevant to adaptation)	✓	Chapter 15 Climate Change
Material assets	✓	Chapter 12 Landscape and Visual Chapter 7 Ground Conditions
Cultural heritage, including architectural and archaeological aspects	✓	Chapter 12 Landscape and Visual Chapter 13 Cultural Heritage
Landscape	✓	Chapter 12 Landscape and Visual
The inter-relationship between the above factors	✓	Chapter 17 Summary

EIA Regulations Topic	Scoped in (√) / Scoped out (x)?	Explanation within this Scoping Report
Waste Management	X	Chapter 16
The Risk of Major Accidents and/or Disasters	x	Chapter 16

5.1.4 For clarity it is proposed to scope out the following items from the EIA. Further detail and justification for scoping these items out is provided in Chapters 7-16 of this Scoping Report:

- Effects arising from the decommissioning phase of the Proposed Development;
- Effects arising from potential re-powering at the end of the operation lifetime of the Proposed Development, as this would be subject to a separate planning application at the time;
- Natural watercourses and aqueduct connections draining into Cruachan Reservoir;
- Watercourses draining into Loch Awe – River Orchy, River Awe;
- Changes to the hydrological regime of Cruachan Reservoir and Loch Awe;
- Effects on the following species: wildcat, freshwater pearl mussel, beaver and specially protected amphibians such as great crested newt;
- Operational effects on traffic and transport;
- Effects on public transport;
- Operational noise;
- Cumulative Landscape and Visual Impacts Assessment (CLVIA);
- Operational effects on heritage assets;
- Vulnerability of the Proposed Development due to climate change during construction;
- Effects from waste management; and
- Risk of Major Accidents and Disasters.

5.1.5 The following sets out the principles for the temporal and spatial scope, and the approach to the assessment of effects, that will be applied to the EIA of the topics identified in Chapters 7 –15.

5.2 Temporal Scope

Environmental Baseline

5.2.1 As a general principle, environmental effects will be assessed by comparing the predicted state of the environment without the Proposed Development, with the state of the environment with the Proposed Development for a particular year.

5.2.2 The EIA Regulations require an outline of the likely evolution of the Site environment without implementation of the Proposed Development as far as changes from the baseline scenario can be predicted. This baseline evolution will include future trends such as air quality and traffic growth.

5.2.3 The EIA will take into account existing, proposed (in planning) and approved developments that are likely to come forward during the demolition and construction of the Proposed Development and, where appropriate, these will be factored into the definition of the baseline or identified as receptors at a relevant point in time.

Duration of Effects

5.2.4 Environmental effects will be classified as either permanent or temporary, as appropriate. Permanent changes are those which are irreversible or will last for the foreseeable future.

5.2.5 The duration of temporary environmental effects will be defined as short, medium or long term based on the likely durations of the demolition, construction and operational phases of the development. These definitions will be considered within the assessment of the likely significant effects and will be set out in the EIA Report.

5.2.6 Where environmental effects will be infrequent or intermittent (such as effects related to activities that will not be continuous during demolition and construction) this will be noted in the EIA Report; and the frequency of these activities will be considered in the assessment.

Phases of the Scheme

5.2.7 There are two discrete phases of the Proposed Development which will be considered in relation to the likely significant effects: the construction phase; and the operation phase. The Proposed Development is considered to be permanent and therefore the assessment of effects associated with decommissioning have been scoped out of the EIA.

Construction

5.2.8 Certain environmental effects will only occur during construction of the Proposed Development and will cease once construction activities have ceased. These will typically be the temporary effects of the scheme and will be described as “short-term” or “medium-term”, as appropriate, using the definitions set out in the EIA Report. Examples include but are not limited to:

- Creation of dust;
- Risk of pollution from e.g. stockpile runoff; and
- Changes to the landscape and people’s views from e.g. large cranes and construction plant.

Operation

5.2.9 Environmental effects that occur during the operation of the Proposed Development will typically be permanent or “long-term”. Examples of permanent effects which might occur during the operation of the scheme include but are not limited to:

- Changes to people’s key views due to the presence of new development in the landscape;
- Changes to the hydrological regime of Cruachan Reservoir and Loch Awe; and
- Increased traffic on surrounding roads.

5.3 Spatial Scope

5.3.1 The spatial extent of each of the technical assessments will vary from one to another in accordance with the relevant policy and guidance for the assessment of that topic; in some instances, the environmental effects will extend no further than the boundary of the Site and in other cases the assessment will extend to a buffer beyond the Site boundary. The study area for each technical assessment will be identified and described as appropriate in each of the topic chapters of the EIA Report.

5.4 Assessment of Effects

Types of Effects

5.4.1 In assessing the significance of effects identified during the EIA, account will be taken as appropriate as to whether effects are:

- **Direct Effects** – effects that are caused by activities which are an integral part of The Proposed Development;
- **Indirect Effects** – effects arising indirectly from the demolition and construction or use of a development;
- **Secondary Effects** – are 'knock-on'/one-removed effects arising in consequence of indirect effects;

- **Cumulative Effects** – effects of The Proposed Development and other developments of the same type on the same receptor;
- **Short-Term and Medium-Term** – Environmental effects that occur during the demolition and construction of a project will typically be Short or Medium Term;
- **Long-Term** – Environmental effects that occur during the operation of a project will typically be Long Term;
- **Temporary Effects** – Environmental effects that occur during the construction of a project will typically be temporary;
- **Permanent Effects** – Environmental effects that occur during the operation of a project will typically be permanent;
- **Positive Effects** – effects that have a positive influence on the environment; and
- **Negative Effects** – effects that have a negative influence on the environment.

5.4.2 For clarity within the assessment, 'impact' will be used in relation to the outcome of the project (e.g. the removal of habitat or the generation of emissions to air), while the 'effect' will be the consequent implication in environmental terms (continuing the above example, e.g. the loss of a potential bird breeding site or the reduction in local air quality).

Residual Effects

5.4.3 The incorporation of mitigation measures will be reported where appropriate and likely significant residual effects that remain will be described and assessed according to the significance criteria set out in Table 5-2 below.

5.4.4 The significance of an effect is typically the product of two factors, the sensitivity of the environmental resource affected and the magnitude of the impact. Consideration may also need to be given to the likelihood of an effect occurring.

5.4.5 This approach to assessing and assigning significance to an environmental effect will be based upon legislative requirements, guidelines, standards and codes of practice, the advice and views of statutory consultees and other interested parties and expert judgement. The following questions are relevant in evaluating the significance of likely environmental effects:

- Which risk groups are affected and in what way?
- Is the effect reversible or irreversible?
- Does the effect occur over the short, medium, or long term?
- Is the effect permanent or temporary?
- Does the effect increase or decrease with time?
- Is the effect of local, regional, national, or international importance?
- Is it a positive, neutral, or adverse effect?
- Are health standards or environmental objectives threatened?
- Are mitigating measures available and is it reasonable to require these?

5.4.6 Specific significance criteria will be prepared for each specialist topic as appropriate, based on the above and the generic criteria set out in Table 5-2 below and adapted to accord with topic-specific guidance.

Table 5-2 - Significance criteria

Significance Level	Criteria
Substantial	Only adverse effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change at a local scale site or feature may

	also enter this category.
Major	These effects are likely to be important considerations at a local scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process.
Moderate	These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.
Negligible	Either no effect or effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

5.4.7 Effects that are described as 'substantial', 'major' or 'moderate' are determined to be *significant*; and effects that are described as 'minor' or 'negligible' are determined to be *not significant* in the context of the EIA Regulations.

Cumulative Effects

5.4.8 The EIA Regulations require the consideration of the potential impact of inter-relationships and cumulative effects of "existing and/or approved development" with the Proposed Development.

5.4.9 The EIA will consider as appropriate:

- The likely significant cumulative effects of The Proposed Development and other major local existing and/or approved developments; and
- The potential for impact interactions leading to an aggregated environmental effect on a receptor being greater than each of the individual effects that have been identified (e.g. local people being affected by noise, dust and increased traffic levels during the demolition and construction of the development, where those impacts are greater combined than individually).

5.4.10 A review of approved developments and undetermined applications within the locality of the Proposed Development has been undertaken. Through the EIA process, consideration of which approved developments have the potential to lead to significant cumulative effects with the Proposed Development will be made.

5.4.11 At this stage given the remote location of the Site, no schemes under the Town and Country Planning (Scotland) Act 1997 or S.36 of the Electricity Act which have been identified of significant size or scale that are likely to lead to potential cumulative effects in combination with the Proposed Development. This review will be updated prior to the production of the EIA Report and associated assessments to confirm this remains the case. For the traffic and transport chapter of the EIA Report, NRTF low and high growth factor for local and trunk roads respectively will be applied in order to forecast the traffic demand for the worst-case year of the construction phase (2026).

5.4.12 Committed developments will be allowed for in the assessment, including any interventions and road network improvements, during the construction phase period.

Impact Interactions

5.4.13 A dedicated chapter of the EIA Report will assess the potential impact interactions, i.e. receptors being affected by more than one environmental effect and therefore potentially being subject to a more significant combined effect than the individual effects reported in each of the topic chapters. This chapter will draw together the outcomes of individual discipline assessments in order to identify the overall effect of the Proposed Development.

5.5 Uncertainty and Difficulties Undertaking the Assessment

5.5.1 The prediction of future effects inevitably involves a degree of uncertainty. Where necessary, the EIA Report will describe the principal factors giving rise to uncertainty in the prediction of environmental effects and the degree of the uncertainty.

5.5.2 Confidence in predictions will be engendered by employing accepted assessment methodologies, e.g. Guidance for Ecological Impact Assessment by the Institute of Ecology and Environmental Management. Uncertainty inherent within the prediction will be described.

5.5.3 Uncertainty also applies to the success or otherwise of measures to mitigate negative environmental effects. Where the success of a mitigation measure is uncertain, the extent of the uncertainty will be identified in the EIA Report.

5.5.4 The EIA Report will identify, in accordance with Schedule 4 of the EIA Regulations, any difficulties that have been encountered in undertaking the assessment.

6 Legislative and Planning Policy Context

6.1 Introduction

6.1.1 The EIA will be progressed taking account of applicable legislation, policy and guidance, as detailed in this section of the Scoping Report. At this stage, relevant legislative and policy frameworks have been used to guide the scope of the EIA and determine the receptors and environmental effects which require to be assessed. The implications of the statutory requirements and policy documents identified below will be considered in further detail within the EIA Report for the Proposed Development.

6.2 Applicable Statutory Provisions

6.2.1 The Proposed Development will have an installed generating capacity in excess of 50MW, therefore consent will be sought from the Scottish Ministers under section 36 of the Electricity Act 1989. In making a section 36 application, the applicant will also seek a direction from the Scottish Ministers under Section 57(2) of the Town and Country Planning (Scotland) Act 1997 that planning permission is deemed to be granted for the Proposed Development. Any conditions attached to the deemed planning permission will require to be discharged through the submission of relevant information to Argyll and Bute Council (ABC) as the host local planning authority (LPA).

6.2.2 In the case of section 36 applications, section 25 of the Town and Country Planning (Scotland) Act 1997 is not engaged, and the statutory Development Plan does not have primacy in the decision-making process, although it will be a material consideration. Rather, more weight is given to the provisions of the Electricity Act 1989 as well as national planning policy and guidance, whilst taking account of other valid considerations.

6.2.3 In accordance with Schedule 9 of the Electricity Act 1989, the Applicant:

> *"shall have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiological features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and*
>
> *shall do what he reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects".*

6.2.4 Scottish Ministers are also required to have regard to these matters in determining a section 36 application.

6.2.5 Regulation 5 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 provides that an EIA Report must accompany any application for section 36 consent for EIA developments.

6.2.6 These obligations will be met by undertaking a robust assessment of likely significant effects from the Proposed Development on the environment, which will be reported in the EIA Report. Relevant subject specific legislation will also be identified and addressed where relevant in topic specific chapters of the EIA Report.

6.3 Renewable Energy and Climate Change Framework

Introduction

6.3.1 Pumped storage hydro schemes take advantage of cyclical patterns of energy usage. When energy use is low, electricity is absorbed from the national grid and used to pump water from a lower reservoir to a higher one for storage. When energy generation is required (i.e. greater demand/usage) water is

released through the generation infrastructure back into the lower reservoir. Pumped storage hydro can be used to avoid the curtailment of intermittent non synchronous renewables technologies (such as wind and solar) and can avoid the costly reinforcement of the transmission network. In other words, the deployment of such projects enables greater renewables deployment on the GB power system. With their ability to provide long duration energy storage and utilise renewable water resources, hydro pumped storage schemes effectively act as large batteries and provide extremely quick back-up during periods of excess demand, and also helping maintain grid stability which is a key challenge identified by the CCC in their recent report to the Scottish Parliament.

International and European Policy Context

6.3.2 Statutory and policy requirements at UK and Scottish level to mitigate climate change and increase renewable energy generation are informed by higher level international agreements as outlined below.

6.3.3 At the international level, action to tackle climate change is informed by the work of the Intergovernmental Panel on Climate Change (IPCC) and underpinned by the United Nations Framework Convention on Climate Change (UNFCCC, 1992), which aims to stabilise atmospheric greenhouse gas concentrations at a level sufficiently low "*to prevent dangerous anthropogenic interference with the climate system"* (Article 2). On 12th December 2015, 196 Parties to the UNFCCC including the UK adopted the Paris Agreement, which commits UNFCCC signatory countries to take action to cut carbon emissions and emphasises the aim of restricting temperature rises to below 2°C above pre-industrial levels. In addition, a recent report by the World Energy Council references the 'Energy Trilemma', which ranks countries on their ability to provide sustainable energy through three metrics: energy security, energy equity, and environmental sustainability. Pumped Storage Hydro is able to play a key role in meeting all three of these objectives.

UK Legislative and Policy Context

6.3.4 At the UK level, action to tackle climate change is underpinned by the Climate Change Act 2008 as amended by the Climate Change Act 2008 (2050 Target Amendment) Order 2019. This legislation created a legally binding duty on the Secretary of State to ensure a 100% reduction by 2050 in the UKs net CO2 account – covering all six Kyoto Protocol Green House Gasses (GHGs) – compared with 1990 levels, resulting in 'net-zero carbon' emissions. The 2008 Act also established a rolling system of statutory five-year carbon budgets to ensure steady progress towards the 2050 emissions reduction target. The UK Government has also indicated it will legislate for a 78% reduction of GHGs by 2035 in line with the recommendations of the 6th carbon budget.

6.3.5 A range of policy documents set out the UK Governments binding commitments to cut carbon emissions through the deployment of renewable energy, including the UK Government's Ten Point Plan for a Green Industrial Revolution (2020), Energy White Paper (2020), Carbon Plan (2011), and the UK Renewable Energy Roadmap (2011) (updated 2012 and 2013).

Scottish Legislative and Policy Context

6.3.6 On 14th May 2019 the Scottish Government declared a climate emergency and stated that tackling climate change would be placed at the heart of all decision making. The Scottish Government recognises the opportunities that Scotland's vast renewable energy potential provides for both playing an important role in tackling climate change and developing world leading expertise in low carbon technologies.

6.3.7 Scotland has enacted a world leading legislative framework to tackle climate change and transition to a low carbon economy, with the Climate Change (Scotland) Act 2009 as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. This sets out ambitious binding net carbon emission reduction targets to require a 70% reduction in net emissions by 2030, a 90% reduction by 2040 and a 100% reduction (i.e. for Scotland to become net zero carbon) by 2045. The targets reflect the view expressed by the UK Committee on Climate Change (May 2019) that Scotland has greater capacity to remove emissions than the UK as a whole, including through substantial renewable energy generation.

6.3.8 Sitting alongside Scotland's world leading climate change legislative framework, the Scottish Energy Strategy (2017) sets a target for "*the equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources*" by 2030. This builds upon existing

electricity generation-only targets set for 2020 and confirms that further action to decarbonise Scotland's energy system is required. The Energy Strategy notes that *"investment in new PSH capacity in Scotland could greatly enhance the flexibility and resilience of our electricity network and power supplies. These are major infrastructure projects, with considerable economic and industrial value attached.*" In March 2021 the Scottish Government published Scotland's Energy Strategy Statement Position Statement which provides an overview of their approach to supporting the energy sector in the lead up to COP26 and a green economic recovery from the COVID-19 pandemic. The statement sets out a comprehensive programme of work across the energy sector but does not replace the current Energy Strategy.

6.3.9 In response to the new and ambitious targets set by the Climate Change Act 2019 the Scottish Government has updated Scotland's 2018-2032 Climate Change Plan. Published in December 2020, the Update to the Climate Change Plan, 2018-2032, Securing a Green Recovery on a Path to Net Zero, is a key strategic document supporting the green recovery from COVID-19. Chapter 3.1, Electricity, discusses the decarbonisation of Scotland's energy sector which has been aided by the growth of renewable technology and sets out that further progress is needed to move for a low carbon electricity system to one that is no carbon. The Plan recognises that further decarbonising the system means addressing the substantial challenges of maintaining security of supply and a resilient electricity system, noting that pumped hydro storage has an important role to play in this as it can release stored electricity when the demand is high and system needs it most. The Update also confirms that the Scottish Government's policy of collaborating to support investment in new pumped storage hydro capacity, set out in the Climate Change Plan, remains in place.

6.4 Planning Policy Framework

National Planning Framework 3 (NPF3) (2014)

6.4.1 The NPF3 provides a statutory framework around which to orientate Scotland's long-term spatial development. In relation to renewable energy, Section 3 of the NPF3, "*A low carbon place"*, sets out a commitment to continue to facilitate renewable energy developments and guiding new infrastructure to appropriate locations and sets an ambition for Scotland to be considered a world leader in the low carbon energy generation sector.

6.4.2 Paragraph 3.30 of NPF3 identifies hydroelectric power as a key asset and recognises that increasing the capacity of pumped storage hydroelectricity can complement ambitions for more renewable energy capacity. The expansion of Cruachan through the Proposed Development is specifically cited as being amongst the most advanced plans for new hydropower pumped storage schemes and the relationship with the existing Cruachan 1 Power Station is noted.

6.4.3 Section 6 of NPF3 *Delivery,* identifies 14 National Developments that are needed to help deliver the spatial strategy and establishes the need for those developments. Paragraph 6.5 sets out that the strategy for a *low carbon place* reflects the opportunities for growth arising from natural energy resources and a range of infrastructure, including enhancement of existing facilities, is needed to meet the ambition. Three national developments are included to assist delivery of the low carbon place strategy, one of which is pumped hydroelectric storage at existing and new sites with particular support given to Cruachan which is recognised as *a nationally important pumped storage facility with significant potential for enhanced capacity.*

6.4.4 The National Planning Framework 4 (NPF4) Position Statement (November 2020) sets out the Scottish Government's current thinking on the issues that will need to be addressed when Scotland's fourth National Planning Framework is being prepared. The Position Statement will be used inform further discussions on the content of the draft revised framework for consultation. NPF4 will be a plan for Scotland in 2050 that sets out where development and infrastructure is needed in the coming years. The Position Statement sets out that the strategy contained in NPF4 needs to align with the ambitious targets for addressing climate change which demand a fresh approach and significant investment in infrastructure. It recognises that planning needs to support a green economic recovery from COVID-19 in the short term, as well as enabling strategic investment in the long term. NPF4 will include national planning policies which will provide a clear and coherent plan for future development in Scotland. At

this stage, Cruachan has been submitted as a candidate National Development and has been identified by the Scottish Government for consideration in the preparation of the Draft NPF4.

6.4.5 The current NPF3 and Scottish Planning Policy remain in place until NPF4 is adopted by Scottish Ministers. It is expected that a draft NPF4 will be presented to the Scottish Parliament in autumn 2021, following which public consultation on the full proposals will take place. Working to this timescale it is likely that Draft NPF4 will have been published at the time of submission of the S36 application and NPF4 will have replaced NPF3 at the time of the S36 application being determined.

Scottish Planning Policy (SPP) (2014) (Revised December 2020)

6.4.6 The Scottish Planning Policy (SPP) sets out national planning policies which reflect Scottish Ministers' Priorities for operation of the planning system and for the development and use of land. The document aims to contribute to the achievement of the Scottish Government's overarching purpose of achieving sustainable economic growth and sets out supportive policies relating to sustainable development and the delivery of renewable energy generation capacity, including energy storage projects at a range of scales.

6.4.7 SPP sets out four planning outcomes. Outcome 2 'a low carbon place' involves *"reducing our carbon emissions and adapting to climate change"*, and SPP paragraph 19 recognises that *"planning can support the transformational change required to meet the emission reduction targets and influence climate change*."

6.4.8 SPP contains a presumption in favour of sustainable development, and paragraph 29 sets out 13 principles to guide any assessment of whether a proposal supports sustainable development.

6.4.9 Paragraph 156 includes energy storage among the national priorities for energy infrastructure, and paragraph 168 recognises that *"Energy storage schemes help to support development of renewable energy and maintain stability of the electricity network where reinforcement is needed to manage congestion."*

6.4.10 Paragraph 169 identifies criteria to be taken into account in determining energy infrastructure proposals:

- "*net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities;*
- *The scale of contribution to renewable energy generation targets;*
- *Effect on greenhouse gas emissions;*
- *Cumulative impacts – planning authorities should be clear about likely cumulative impacts arising from all of the considerations below, recognising that in some areas the cumulative impact of existing and consented energy development may limit the capacity for further development;*
- *Impacts on communities and individual dwellings, including visual impact, residential amenity, and noise ;*
- *Landscape and visual impacts, including effects on wild land;*
- *Effects on the natural heritage, including birds;*
- *Impacts on carbon rich soils, using the carbon calculator;*
- *Public access, including impact on long distance walking and cycling routes and scenic routes identified in the NPF;*
- *Impacts on the historic environment, including scheduled monuments, listed buildings and their settings;*
- *Impacts on tourism and recreation;*
- *Impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised;*
- *Impacts on road traffic;*

- *Impacts on adjacent trunk roads;*
- *Opportunities for energy storage*
- *Effects on hydrology, the water environment and flood risk; and*
- *The need for conditions relating to the decommissioning of developments including ancillary infrastructure, and site restoration"*

6.4.11 Where relevant, the scope of the EIA will allow for these considerations to be identified and assessed. Other relevant provisions within SPP (2014 as amended), including requirements under the heading 'Valuing the Natural Environment' to afford appropriate protection to environmental assets and designated sites, will also be taken into account in this EIA Report. A more detailed analysis of the relevance and implications of SPP (2014) will be provided in the EIA Report to accompany the section 36 application for the Proposed Development.

National Planning Policy Advice and Guidance

6.4.12 Scottish Government Planning Advice Notes (PAN) which set out detailed advice in relation to relevant planning issues are:

- PAN 51: Planning, Environmental Protection and Regulation (2006);
- PAN 60: Planning for Natural Heritage (2000);
- PAN 61: Planning and Sustainable Urban Drainage Systems (2001);
- PAN 75: Planning for Transport (2005);
- PAN 79: Water and Drainage (2006);
- PAN 3/2010: Community Engagement (2010);
- PAN 1/2011: Planning and Noise (2011);
- PAN 2/2011: Planning and Archaeology (2011);
- PAN 1/2017: Environmental Impact Assessment Regulations (2017);
- Flood Risk: Planning Advice (2015);
- Hydro Schemes: Planning Advice (2013);
- Energy Storage: Planning Advice (2013); and

6.4.13 Relevant guidance developed by the Scottish Government's Key Agencies:

- Land Use Planning System Guidance Note 18: Planning Guidance on Hydropower Developments (Version 3) (SEPA 2013);
- Land Use Planning System Guidance Note 2a: Development Management Guidance on Flood Risk (Version 2) (SEPA, 2018)
- Guidance for Applicants on Supporting Information Requirements for Hydropower Applications: The Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR) (SEPA)
- Hydroelectric Schemes and the Natural Heritage (SNH now NatureScot, 2015)

The Development Plan

Argyll and Bute Local Development Plan (2015)

6.4.14 The Argyll and Bute Local Development Plan (LDP) was adopted by Argyll and Bute Council (ABC) in March 2015 and sets out the overarching vision, spatial strategy and general planning policies to guide development in their administrative area.

6.4.15 Policy LDP 6: Supporting the Sustainable Growth of Renewables is most relevant to the Proposed Development. It states that

"the Council will support renewable energy developments where these are consistent with the principles of sustainable development" and it is demonstrated that there are no cumulative or individual unacceptable significant adverse effects, including on *"local communities, natural and historic environments, landscape character and visual amenity"* and the Proposed Development should be compatible with adjacent land uses.

6.4.16 The scope of the EIA will allow for any likely significant effects on these environmental and amenity interests to be identified and assessed in accordance with Policy LDP 6.

6.4.17 Other relevant policies within the LDP are listed in Table 6-1 below. This table does not quote the policies in full but rather identifies relevant receptor types and issues which will be assessed through the EIA to demonstrate the accordance of the Proposed Development with these policies.

Table 6-1 - Relevant LDP Policies and Key Issues and Receptors Requiring Assessment

LDP Policy	Key Issues and Receptors Requiring Assessment
DM1: Development within the Development Management Zones	▪ Very Sensitive Countryside designation – renewable energy development encouraged
1: Sustainable Development	▪ Local community benefit ▪ Use of existing infrastructure and services ▪ Sustainable forms of design including minimising waste, reducing carbon footprint and increasing energy efficiency ▪ Natural and built environment ▪ Biodiversity, natural and built heritage resources ▪ Landscape character of the area ▪ Setting and character of settlements ▪ Flooding and ground instability ▪ Impacts on land, air and water environment
3: Supporting the Protection, Conservation and Enhancement of Our Environment	▪ Protecting, conserving and enhancing (where possible): - biodiversity - soils and peat - woodland - green networks - wild land - water environment - marine environment - established character and local distinctiveness of the landscape ▪ Avoid significant adverse effects, including cumulative effects, on the integrity or special qualities of international or nationally designated natural and built environment sites

LDP Policy	Key Issues and Receptors Requiring Assessment
9: Development Setting, Layout and Design	▪ Location context ▪ Layout and density ▪ Design
10: Maximising our Resources and Reducing Our Consumption	▪ Recycling ▪ Pollution and abstraction of water ▪ Flood risk and erosion ▪ Biodiversity and the natural environment ▪ Mineral resources ▪ Trees and woodland ▪ Renewable energy generation ▪ Carbon rich soils ▪ Agricultural land
11: Improving Connectivity and Infrastructure	▪ Rights of Way and public access ▪ Public transport ▪ Accessibility ▪ Car parking ▪ Location and design ▪ Drainage, sewage, waste water and water supply

LDP Supplementary Guidance

6.4.18 The Argyll and Bute LDP is supported by two sets of statutory Supplementary Guidance. Table 6-2 below lists the Supplementary Guidance of relevance to the Proposed Development and identifies relevant receptor types and issues which will need to be assessed through the EIA.

Table 6-2 - Relevant LDP Supplementary Guidance

Supplementary Guidance	Key Issues and Receptors Requiring Assessment
Supplementary Guidance (Adopted March 2016)	
ENV 1 – Development Impacts on Habitats, Species and Our Biodiversity	▪ Habitats and Species listed under Annex I, II and IV of the Habitats Directive ▪ Species listed under Annex I & II of the Birds Directive and Red and Amber status in 'Birds of Conservation Concern' ▪ Article 10 Features under the Habitats Directive ▪ Wildlife and Countryside Act 1981; (and as amended by the Nature Conservation (Scotland) Act 2004); Species listed on Schedules 1, 5, 7, 8, 9 and 14 ▪ Wildlife and Natural Environment (Scotland) Act 2011. A Code of Practice on Non-Native Species supports this Act ▪ Protection of Badgers Act 1992 ▪ Local Biodiversity Action Plan ▪ Scottish Biodiversity Strategy

Supplementary Guidance	Key Issues and Receptors Requiring Assessment
	▪ Biodiversity Checklist
ENV 2 - Development Impact on European Sites	▪ European Sites including Glen Etive and Glen Fyne Special Protection Area (SPA) and Loch Etive Woods Special Area of Conservation (SAC)
ENV 5 – Development Impact on Local Nature Conservation Sites (LCNS)	▪ Local Nature Conservation Sites ▪ Social, environmental or economic benefits ▪ Mitigation measures ▪ ecological, geological and geomorphological interests.
ENV 6 – Development Impact on Trees/Woodland	▪ Preservation of and where appropriate the planting of new woodland/trees ▪ Compensatory planting and management agreements.
ENV 9 – Development Impact on Areas of Wild Land	▪ Character of Wild Land Areas ▪ Siting, design and mitigation
ENV 10 – Geodiversity	▪ Geological Conservation Review Sites ▪ Local Geodiversity Sites2 ▪ Mitigation measures ▪ Social, environmental or economic benefit
ENV 11 – Protection of Soil and Peat Resources	▪ Soil resources ▪ Functions of peat structure ▪ Disturbance, degradation or erosion
ENV 12 Development Impact on National Scenic Areas (NSAs)	▪ Impact of development in or affecting NSAs ▪ Special qualities of NSAs
Env 13 – Development Impact on Areas of Panoramic Quality (APQs)	▪ Siting, design, layout and scale ▪ Landscape character ▪ Argyll and Bute Council will resist ▪ Landscape quality ▪ Argyll and Bute Landscape Capacity Assessment.
ENV 14 – Landscape	▪ Landscape impact ▪ Social, economic or environmental benefits of community wide importance;
ENV 16 – Development Impact on Listed Buildings	▪ Listed buildings and their setting ▪ Features of special architectural or historic interest
ENV 20 – Development Impact on Sites of Archaeological Importance	▪ Retaining, protecting, preserving and enhancing the existing archaeological heritage and any future discoveries
SERV 4 – Contaminated Land	▪ Contaminated land assessment and remediation
TRAN 1 – Access to the Outdoors	▪ Public access ▪ Core Paths and Public Rights of Way ▪ Foreshore development
TRAN 5 - Off-site Highway Improvements	▪ Public and private road improvements
TOUR 1 – Tourist Facilities and Accommodation, Including Static and Touring Caravans	▪ Form, location and scale ▪ Amenity of the surrounding area ▪ Accessibility ▪ Pattern of development ▪ Green belt
Supplementary Guidance 2 (December 2016)	
TRANS 8 – Piers and Harbours	▪ Temporary facilities for renewable energy construction – environmental impacts of development and removal

Supplementary Guidance	Key Issues and Receptors Requiring Assessment
Section 8.1 – Renewable Energy including Hydro	▪ Renewable energy generation ▪ Electricity grid resilience ▪ Location ▪ Natural and cultural heritage ▪ Water environment ▪ Fisheries ▪ Aquatic habitats and amenity ▪ Environmental and transport issues

Local Development Plan 2

6.4.19 Argyll and Bute Council are preparing a new Local Development Plan (LDP2) which will replace the current LDP. The Argyll and Bute LDP2 Proposed Plan (2019) identifies the Tobermory to Dalmally Growth Corridor, which the Site is located within, as an area for sustainable economic growth. The LDP2 Proposed Plan also identifies Cruachan as Proposal E, Cruachan Dam Pumped Storage Hydro-electricity Facility Expansion. Under Proposal E, the Proposed Plan reports that

> *'Argyll and Bute Council support the National Planning Framework 3 proposal for delivery of a project to increase the pumped hydro storage hydroelectricity capacity at Cruachan dam'.*

6.4.20 The LDP2 Proposed Plan confirms that Argyll and Bute Council, through partnership working, will look to maximise direct and indirect economic benefit for Argyll and Bute resulting from accommodation and tourism developments promoted within the Tobermory to Dalmally growth corridor both in the construction and legacy phases of the project.

Table 6-3 - Relevant LDP2 Policies and Key Issues and Receptors Requiring Assessment

LDP2 Policy	Key Issues and Receptors Requiring Assessment
Policy 04 Sustainable Development	▪ Local community benefit ▪ Use of existing infrastructure ▪ Agricultural land ▪ Recreational and amenity open space ▪ Natural and built environment ▪ Landscape character, setting and character of settlements ▪ Flooding, tidal inundation, coastal erosion and ground instability ▪ Impacts on land, air and water environment
Policy 05 Design and Placemaking	▪ Surrounding land uses ▪ Resource efficiency ▪ Topography and surrounding important landmarks or views ▪ Green infrastructure ▪ Density, appearance, height, scale, massing, materials and finishes ▪ Response to the natural environment ▪ Materials ▪ Future adaptability ▪ Climate change mitigation
Policy 06 – Green Infrastructure	▪ Existing green networks ▪ Biodiversity ▪ Water management ▪ Climate change ▪ Loss of integrity of existing green networks ▪ Future management and maintenance
Policy 08 – Suitable Siting	▪ Landscape or existing built form integration ▪ Sloping topography – excavation and under-building ▪ Access to existing infrastructure and services ▪ Siting of ancillary services e.g parking and services areas
Policy 09 Sustainable Design	▪ Renewable sources of energy ▪ Sustainable design and construction methods – embodied energy, conversion, re-use and adaptability
Policy 10 Design: All Development	▪ Response to character of development site and wider area ▪ Incorporation of existing and enhancing features ▪ Proportions of built elements and details including massing and fenestration

LDP2 Policy	Key Issues and Receptors Requiring Assessment
	▪ Harmonious materials
Policy 14 – Bad Neighbour Development	▪ Noise or vibration ▪ Odour or fumes ▪ Emissions including dust, smoke, soot, ash, dirt or grit or any other environmental pollution to water, are or soil ▪ Light pollution or flicker
Policy 15 – Supporting the Protection, Conservation and Enhancement of Our Historic Built Environment	▪ Protection, preservation, conservation or enhancement of the historic built environment in terms of location, scale, form, design or proposed use ▪ Cumulative effect upon the integrity or special qualities of designated built environment sites
Policy 16 – Listed Buildings	▪ Setting, scale, design, materials and proposed use ▪ Conforms to national policy and guidance
Policy 19 – Scheduled Monuments	▪ Protecting, conservation, retention or enhancement of a Scheduled Monument or integrity of its setting
Policy 20 – Gardens and Designed Landscapes	▪ Adequate measures to protect, conserve and enhance the special interest of the asset (s)
Policy 21 – Sites of Archaeological Importance	▪ Identified sites within the influence of the works
Policy 22 – Economic Development	▪ Net economic benefit ▪ Clear operational need for a specific location
Policy 30 – The Sustainable Growth of Renewables	▪ Principles of sustainable development ▪ Environmental effects on local communities, natural and historic environments, landscape character and visual amenity ▪ Compatibility with adjacent land uses ▪ Opportunities for energy storage, local energy networks and long-term environmental management of the site
Policy 32 – Active Travel	▪ Integration and safeguarding of active travel routes and rights of way ▪ Delivery of active travel routes within development sites ▪ Integration of active travel routes to surrounding areas
Policy 33 – Public Transport	▪ Utilisation of existing or potential public transport corridors ▪ Travel facilitated by public transport
Policy 34 – Electric Vehicle Charging	▪ Provision of electric vehicle charging points
Policy 35 – Design of New and Existing, Public Roads and Private Access Regimes	▪ Road safety and street design
Policy 36 – New Private Access	▪ Level of pedestrian or vehicular traffic
Policy 37 – Development Utilising Existing Private Access or Existing Private Road	▪ Commensurate improvements appropriate to the scale and nature of proposed new development ▪ Ownership
Policy 39 – Construction Standards for Private Access	▪ Visibility splays ▪ Access gradients ▪ Geometry ▪ Passing places ▪ Boundary definition ▪ Turning capacities ▪ Provision for waste management and recycling ▪ Future improvements including to adoptable standard ▪ Impact on Trunk Road
Policy 40 – Vehicle Parking Provision	▪ Car parking standards
Policy 55 – Flooding	▪ Facilitation of key development strategies ▪ Flood risk framework ▪ Flood risk elsewhere ▪ Mitigation ▪ Little or no risk areas

LDP2 Policy	Key Issues and Receptors Requiring Assessment
	▪ Low to medium risk areas ▪ Medium to high risk areas ▪ Flood prevention or management areas
Policy 57 – Risk Appraisals	▪ Flood risk assessments ▪ Drainage impact assessments ▪ Land erosion risk appraisals ▪ Potential for flooding ▪ Possible effects of climate change ▪ Land erosion risks associated with proposed development
Policy 59 – Water Quality and the Environment	▪ Water quality and quantity ▪ Ecological status including morphology and flow rate ▪ Riparian habitats and wildlife ▪ Geomorphic processes ▪ Leisure and recreational facilities and users ▪ Economic activity ▪ Mitigation measures
Policy 61 – Sustainable Drainage Systems (SUDS)	▪ Incorporation of existing ponds, watercourses or wetlands
Policy 62 – Drainage Impact Assessment	▪ Sensitive areas such as areas affecting by flooding, contamination or wildlife interest
Policy 70 – Development Impact on National Scenic Areas (NSAs)	▪ Effect on integrity of area and special qualities
Policy 71 – Development Impact on Local Landscape Areas (LLA)	▪ Scale, location and design ▪ Social, economic or environmental benefits or community wide importance
Policy 72 – Development Impact on Areas of Wild Land	▪ Social, economic or environmental benefits of national importance
Policy 73 – Development Impact on Habitats, Species and Biodiversity	▪ Wildlife and Countryside Act 1981; (and as amended by the Nature Conservation (Scotland) Act 2004); Species listed on Schedules 1, 5, 7, 8, 9 and 14 ▪ Wildlife and Natural Environment (Scotland) Act 2011. A Code of Practice on Non-Native Species supports this Act. ▪ Protection of Badgers Act 1992 ▪ Delivery and objectives of Local Biodiversity Action Plan and Scottish Biodiversity Strategy ▪ Justification in accordance with the relevant protected species legislation
Policy 74 – Development Impact on Sites of International Importance	▪ Alternative solution ▪ Imperative reasons for over-riding public interest
Policy 75 – Development Impact on Sites of Special Scientific Interest and National Nature Reserves	▪ Impact on natural feature or conservation objectives ▪ Public interest and benefit
Policy 76 – Development Impact on Local Nature Conservation Sites (LCNS)	▪ Effect on integrity of LCNS ▪ Social, environmental or economic benefits of community wide importance ▪ Mitigation measures
Policy 77 – Forestry, Woodland and Trees	▪ Impact on ancient semi-natural woodland, native or long-established woods, hedgerows and individual trees with high nature conservation or landscape value ▪ Conservation objectives and impact on integrity ▪ Public interest and benefit ▪ Provision made for the preservation of and where appropriate the planting of new woodland/trees, including compensatory planting and management agreements
Policy 78 – Woodland Removal	▪ Compensatory planting

LDP2 Policy	Key Issues and Receptors Requiring Assessment
Policy 79 – Protection of Soil and Peat Resources	▪ Maintain soil resources and function ▪ Disturbance, degradation or erosion ▪ Social, environmental or economic benefits ▪ Soil and peatland management plan
Policy 80 – Geodiversity	▪ Effect on non-designated Geological Conservation Review Sites or Local Geodiversity Sites ▪ Social, environmental or economic benefits ▪ Mitigation measures

7 Ground Conditions

7.1 Introduction

7.1.1 This chapter of the Scoping Report discusses the proposed scope of the ground conditions assessment which would be undertaken for the Proposed Development.

7.1.2 Primarily the assessment will describe:

- the baseline conditions (based on historical information and publicly available environmental information);
- the approach to assessing the potential impacts arising from the ground conditions (instability and excavation) and land use (contamination) during the construction phase and subsequent operational phases; and,
- the mitigation measures required to prevent, reduce, or offset the impacts.

7.1.3 On the basis of the summary of baseline conditions, effects associated with land and groundwater quality (including stability) are considered likely in the absence of mitigation.

7.2 Potential Effects

7.2.1 Having regard to the current and expected future characteristics of the Site and the surrounding area (Chapter 2) and the characteristics of the Proposed Development (Chapter 3), the construction and operation of the Proposed Development has the potential to result in a range of effects on geology, hydrogeology, hydrology, contamination and ground stability, as follows:

- Potential exposure to and release of any existing ground or soil contaminants to relevant receptors, such as human health, structural/property, and ecological setting;
- Potential pollution discharges to surface water and groundwater receptors; and
- Potential changes to geological conditions and ground stability (e.g., disturbance of slope stability, construction of new foundations, etc.), including potential effects from excavation (e.g. tunnelling). Spoil arisings generated during the construction phase will be managed through the development and implementation of an Outline Waste Management Plan (OWMP) as detailed in Section 16.3 – Waste Management.

7.2.2 From these potential effects, this chapter identifies the scope of effects which at this stage have the potential to be significant and thus require detailed assessment through the EIA process, together with proposed assessment methodologies.

7.2.3 The potential for significant contamination based on land use is considered to vary between Very Low and Low across the Site, depending primarily on the former use.

7.3 Relevant Legislation, Guidance and Technical Standards

7.3.1 The assessment of likely significant effects will be taken in accordance with relevant and applicable legislation, policies and technical standards. In addition to the relevant legislation and policy considerations outlined in Chapter 6 – Legislative and Planning Policy Context, the assessment will be undertaken in accordance with subject specific legislation and best practice guidance.

7.3.2 The statutory regime for the identification and remediation of historically contaminated land came into force in July 2000. Legislative provision for the regime was made in the Environment Act 1995 which inserted a new Part IIA into the Environmental Protection Act 1990. The regime was further established by The Contaminated Land (Scotland) Regulations 2000 which was amended in 2005. Statutory guidance is contained within Environmental Protection Act 1990 – Part IIA Contaminated Land: statutory guidance edition 2.

Legislation

7.3.3 The overarching legislative framework applicable to this EIA for the Proposed Development is outlined in Section 6 Legislative and Planning Policy Context. Subject specific legislation of relevance to this chapter are as follows:

- Environmental Protection Act 1990 (Part IIA);
- Environment Act 1995 (Section 57);
- The Contaminated Land (Scotland) Regulations 2000;
- Water Environment and Water Services (Scotland) Act 2003 which implemented the Water Framework Directive 2000/60/EC ("the WFD"); and,
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) which implements the Groundwater Directive 2006/118/EC (a daughter directive to the WFD).

Guidance and Technical Standards

7.3.4 The following guidance and technical standards have informed this assessment:

- BS 5930:2015+A1:2020 Code of practice for ground investigations[7];
- BS 10175:2011+A2:2017 Investigation of potentially contaminated sites – Code of practice[8];
- Guidance for Pollution Prevention (GPPs)[9] and Pollution Prevention Guidelines (PPGs) (note that PPGs have largely been withdrawn and replaced by GPPs) published by SEPA including GPP 2 (above ground oil storage tanks), GPP 5 (works and maintenance in or near water), GPP 8 (safe storage and disposal of used oils), GPP 21 (pollution incident response planning), GPP 22 (dealing with spills) and PPG 26 (safe storage - drums and intermediate bulk containers);
- Position Statement (WAT-PS-10-01) Assigning Groundwater Assessment Criteria for Pollutant Inputs v3.0[10];
- Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters v7[11];
- Department of the Environment (DOE) Industry Profiles[12];
- 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance'. Second Edition[13].

7.4 Baseline Conditions

7.4.1 The baseline conditions have been determined from a review of:

- available published information including published geological, hydrogeological and aquifer vulnerability maps and historical Ordnance Survey maps;
- existing ground condition information from the British Geological Survey's (BGS) geology maps; and
- a review of studies previously undertaken within the Site boundary; and
- site specific historical maps and environmental data searches included within an Envirocheck Report commissioned from Landmark Information Group.

Baseline Summary: Current Land Use

7.4.2 For the purposes of the ground conditions assessment, different sections of the site have been considered separately given the varying ground conditions which are described below.

The Lower Inlet / Outlet Area

7.4.3 The Lower Inlet / Outlet area comprises the area of the loch side and lower hillside around the lower end of the tunnel. The area will include a new jetty into Loch Awe, a new tunnel portal, a new inlet/outlet structure, and the existing infrastructure related to the existing Cruachan 1 hydro station. Within this area is a section of the A85 road and a section of the Oban railway line as well as the Falls of Cruachan railway stop. The Allt Cruachan burn flows down the hillside as the Falls of Cruachan and then beneath the railway and road and enters the loch in this area. The area is bounded to the south by Loch Awe and to the north, east and west by the slopes of Meall Cuanail / Beinn a'Bhuiridh.

7.4.4 The A85 road runs south east to north west parallel to and along the shoreline of Loch Awe. The Glasgow Oban railway line runs parallel to the shoreline, approximately 20 – 30m to the north from the A85. The existing intake / outlet, carpark and service facilities of the Cruachan 1 power station are situated on the loch side of the A85 immediately beside the water, with the tailrace tunnel and service tunnels running under the road and railway.

7.4.5 From the narrow section of flatter shoreline between the hillside and loch hosting the road and railway, the hillside rises very steeply to the north and the loch deepens steeply to the south. The hillside is wooded for the initial several hundred metres and transitions into open hillside with low level vegetation.

Upper Compound and Gate Shaft Area

7.4.6 The area of the proposed upper construction compound and the upper gate shaft currently comprises an area of open hillside on the western side of Beinn a' Bhuiridh, to the south and east of the eastern end of Cruachan Dam. The area is undulating and generally rising to the north and east and bisected by the tarmac surfaced Cruachan 1 access road running down the hillside from the dam.

7.4.7 The Upper Inlet-Outlet Structure will be a concrete structure below minimum operating water level in Cruachan Reservoir, which will direct water into the headrace tunnel. The concrete intake will include a wheeled gate operated by a hydraulic cylinder, together with stop logs for maintenance, both located within a common gate shaft, within the western side of Beinn a'Bhuiridh.

Site access road from the Upper Compound and Gate Shaft to the junction with the A85

7.4.8 The area of the Site access road from the dam to the A85 junction comprises a single-track tarmac surfaced road with passing places. The road is built across a hillside which slopes steeply up to the north away from the road and steeply down to the south away from the road. There is a grass verge on the downslope side of the road and typically a metal crash barrier. On the upslope side of the road there is no verge and typically there is exposed rock cutting. The road runs beneath or beside an overhead transmission line on steel lattice towers. The road crosses over several watercourses along the route on bridges and culverts.

7.4.9 The hillside above the road is grass and scree covered along the route. The hillside below the road is grass and scree covered in the upper section and tree covered in the lower section.

7.4.10 Immediately before the junction with the A85 the road enters the village of Loch Awe with the houses of St Conan's Road to the south of the road.

Area to the north east of the A85/site access junction including the site compound location

7.4.11 The area comprises an approximately 3km corridor of the A85, Oban railway line and Loch Awe foreshore from the access road junction to the River Orchy bridge. The area to Loch Awe railway station is wooded and includes streets and private dwellings on the outskirts of Lochawe village as well as a post office, St Conan's Kirk and a railway yard to the west of the station. From Loch Awe railway station onwards, the area increases in width to the north to take in the area of the possible site compound to the north of the A85 at the head of Loch Awe.

7.4.12 To the south of the A85 the area is typically wooded with occasional isolated dwellings. To the north of the A85 the tree cover decreases, and the area comprises an open moor lower hillside. The area of the

Site compound in the east is bisected by the B8077 minor road running north east to south west. To the north is open moor land and to the south is open moorland and farmed grazing land.

Baseline Summary: Historical Land Use

The Lower Inlet / Outlet Area

7.4.13 The available historical mapping from 1875 shows the area as hillside and loch shore, with trees on the lower slopes. A path is shown at the location of the current road and railway. An Electric Telegram is labelled running alongside the path.

7.4.14 The 1890 map shows the Callander and Oban Railway in the location of the current railway line running parallel to Loch Awe. The Falls of Cruachan Platform is shown at the location of the current station and a small pier is indicated immediately to the east. Otherwise, the area is unchanged.

7.4.15 The 1927 map shows the path at the shoreline has become a widened road, surface unknown.

7.4.16 No changes are shown up to the last available historic map in 1960.

7.4.17 Historical records show the Cruachan 1 Power Station was built in the early 1960s and opened in 1965, with the construction of the tunnels beneath the road and railway and the tailrace outlet / inlet and infrastructure on the shore of Loch Awe. The overhead transmission line to export / import power for the power station runs down the hillside approximately alongside the access road from a substation downslope from the Cruachan Dam.

7.4.18 Recent mapping and satellite imagery shows the Cruachan 1 Power Station and that the surrounding area in this part of the Site has seen little further change since the 1960s.

7.4.19 The area is used as a transport corridor by road and rail to access Oban and the west and to access the local area via the Falls of Cruachan railway station. The area is used to access the Cruachan 1 Power Station by workers and visitors.

Upper Compound and Gate Shaft Area

7.4.20 Historical mapping shows the Upper Compound and Gate Shaft area to have remained largely unchanged since the first mapping in 1875 until the historical mapping in 1956 when it comprised open hillside. The area was altered with the construction of the now Category B-listed Cruachan Dam and reservoir, access road, substation, and overhead transmission line in the early 1960s, infrastructure which is present to this day. Since then, the area has remained largely unchanged until the present day.

7.4.21 The area is used to service the Cruachan 1 Power Station and by the public as walkers access the area to view the dam and to access the path around the reservoir as part of the route used to access the summit of Ben Cruachan.

Site access road from the Upper Compound to the junction with the A85

7.4.22 Historical mapping shows the majority of the Site access road area to have remained largely unchanged since the first mapping in 1875 until the historical mapping in 1956 when it comprised open hillside. In the early 1960s the access road, and overhead transmission line was constructed which is present to this day. Since then, the area has remained largely unchanged until the present day.

7.4.23 On the 1975 mapping the lower end of the access road at the junction with the A85 is shown as hillside and loch shore, with trees. A path is shown at the location of the modern A85 and access road junction with Electric Telegram labelled running alongside the path. The 1890 map shows the Callander and Oban Railway in the location of the current railway line running parallel to Loch Awe.

7.4.24 The houses around the junction on St Conan's Road are not shown on the historic mapping and so it is inferred they were constructed post 1960.

7.4.25 The area is used for access to operate and maintain the Cruachan 1 Power Station and by the public as walkers access the area to view the dam and to access the path around the reservoir as part of the route used to access the summit of Ben Cruachan. The lower junction area is a residential area.

Area to the north east of the A85/site access junction including the site compound location

7.4.26 The available historical maps from 1875 show the area as hillside and loch shore, with trees on the lower slopes. The path and Electric Telegram are shown at the location of the modern A85 and railway. The area is used for sheep farming shown by the occasional sheepfold and buildings.

7.4.27 The 1890 map shows the Callander and Oban Railway in the location of the current railway line running parallel to Loch Awe. The Loch Awe station is shown at the current location. Otherwise, the area is unchanged.

7.4.28 The 1897 map shows development of Lochawe village around and to the south west of the station with St Conan's Kirk and several buildings including an inn. A pier is also shown on the loch beside the station.

7.4.29 The 1927 map shows the path at the shoreline has become a widened road, surface unknown and the village has further developed with a school and the Inn is now indicated as a Hotel.

7.4.30 On the 1956 map the road is shown as the A85 (T) indicating an upgrade to a trunk road.

7.4.31 The area is not shown to change further up to the last available historic map in 1960. Recent mapping and satellite imagery show the area has not changed greatly other than a small number of additional houses being added within Lochawe village.

7.4.32 The area is used as a transport corridor by road and rail to access Oban and the west and to access the area via the Loch Awe railway station.

Geology

7.4.33 According to the available BGS information, superficial deposits are shown to be absent across the majority of the Site area apart from the following specific area:

- the area of Coire Cruachan to the north of the existing reservoir - the superficial deposits underlying this area largely comprise Hummocky Glacial Deposits of Diamicton, Sand and Gravel.
- the area to the north east of the A85/site access junction including the Site compound location – the superficial deposits underlying the area comprise Hummocky Glacial Deposits of Diamicton, Sand and Gravel (north and west) and Alluvium of Clay, Silt, Sand and Gravel (south and east).

7.4.34 The depth of the superficial deposits is unknown. Where development (including the existing Cruachan 1 development, road and railway land etc.) has taken place, localised areas of Made Ground are likely to be present.

7.4.35 The bedrock geology below the Proposed Development is of the Argyll and Appin Groups with intrusive and extrusive rocks of Devonian age. The lower section of the slope rising from Loch Awe (Lower Inlet / Outlet, lower access, A85 and compound area) comprises a complex assemblage of metasediments of Quartzite, Metalimestone, Semipelite and Pelite, with numerous dyke intrusions of typically quartz diorite. The upper section of the slope (the existing Cruachan Dam, upper compound, new gate shaft, upper access track) comprises Quartz Diorite intrusive igneous rock. The central area of Coire Cruachan to the north of this comprises Andesite and Basalt extrusive igneous rock. The upper area of Coire Cruachan comprises Quartz Monzodiorite intrusive igneous rock.

Hydrogeology

7.4.36 The baseline hydrogeology is summarised in Table 7-1below.

Table 7-1 – Hydrogeology

Item	Details
Aquifer Classification	The superficial and bedrock aquifers underlying the majority of the site is considered low productivity (in terms of potential yield)
Depth to Groundwater	Unknown
Groundwater Flow Direction	Unknown but assumed to be in a south west direction, following local topography, towards Loch Awe

Item	Details
Groundwater Abstraction	None known within 1km
Groundwater Vulnerability	SEPA Water Classification Hub[14] has named the underlying groundwater body as Oban and Kintyre, described as having an overall status of Good with High confidence at the latest available year of 2018. Due to the Good water status and the permeability of the underlying geology, the groundwater is considered to be moderately sensitive

Hydrology

7.4.37 The Site is bounded to the south by Loch Awe and in the far east of the Site by the mouth of the River Orchy where it meets Loch Awe. The River Awe connects Loch Awe to the Loch Etive sea loch to the west of the Site.

7.4.38 According to SEPA Water Classification Hub, Loch Awe has an ecological status of 'Moderate' and a chemical status of 'Pass'. The water body has been designated as a heavily modified water body on account of physical alterations that cannot be addressed without a significant impact on water storage for hydroelectricity generation.

7.4.39 Taking into account the status of the water bodies and their immediate proximity to the Proposed Development site, their vulnerability is considered to be moderately sensitive.

Ecological Setting

7.4.40 A full review of relevant ecological baseline conditions at the site and in the surrounding area is provided in Chapter 9 – Ecology. This identifies the following relevant ecological designations:

- The Glen Etive and Glen Fyne Special Protection Area is present on site to the west of Allt Cruachan and around Coire Cruachan excluding the Cruachan Reservoir.
- The Loch Etive Woods Special Area of Conservation and Coille Leitre Site of Special Scientific Interest covers an area of the Site to the north of the existing railway line in the south west of the Site, and immediately to the south of the central section of the access road.
- The Cruachan Reservoir Geological Conservation Review site covers the upper compound, gate shaft and upper access track areas of the Site.

Other

7.4.41 Current archaeological baseline conditions at the Site and the surrounding area are described in detail in Chapter 13.

Potential for Contamination and Geotechnical Considerations

7.4.42 A review of the Site history and environmental context (summarised above) has identified the following issues and potential constraints that will require investigation, assessment and potential remediation for the proposed development:

- Railway land, sidings, and infrastructure along the shoreline of Loch Awe in the south of the Site – these represent a potential source of contamination from the materials brought onto the Site to make up the railway lines (ballast) and potential spills and leaks of fuel and lubricants and other chemicals.
- Infilled ground associated with localised excavations associated with the temporary works for the Cruachan 1 Power Station – excavations that have been backfilled with unknown material to unknown specification represent a potential source of contamination, gas generation and instability.
- Potential soil and groundwater contamination associated with the agriculture in the east of the Site – this could have impacted land quality and groundwater quality from the application of fertiliser and pesticides.

- Above ground and underground infrastructure associated with the Cruachan 1 Power Station – the physical presence of the infrastructure itself represents a potential constraint to the investigation and development. In terms of potential contamination, plant maintenance and fuel use represent potential sources of localised contamination.
- The geotechnical properties of the superficial deposits will require assessment prior to the development, which will include temporary works, excavations and spoil generation.

7.5 Embedded Mitigation and Design Principles

7.5.1 Site Investigations will be undertaken to better understand geotechnical and geo-environmental conditions within the Site and to address identified land stability and contamination (of ground and groundwater). So far work has included determining a suitable substrate geology in which to excavate the new power cavern. This will be completed within the detailed design phase prior to the commencement of the construction phase of the Proposed Development.

7.5.2 Good practice is that the EIA should be an iterative process rather than a single, post design, environmental appraisal. In adopting this approach, the findings of the environmental and technical studies will be continually used to inform the design of the Proposed Development.

7.5.3 In the event that likely significant negative effects are identified, the development will be amended to avoid or minimise these as far as practicable within the parameters of the project. This is referred to as 'embedded mitigation' i.e. mitigation which has been embedded within the project design.

7.5.4 A Construction Environmental Management Plan (CEMP) will be prepared which will limit effects through best practice with more detailed mitigation measures which are developed through the design process.

7.6 Proposed Scope of Assessment

7.6.1 The potential environmental effects will be assessed using a "source – pathway – receptor" approach to identify potential pollutant linkages. The principal planning objective is to ensure that any unacceptable risks to defined receptors from any adverse ground conditions are identified so that appropriate action can be considered and taken to address those risks. Potential receptors include:

- Human Health – including construction and future maintenance workers, and neighbouring properties/third parties;
- Ecological systems - international or nationally designated sites "in the local area" will be identified as potential ecological receptors.
- Water Environment – including surface water and groundwater; and
- Property, Animal or Crop (existing or proposed) - including buildings, utility lines and pipes, crops, livestock, woodland.

7.6.2 In order to inform the assessment effects and impacts, it is intended to prepare a Ground Conditions Report comprising a ground stability appraisal that summarises the likely residual ground conditions, the environmental setting and assesses the information to identify potential issues which might have associated environmental liabilities or affect the Site's redevelopment. A ground investigation will be completed prior to the construction phase of the project with the objective of further characterising the ground conditions, ground gas potential and groundwater status across the Site. The information will be used to inform remediation, if required, and scheme design together with any mitigation measures.

7.6.3 The assessment of likely effects on ground conditions will also be informed by the preparation of a OWMP to address spoil arisings from tunnel excavations as detailed in Section 16.3 – Waste Management.

7.7 Proposed Assessment Methodology

7.7.1 Guidance on ground condition assessment is given in the Land Contamination Risk Management (LCRM) guidance, that sets out a process based on a tiered risk assessment with increasing level of detail required to progress through the tiers. The guidance includes a definition of 'risk', where a risk is said to be:

> *"a combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence".*

7.7.2 In order to assess potential effects and identify the need for mitigation measures, a Conceptual Model (CM) with respect to contamination and a Ground Model with respect to ground conditions will be prepared for baseline, construction phase and operational phase of the development using the data identified above. Potential effects will be considered separately for each potentially complete pollutant linkage such that any potential impacts are identified and mitigated as required.

7.7.3 The CM will consider:

- The principal pollutant hazards (the contamination sources);
- The principal pathways between the identified hazard(s) and receptor(s); and
- The principal receptor(s) at risk from the identified hazards, for example, people, environmental assets, surface or groundwater.

7.7.4 The qualitative risk is determined by the interrelationship between the potential for a source of contamination to be present, the potential for migration of the contaminant along a given pathway, and the significance of potential receptors. A pollutant linkage is identified where all three elements (source-pathway-receptor) are present.

7.7.5 The Ground Model considers the soil and bedrock present and their relationship, the groundwater conditions, and the geotechnical structural features, to consider the potential for land instability. This may be either as a result of natural processes or as a result of historical activities such as excavation, resulting in landslides or slips, soil creep, and ground compression

Impact Assessment Methodology

Table 7-2 – Classification for Likelihood

Likelihood / Probability	Definition
High	There is a source-pathway-receptor relationship, and an event either appears very likely in the short-term and almost inevitable over the long-term.
Likely	There is a source-pathway-receptor relationship and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low	There is a source-pathway-receptor relationship and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less likely in the shorter- term.
Unlikely	There is a source-pathway-receptor relationship, but circumstances are such that it is improbable that an event would occur even in the very long-term.
No Likelihood	There is no source-pathway-receptor relationship present. No further consideration of risk is therefore required (i.e. the risk is scoped out from resulting in likely environmental effects and is not taken forward to the assessment matrix detailed in Table 7.5 below).

Table 7-3 – Classification for Consequence

Severity of Impact	
Severe	Acute (short term) risks to human health. Catastrophic damage to buildings / property. Major pollution of the water environment (watercourse or groundwater) or atmosphere.
Medium	Chronic (long-term) risk to human health. Pollution of the sensitive water environment (surface waters or aquifers) or atmosphere. Measurable adverse effects on sensitive ecosystems or species. Major structural damage to buildings or structures.
Mild	Pollution of non-selective waters (e.g. groundwater in non-productive strata) or atmosphere. Limited structural damage to buildings or structures.
Minor	Damage to non-selective ecosystems or species e.g. existing poor quality surface water bodies. Minor damage to buildings or structures e.g. minor cracks which do not affect structural integrity.
Negligible	Potential damage to non-selective ecosystems or species or potential damage to buildings or structures that is beneath the level of perception. No further consideration of risk is therefore required (i.e. the risk is scoped out from resulting in likely environmental effects and is not taken forward to the assessment matrix detailed in Table 6.5 below.

Assessment of Effect Level and Significance

Table 7-4 – Matrix for Establishing Risk Level and Significance

		Severity			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High**	Substantial	Major	Moderate/minor	Minor
	Likely	Major	Moderate	Minor	Negligible
	Low	Major/moderate	Moderate/minor	Minor	Negligible
	Unlikely	Moderate/minor	Minor	Minor	Negligible

7.7.6 Table 7-5 is also used in the final stage of the assessment, where the level and significance of likely environmental effects as a result of identified risks will be determined. This was achieved by comparing the predicted residual level of risk from the construction and operational phases of the Proposed Development with the same possible risks (but potentially with different likelihood and consequence) under the likely future baseline scenario, using the matrix provided in Table 7-5 below. This demonstrates the additive impact of the Proposed Development upon the likely future baseline scenario.

Table 7-5 – Determining Significance of Potential Effects (Relative to Future Baseline Conditions)

		Significance of Likely Effect				
Risk Related to Proposed Development	**Substantial**	Substantial Adverse	Major Adverse	Moderate Adverse	Minor Adverse	Negligible
	Major	Major Adverse	Moderate Adverse	Minor Adverse	Negligible	Minor Beneficial
	Moderate	Moderate Adverse	Minor Adverse	Negligible	Minor Beneficial	Moderate Beneficial
	Minor	Minor Adverse	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial
	Negligible	Negligible	Minor Beneficial	Moderate Beneficial	Major Beneficial	Major Beneficial

7.7.7 It is not proposed to undertake a formal Environmental Assessment of the waste arising from the Proposed Project (See Chapter 16). It is therefore not proposed to define the significance of waste impacts, rather an Outline Waste Management Plan (OWMP), focused on bulk Construction and Excavation arisings will be prepared for the planning submission and will form an appendix to the Ground Conditions Chapter (Chapter 7) of the Environmental Assessment Report.

7.7.8 The OWMP will be undertaken by means of a desk study; a site visit (if required), consultations with the key consultees with a responsibility for controlling waste re-use and disposal (Argyll and Bute Council and SEPA).

7.7.9 Initial consultation will also be undertaken with parties which may be able to reuse the arisings in the most sustainable manner including:

- Infrastructure developers (e.g. Transport Scotland, Network Rail) which may be able to utilise arisings from the project for engineering purposes;
- Quarry operators which require material such as that produced by the project to meet obligations to restore mineral workings; and
- Waste management operators which may identify future contracts or frameworks which could reuse the arisings in a sustainable manner.

7.7.10 The OWMP will include an overview of the Proposed Project in terms of:

- the principal materials requirements and waste outputs;
- The volume of the waste generated;
- The nature and characteristics of the waste generated;
- The level at which the management of the waste sits within the waste hierarchy;
- The ability to effectively manage the waste through the Outline Waste Management Plan;
- The availability of suitable reuse options; and
- The location and capacity of receptors for the anticipated arisings.

7.7.11 The objectives of the OWMP (in order of preference, in accordance with the waste hierarchy) are:

- minimise raw materials consumed, and the volume of waste produced;
- re-use any waste produced, where practicable;
- recycle waste, where reuse is not practicable;
- recover waste, where feasible; and

- dispose of any remaining waste streams in accordance with legislative requirements.

7.7.12 The OWMP Plan will cover the following key areas:

1. Introduction - To include; background to the project; guiding principles and the waste hierarchy; description of stakeholders and statutory bodies; and indicative roles and responsibilities.
2. Policy and Legislation – A summary of relevant prevailing Scottish Government planning policy associated with waste management, and Regional and Local Policy. This section will also include a summary of prevailing waste legislation including the overarching Waste Framework Directive (WFD), ancillary legislation and National instruments.
3. Drax's Waste Management Policy – Drax's Corporate Procedures for Waste Management and how these interface with its accredited Environmental Management Systems (EMS). The OWMP will include requirements from these procedures that are of relevance to the Proposed Project.
4. Waste Types and Volumes – It is envisaged that this section of the OWMP will provide an initial estimate of the likely types and volumes of waste arising as a result of the construction of the Proposed Project, however these initial estimates will need to be fully determined, on an iterative basis, during the detailed design stage.
5. Sustainable Waste Management Principles – this section will be developed to provide project specific examples of how the application of the waste hierarchy may be applied in practice.
6. Example Site Waste Management Plan (SWMP) – A template example SWMP will be provided as part of the OWMP. The template SWMP will follow best practice guidelines, including the general requirements of the Site Waste Management Regulations 2008 (repealed) and ensure that the following key areas are identified in an appropriate and accessible format:
   - Who will be responsible for resource management;
   - What types of waste will be generated;
   - How the waste will be managed – will it be reduced, reused or recycled?
   - Which contractors will be used to ensure the waste is correctly recycled or disposed of responsibly and legally; and
   - How the quantity of waste generated by the Proposed Project will be measured.

7.8 References

[1]ABC (2015) Argyll and Bute Local Development Plan 2015.

[2]ABC (2019) Argyll and Bute Proposed Local Development Plan 2 Proposed Plan 2019.

[3]Scottish Government (2020) Scottish Planning Policy Revised December 2020, available: https://www.gov.scot/publications/scottish-planning-policy-finalised-amendments-december-2020/ , accessed: 04/06/21.

[4]Scottish Government (2017) Planning Advice Note 33: Development of contaminated land, available here: https://www.gov.scot/publications/pan-33-development-of-contaminated-land/ , accessed 04/06/2021.

[5]EA (2020) Land contamination risk management (LCRM), available: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm , accessed on 10/05/2021.

[6]EA (2004) The Model Procedures for the Management of Land Contamination, Contaminated Land Report (CLR) 11. Environment Agency, Bristol.

[7]BSI (2015) BS 5930:2015+A1:2020 Code of practice for ground investigations. British Standards Institute, London.

[8]BSI (2011) BS 10175:2011+A2:2017 Investigation of potentially contaminated sites – Code of practice. British Standards Institute, London.

[9]SEPA, Northern Ireland Environment Agency and National Resources Wales (2020) Guidance for Pollution Prevention – Full list, available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/guidance-for-pollution-prevention-gpps-full-list/ , accessed 10/05/2021.

[10]SEPA (2014) Position Statement (WAT-PS-10-01) Assigning Groundwater Assessment Criteria for Pollutant Inputs v3.0. Scottish Environmental Protection Agency.

[11]SEPA (2020) Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters versions v7.1. Scottish Environmental Protection Agency.

[12]Department of Environment via CL:AIRE (1995) Industry Profiles published by DoE, available: https://www.claire.co.uk/useful-government-legislation-and-guidance-by-country/198-doe-industryprofiles#:~:text=Department%20of%20Environment%20%28DoE%29%20Industry%20Profiles%20%28published%20in,with%20individual%20industries%20with%20regard%20to%20land%20contamination

8 Hydrology

8.1 Introduction

8.1.1 This chapter of the Scoping Report discusses the proposed scope of the hydrology assessment which will be undertaken for the Proposed Development. This chapter considers the potential for the proposed Cruachan Expansion Project to have significant effects on the water environment, principally the Cruachan Reservoir and Loch Awe, in terms of hydrology, water resources, water quality and flood risk during the construction and operational phases.

8.2 Potential Effects

8.2.1 Potential effects on hydrology, water resources, water quality and flood risk as a result of the Proposed Development could include:

Construction

- Increased road runoff and pollution potential associated with the temporary diversion/extension of the A85 and increase in road traffic haulage and plant movements;
- Mobilisation by wind and rainfall-runoff of stockpiled material into Loch Awe;
- Temporary increases in surface water runoff discharges;

Operation

- Potential for alterations in the hydrological regime and hydromorphology of Cruachan Reservoir;
- Potential for alterations in the hydrological regime and hydromorphology of Loch Awe;
- Potential effects of the new quayside structure on volume displacement and water levels in Loch Awe; and
- Potential increases in surface water runoff due to an increase in permanent impermeable surface areas during the operational phase.

8.3 Technical Standards and Guidance

8.3.1 The assessment of likely significant effects will be taken in accordance with relevant and applicable legislation, policies and technical standards. In addition to the relevant legislation and policy considerations outlined in Chapter 6 – Legislative and Planning Policy Context, the assessment will be undertaken in accordance with subject specific legislation and best practice guidance including the following:

Water Environment (Hydrology and Hydrogeology)

- Water Framework Directive (2000/60/EC)
- The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act (2003)
- The Private Water Supplies (Scotland) Regulations (2006)
- Flood Risk Management Scotland Act 2009
- The Water Environment (Controlled Activities) (Scotland) Regulations (2011)
- The Reservoir (Scotland) Act (2011)
- The Water Resources (Scotland) Act (2013)
- The Water Supplies (Water Quality) (Scotland) Regulations (2014)

Design Manual for Roads and Bridges (DMRB)

8.3.2 The documents applicable to the water environment include Volume 11, Section 3, Part 10 (LA 113 Road drainage and the water environment; formally HD 45/09 – Road Drainage and the Water Environment) and the TAG Unit A3 Environmental Impact Appraisal – Impacts on the Water Environment.

8.3.3 In addition to the DMRB, which sets a standard of good practice that is supported by Highways England, Transport Scotland and Traffic Wales, the following documents are still applicable in Scotland:

- TD 37/93 Scheme Assessment Reporting;
- TA 46/97 Traffic Flow Ranges for Use in the Assessment of New Rural Roads; and,
- TA 79/99 Traffic Capacity of Urban Roads [Incorporating Amendment No.1 dated May 1999].

Guidance Documents

8.3.4 Guidance developed by the Scottish Government's Key Agencies, relevant to this chapter include:

- Land Use Planning System Guidance Note 2a: Development Management Guidance on Flood Risk (Version 2) (SEPA, 2018), supported by the Planning Background Paper: Flood Risk (SEPA, 2018);
- Land Use Planning System Guidance Note 2b: Development Management Guidance on the Water Environment (Version 2) (SEPA, 2017), supported by the Planning Background Paper: Water Environment (SEPA, 2018);
- SEPA Flood Risk Standing Advice for Planning Authorities and Developers (SEPA, 2020);
- Land Use Planning System Guidance Note 19: Planning Advice on Waste Water Drainage (SEPA, 2011);
- Land Use Planning System Guidance Note 2: Planning Advice on Sustainable Drainage Systems (SUDS) (SEPA, 2010);
- Climate Change Allowances for flood risk assessment in land use planning (SEPA, 2019);
- Flood Risk and Land Use Vulnerability Guidance (SEPA, 2018); and
- Reservoir Inundation Maps – potential use for Land Use Planning.

Highland and Argyll Local Plan District: Local Flood Risk Management Plan (2016-2022)

8.3.5 This document supports the Flood Risk Management Scotland Act 2009, by translating this legislation into actions to reduce the damage and distress caused by flooding.

8.4 Baseline Conditions

Topography and Land Use

8.4.1 At EIA Scoping stage a 5km Study Area has been adopted to identify relevant receptors and inform the preparation of this chapter. The Study Area is currently occupied by the Cruachan 1 Power Station, Cruachan Reservoir, the access track to the reservoir, Loch Awe, and the A85. The topography within the Study Area is steep, with a maximum of 1104m AOD at Ben Cruachan mountain, approximately 2.5km to the north west of Cruachan Reservoir, and a minimum of approximately 37m AOD at the outfall to Loch Awe.

Hydrology

8.4.2 The two main surface water bodies within the Study Area include Cruachan Reservoir and Loch Awe. Cruachan Reservoir is impounded by the Cruachan Dam and has a topographical catchment area of ca. 5.87 km^2. The effective catchment area of the Cruachan Reservoir is, however, increased due to the presence of aqueducts, which transfer water via gravity from rivers in adjacent catchments.

8.4.3 The inflows to the reservoir include, in order of magnitude: water pumped up from Loch Awe; water imported by gravity drainage from adjacent catchments via the Main, Brander and Awe Village aqueducts; and natural rainfall-runoff from its modest topographical catchment. The outflows from the reservoir include the discharge for power generation back to Loch Awe (losses via evaporation and leakage are not considered to be significant by comparison).

8.4.4 Loch Awe has a topographical catchment area of ca. 813km^2, which encompasses two natural lakes: Loch Tulla and Loch Avich. Relative to the Cruachan Reservoir, Loch Awe has a large surface area, topographical catchment, and storage volume. Loch Awe is impounded by the Loch Awe Barrage, operated by Scottish and Southern Electricity (SSE). Loch Awe is upstream of the terminus of Mean High Water Springs on the River Awe at Polfearn; therefore Loch Awe is not within the Scottish marine area.

8.4.5 For further details regarding the existing water level regime within these two water bodies, refer to *'Cruachan Expansion Project EIA: Understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe'* Technical Note, in Appendix C .

8.4.6 A number of additional surface water bodies are present within the Study Area, including the River Orchy, the River Awe, and numerous unnamed overland drains.

Geology and Hydrogeology

8.4.7 The bedrock geology within the Study Area is complex. According to the BGS Geo-Index and the Cruachan Power Station Baseline Hydrology Report (Arcus Consultancy Services Limited), there are four main rock types within the Study Area, comprising:

- quartz – monzodiorites belonging to the Cruachan Intrusion;
- andesites and basalts belonging to the Lorn Plateau Volcanic Formation;
- diorites and quartz diorites belonging to the Quarry Intrusion; and,
- metamorphosed sediments belonging to the Ardrishaig Phyllite Formation.

8.4.8 The majority of the Study Area is free from superficial deposits, which is consistent with the rocky outcrops, however an area of Hummocky Glacial Deposits – Diamiction, Sand and Gravel, is present to the north of the Cruachan Reservoir.

8.4.9 The SEPA Environment Interactive Map indicates the Study Area is a Low productivity aquifer (Class 2c), with only small amounts of groundwater near the surface and within fractures. The SEPA Water Classification Hub indicates the Study Area covers two groundwater bodies, the Oban and Kintyre and the Upper Glen Coe.

Water quality

8.4.10 Loch Awe is a WFD waterbody, designated as a heavily modified water body on account of physical alterations that cannot be addressed without a significant impact on water storage for hydroelectricity generation. The overall status in 2018 was 'moderate ecological potential'.

8.4.11 The two groundwater bodies, the Oban and Kintyre and the Upper Glen Coe both have an overall status of 'Good' (2018).

Ecological Designations

8.4.12 The following ecological designations are considered within this chapter, as they are identified as being, at least in part, water dependent. Other ecological designations in the Study Area have been addressed in Chapter 9 'Ecology' of this Scoping Report.

8.4.13 Groundwater Dependent Terrestrial Ecosystems (GWDTEs):

- The Cruachan Power Station Baseline Hydrology Report (Arcus Consultancy Services Limited) identifies four highly groundwater dependant TEs, with a further four moderately dependent.
- Loch Etive Woods Special Areas of Conservation (SAC); and,
- Loch Etive Mountains Wild Land Area (WLA).

Drainage and Flood Risk

8.4.14 The Study Area currently drains mainly via overland flow towards the two surface water bodies, although the Cruachan Reservoir also receives gravity input via aqueducts from adjacent catchments (refer to Appendix D for further information). The existing road and built infrastructure will also contain gravity surface water drainage systems.

8.4.15 The SEPA Flood Maps indicate that the Cruachan Reservoir and Loch Awe have a Low-High likelihood of fluvial flooding. High Likelihood indicates a 10% annual probability of flooding, whilst Low Likelihood indicates a 0.1% annual probability. Fluvial flood risk is confined to those waterbodies.

8.4.16 The SEPA Flood Maps also indicate that the Cruachan Reservoir and Loch Awe have a Low-High likelihood of surface water flooding. High Likelihood indicates a 10% annual probability of flooding, whilst Low Likelihood indicates a 0.1% annual probability. Surface water flood risk is generally confined to those waterbodies, given the steep topography of the Study Area.

8.5 Embedded Mitigation and Design Principles

Operational Hydrological Regime of the Proposed Development Cruachan Expansion Project

8.5.1 The operational water level range in the Cruachan Reservoir with the Proposed Development in place will not exceed the current maximum and minimum operational water level boundaries, which have an existing range of ca.20m. The Proposed Development also does not involve increasing the maximum storage capacity currently available within the Cruachan Reservoir or increasing the storage volume available within Loch Awe.

8.5.2 Water level gauge data and statistical analysis indicates that the operation of Cruachan 1 has negligible influence on water levels within Loch Awe, compared with natural rainfall-runoff inputs. It is reasonable to conclude that Cruachan Expansion Project will not result in a discernible impact on Loch Awe water levels. This is because the main impact of Cruachan Expansion Project will be to increase the rate of level rise and fall within the Cruachan Reservoir, rather than increase its storage volume (and thus total volume abstracted from, and discharged back to, Loch Awe). Water levels within Loch Awe are also controlled by SSE's Loch Awe Barrage.

8.5.3 A full description of existing operation of the Cruachan 1 power station, its influence on water level variability both in the reservoir and on Loch Awe, and an initial appraisal of the likely hydrological impacts of the Proposed Development, is provided in Appendix C .

8.5.4 As with the Cruachan 1 power station, the Proposed Development will largely be subterranean, and will be constructed within Ben Cruachan mountain. As a result, the Proposed Development would only be at risk of flooding from a failure of the reservoir and/or power station infrastructure, which is considered very unlikely, given that the Applicant will operate the Proposed Development in accordance with the requirements of the Reservoirs (Scotland) Act (2011).

Designed levels of the Lower foreshore structures

8.5.5 The design of the Lower foreshore structures will ensure that critical operational assets will be set above extreme flood levels on Loch Awe. The design of these structures will align with the requirements of Scottish Planning Policy and will account for climate change over the design life of the Proposed Development.

Hydro morphological Mitigation

8.5.6 The new lower inlet – outlet structure has been designed to minimise the depth of the structure on the foreshore, to be similar to existing levels. In terms of water velocity at the proposed Cruachan Expansion Project intake (which will also be the new outlet when generating), smolt screens have been designed such that maximum velocities through the screens will not exceed 0.3 m/s; a velocity that is unlikely to cause additional scour or morphological damage to the bed and banks of Loch Awe.

Surface Water Drainage

8.5.7 Surface water drainage associated with the Proposed Development, including the temporary extension/diversion of the A85, will be managed sustainably, as part of the embedded mitigation. Details of the surface water drainage strategy will be provided in the accompanying Flood Risk Assessment and will ensure that the Proposed Development will remain safe and operational, does not result in an increase in flood risk elsewhere, and does not cause pollution of surface or groundwater receptors, whilst taking climate change into account over its design lifetime

Construction Environmental Management Plan

8.5.8 Construction phase embedded mitigation measures will be implemented though a Construction Environmental Management Plan (CEMP) for the Proposed Development, which will be prepared prior to commencement of construction. This will include, for example, mitigation measures to prevent the spoil stored on the quayside from entering Loch Awe.

8.6 Proposed Scope of Assessment

8.6.1 As per the potential effects outlined in section 8.2, the assessment of likely significant effects will consider:

- Increased road runoff and pollution potential associated with the temporary diversion/extension of the A85 and increase in road traffic haulage and plant movements;
- Mobilisation by wind and rainfall-runoff of stockpiled material into Loch Awe
- Potential increases in surface water runoff due to an increase in permanent impermeable surface areas during the operational phase.

8.6.2 It is likely that, in the main, these potential effects will be mitigated using embedded mitigation measures and through the use of a CEMP. However, given the emerging design details around the Proposed Development, they will be considered as potential effects for the purpose of EIA Scoping.

8.6.3 As per the 'Understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe' Technical Note, in Appendix C and with the embedded mitigation measures outlined above in section 8.5, the Proposed Development would not have any likely significant effects on water levels or the hydrological regime of Loch Awe or Cruachan Reservoir. Although changes in water level will happen more rapidly with the operation of both Cruachan 1 and Cruachan Expansion, the overall changes in water level will be insignificant compared to the baseline volumes of water in both water bodies and the natural variability in water levels through rainfall, seasonal variations, run off and river inputs. It is therefore proposed to scope these elements out of the assessment.

8.6.4 The Proposed Development is not anticipated to have any significant effects on the following sensitive receptors, which have been scoped out of the assessment:

- Natural watercourses and aqueduct connections draining into Cruachan Reservoir; and
- Watercourses draining into Loch Awe – (e.g. River Orchy).

8.6.5 In accordance with Scottish Planning Policy and SEPA requirements, a Flood Risk Assessment (FRA) will be undertaken, given that the red-line boundary for the Proposed Development interacts with areas of High, Medium and Low flood risk, as indicated by SEPA mapping. The methodology for the FRA is outlined below in section 8.7.

Likely insignificant effects

8.6.6 There would be no likely significant effects on the hydrological regime of Loch Awe and Cruachan Reservoir during construction of the Proposed Development.

8.6.7 There would be no likely significant effects on water quality within Cruachan Reservoir or Loch Awe during the operational phase. The transfer of water between the main waterbodies during the operational phase of the Proposed Development will be identical to the existing arrangement and will not involve transferring water from additional catchments (although the rate of the transfers would increase due to the presence of the second power station). The Applicant will continue to use similar operational protocols for the storage and management of fuels and chemicals that it applies at the Cruachan 1 power station, meaning that the potential for pollution of the main waterbodies during the operational phase of the Proposed Development will remain low.

8.7 Proposed Assessment Methodology

Study Area

8.7.1 The extent of the study area for the Hydrology assessment will encompass a 5km radius buffer around the Site to consider any potential effects associated typically with overland migration of pollutants directly to surface features, and any impacts on water levels, associated with the operation of The Proposed Development.

8.7.2 Sensitive receptors outside of the 5km buffer will be considered, where appropriate, based on the professional judgement of the assessor and current knowledge of the sensitive receptors in the area that are in hydraulic connectivity.

Baseline Data Collection

8.7.3 Baseline conditions within the study area will be established through a desk-based review comprising:

- OS mapping;
- British Geological Survey ('BGS') data;
- Scotland's Environmental Map;
- SEPA Flood Maps;
- SEPA Water Classification Hub (WFD);
- Argyll and Bute Local Development Plan Interactive Map, and other local planning policy;

8.7.4 Review of operational data and reports provided by Scottish and Southern Electricity Networks (SSE) and the Applicant; and,

8.7.5 Consultation and data review with relevant stakeholders as appropriate (depending on the information already available through other studies).

Sensitive Receptors

8.7.6 The sensitive receptors to be assessed include but are not limited to:

- Surface waterbodies (Cruachan Reservoir, Loch Awe);
- Groundwater bodies (Oban and Kintyre);
- Private water supplies;
- Flood Risk (Low, Medium and High Risk from all sources);
- Ecological designations:
  - Groundwater Dependent Terrestrial Ecosystems (GWDTEs)
  - Loch Etive Woods Special Areas of Conservation (SAC); and,
  - Loch Etive Mountains Wild Land Area (WLA).

8.7.7 The assessment of likely significant effects resulting from the Proposed Development will consider the construction and operational phases only. The assessment will consider that all hydrology-related embedded mitigation measures will be in place ahead of the commissioning of the Proposed Development and its associated infrastructure. The assessment methodology will be delivered by appropriately qualified hydrologists, and will use appropriate matrices for defining receptor sensitivity, magnitude of impact and overall impact significance. Cumulative effects will also be considered, which will examine in-combination impacts of the Proposed Development occurring alongside other similar developments in the Study Area. The assessment will also be informed by a co-ordinated site visit that will be attended by other EIA disciplines. The assessment will consider the existing WFD status of the main waterbodies in the Study Area, their future objectives, and the potential for the Proposed Development to either result in a deterioration of existing status, or prevent future objectives being realised.

8.7.8 The assessment will also provide information that could be used to support future CAR licence applications, which will be required ahead of commencement of the construction phase.

8.7.9 The method of assessment and reporting of significant effects builds on and adapts the classification contained in the DMRB Volume 11, Section 3, Part 10 (LA 113 Road drainage and the water environment; formally HD 45/09 – Road Drainage and the Water Environment). The DMRB promotes the following approach:

- Estimation of the importance of the attribute;
- Estimation of the magnitude of the impact, and,
- Assessment of the significance of the impact based on the importance of the attribute and magnitude of the impact.

8.7.10 The importance of the attribute will be considered in terms of indicators, such as quality, scale, rarity and substitutability.

8.7.11 Where applicable, mitigation will be considered in two stages, embedded (as mentioned above), and further mitigation.

8.7.12 As explained in Appendix C , the Applicant has undertaken historical monitoring of water levels within both Cruachan Reservoir and on Loch Awe. This monitoring will continue once the Proposed Development is in place to provide data to verify the conclusions of the EIA.

Flood Risk Assessment

8.7.13 In accordance with Scottish Planning Policy and SEPA requirements, a Flood Risk Assessment will also be undertaken, given that the red-line boundary for the Proposed Development interacts with areas of High, Medium and Low flood risk, as indicated by SEPA mapping. This will provide a detailed explanation of how the design of the Proposed Development will prevent an increase in flood risk to surrounding people, property and land, including receptors off site, and will consider flood risk during construction and on completion of the scheme.

8.7.14 The FRA will use appropriate data to assess the flood risk to the Proposed Development from all sources during both the construction and operational phases. The FRA will inform the design of the Proposed Development to ensure that all new components will be able to remain operational and safe for users during times of flooding over the lifetime of the development, whilst taking climate change into account. The FRA will consider whether the Proposed Development will involve the introduction of greater numbers of operational staff working in a flood risk area and, if this is the case, outline plans to ensure that these staff will be able to remain safe at all times.

8.7.15 The FRA will follow the requirements outlined in the 'Technical Flood Risk Guidance for Stakeholders – SEPA requirements for undertaking a Flood Risk Assessment' and will assess the compatibility of the Proposed Development with the SEPA Flood Zones based on the 'SEPA Land Use and Vulnerability Guidance'.

8.7.16 The FRA will assess, in detail, the potential for the Proposed Development to result in an increase in flood risk elsewhere. It will quantify any proportional change in impermeable land cover associated with the Proposed Development and assess whether this has the potential to result in an increase in the volume and rate of surface runoff generated over its lifetime, whilst taking climate change into consideration. Sustainable Drainage System (SuDS) techniques will be designed and incorporated into the Proposed Development as appropriate to ensure that surface water flood risk is not increased elsewhere and that opportunities for enhancing water quality treatment and biodiversity on site are fully considered.

8.8 References

European Commission, The Water Framework Directive (2000/60/EC), available online at: http://ec.europa.eu/environment/water/water-framework/index_en.html, accessed 7th June 2021.

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9 Ecology

9.1 Introduction

9.1.1 This chapter of the Scoping Report discusses the proposed scope of the ecological assessment which would be undertaken for the Proposed Development. The Proposed Development has the potential to impact upon ecological features within the area, in both terrestrial and freshwater systems. Therefore, an Ecological Impact Assessment (EcIA) will be undertaken according to guidance provided by the Chartered Institute of Ecology and Environmental Management (CIEEM). This will establish the current baseline conditions and identify important ecological features (IEFs) within the Proposed Development site and its immediate vicinity. The Proposed Development will then be assessed within this context to identify predicted impacts and any required mitigation measures. The EcIA would be undertaken in the context of the EIA Regulations (2017) and the findings reported in the EIA Report.

9.1.2 The assessment will be undertaken and verified by experienced and competent ecologists who are all members of CIEEM.

9.2 Potential Effects

9.2.1 The Proposed Development has the potential to impact upon ecological features within the area, in both terrestrial and freshwater systems. Potential effects include:

- Direct habitat disturbance as a result of construction and future operations;
- Effects on sites designated for nature conservation on site and in the wider area;
- Effects on protected avian and non-avian species (e.g. disturbance or mortality);
- Indirect effects on habitats, species and designated sites through e.g. changes to lighting, noise or air quality.

9.2.2 From these potential effects, this chapter identifies the scope of effects which at this stage have the potential to be significant and thus require detailed assessment through the EIA process, together with proposed assessment methodologies for assessing such effects.

9.3 Relevant Legislation, Guidance and Technical Standards

9.3.1 The assessment of likely significant effects will be undertaken in accordance with relevant and applicable legislation, policies and technical standards. In addition to the relevant legislation and policy consideration outlined in Chapter 6 – Legislative and Planning Policy Context, the assessment will be undertaken in accordance with subject specific legislation and best practice guidance including the following:

- The Conservation (Natural Habitats etc.) Regulations 1994 as amended, including amendments made in 2017 with limited relevance to Scotland, as it applies post-Brexit by virtue of the UK Withdrawal from the European Union (Continuity) (Scotland) Bill (2020);
- The Council Directive on the Conservation of Wild Birds 2009/147/EC (The EU 'Birds Directive'), as it applies post-Brexit by virtue of the UK Withdrawal from the European Union (Continuity) (Scotland) Bill (2020);
- The Wildlife and Countryside Act (as amended) 1981;
- The Wildlife and Nature Environment (Scotland) Act (2011);
- The Protection of Badgers (Scotland) (as amended) Act 1992;
- The Nature Conservation (Scotland) Act, 2004;
- The Scottish Biodiversity List;

- Argyll and Bute Local Biodiversity Action Plan; and
- The former UK BAP Priority Habitats and Species lists.

9.4 Baseline Conditions

9.4.1 A range of detailed ecological surveys have been undertaken for the Proposed Development and/or its environs since 2016, and these have been reviewed as part of this scoping exercise. The surveys previously undertaken are summarised in Table 9-1 to Table 9-3.

Table 9-1: Summary of habitat surveys undertaken.

Survey title	Survey date	Report date	Undertaken by	Coverage
Extended Phase 1 Habitat Survey and NVC	Summer 2016	November 2016	Arcus	Majority of Cruachan Reservoir part of Site and 250 m buffer. Narrow strip of access track and limited extent of 250 m buffer. Off-site compound not covered.
Bryophyte Survey	April 2017	November 2017	Gordon Rothero (reported by Arcus)	Majority of Cruachan Reservoir part of Site physically sampled. Data search for rest of Site.
Extended Phase 1 Habitat Survey	August 2020	February 2021	Donna Black (reported by Arcus)	Restricted study area along shore of Loch Awe to east of visitor centre.

Table 9-2: Summary of protected species surveys undertaken.

Survey title	Survey date	Report date	Undertaken by	Coverage
Extended Phase 1 Habitat Survey and NVC – wildcat	Summer 2016	November 2016	Arcus	Within 250 m of 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – otter	Summer 2016	November 2016	Arcus	Within 200 m of 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – bats	Summer 2016	November 2016	Arcus	Within 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – fish	Summer 2016	November 2016	Arcus	Various locations along Loch Awe.
Extended Phase 1 Habitat Survey and NVC – FWPM	Summer 2016 – habitat suitability only	November 2016	Arcus	Within 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – red squirrel	Summer 2016	November 2016	Arcus	Within 50 m of 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – pine marten	Summer 2016	November 2016	Arcus	Within 250 m of 2016 Site boundary.

Survey title	Survey date	Report date	Undertaken by	Coverage
Extended Phase 1 Habitat Survey and NVC – water vole	Summer 2016	November 2016	Arcus	Within 50 m of 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – badger	Summer 2016	November 2016	Arcus	Within 50 m of 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – amphibians	Summer 2016 – habitat suitability only	November 2016	Arcus	Assumed to be 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – reptiles	Summer 2016 – habitat suitability only	November 2016	Arcus	Assumed to be 2016 Site boundary.
Extended Phase 1 Habitat Survey and NVC – invertebrates	Summer 2016 – habitat suitability only	November 2016	Arcus	Assumed to be 2016 Site boundary.
Bats – PRA (trees and buildings), static detectors, activity watches	Summer 2017	November 2017	Arcus	Within 2016 Site boundary.
Badger survey	June - September 2017	November 2017	Arcus	Within 50 m of 2016 Site boundary.
Otter survey	June - September 2017	November 2017	Arcus	Within 200 m of 2016 Site boundary.
Pine marten survey	June - September 2017	November 2017	Arcus	Within 250 m of 2016 Site boundary.
Red squirrel survey	June - September 2017	November 2017	Arcus	Within 50 m of 2016 Site boundary.
Wildcat survey	June - September 2017	November 2017	Arcus	Within 250 m of 2016 Site boundary.
Water vole survey	June - September 2017	November 2017	Arcus	Within 50 m of 2016 Site boundary.
Fisheries survey	September 2017	January 2018	Arcus	Various locations along Loch Awe.
Protected Species Survey Report	September 2018	March 2020	Arcus	Not known.
Pine Marten Survey	December 2018	March 2020	Arcus	Not known.
Pine marten camera trap	March-September 2019	March 2020	Arcus	Concentrated in woodland surrounding the visitor centre.

Survey title	Survey date	Report date	Undertaken by	Coverage
Badger survey	May-September 2020	February 2021	Arcus	Revised Site boundary incorporating southern edge of Cruachan Loch and access track.
Otter survey	May-September 2020	February 2021	Arcus	Revised Site boundary incorporating southern edge of Cruachan Loch and access track.
Pine marten survey	May-September 2020	February 2021	Arcus	Revised Site boundary incorporating southern edge of Cruachan Loch and access track.
Red squirrel survey	May-September 2020	February 2021	Arcus	Revised Site boundary incorporating southern edge of Cruachan Loch and access track.
Water vole survey	May-September 2020	February 2021	Arcus	Revised Site boundary incorporating southern edge of Cruachan Loch and access track.
Herpetofauna	May-September 2020	February 2021	Arcus	Revised Site boundary incorporating southern edge of Cruachan Loch and access track.

Table 9-3: Summary of ornithological surveys undertaken.

Survey title	Survey date	Report date	Undertaken by	Coverage
Year 1 Surveys	October 2016 – September 2017	March 2018.	Reported by Arcus.	.
Year 2 Surveys	October 2017 – September 2018	Dec 2018	Reported by Arcus.	
VP watches	October 2017 – September 2018	December 2018	Reported by Arcus.	Three VP locations surveyed for full year. two locations stopped in April 2018. Mostly covered proposed site boundary + buffers.
Migratory bird counts	November 2017 and March 2018	December 2018	Reported by Arcus.	Cruachan Reservoir
Winter walkovers	November 2017 and February 2018	December 2018	Reported by Arcus.	Land within 2016 site boundary.
Breeding eagles	February – September 2018	December 2018	Reported by Arcus.	6 km buffer of 2016 site boundary. Reduced from April 2018 to cover just the known golden eagle territory.

Survey title	Survey date	Report date	Undertaken by	Coverage
Breeding raptor and owl surveys	April – August 2018	December 2018	Reported by Arcus.	2 km buffer of 2016 site boundary.
Breeding bird surveys	April – July 2018	December 2018	Scott Smith (reported by Arcus)	Study area reduced in 2018 to focus on west of 2016 Site boundary + 500 m buffer. Low-lying farmland was excluded.
Black grouse	April – May 2018	December 2018	Scott Smith (reported by Arcus)	1.5 km buffer of 2016 Site boundary.

Data search

9.4.2 The NBN Atlas contains nearly 16,000 data records for a 5 km buffer around the Site. The vast majority of these are records which cannot be used for commercial purposes, and are dated pre-2010, and/or are species of no notable conservation importance. Of those records dated from 2010 or later, 77 are not constrained by a CC-BY-NC licence, and include:

- five records of otter;
- 17 records for red squirrel;
- six records for pine marten;
- two records for slow worm;
- 14 records for common lizard;
- three records for black grouse;
- five records for osprey;
- two records for white-tailed eagle; and
- seven records for pearl-bordered fritillary.

9.4.3 These are all species which were considered in one or more of the pre-existing survey reports for the Site.

Designated sites

9.4.4 Two internationally designated sites fall within the Site boundary. These are the Glen Etive and Glen Fyne Special Protection Area (SPA) and part of the Loch Etive Woods Special Area of Conservation (SAC). Figure 9.1 shows an environmental constraints plan including designated sites within the vicinity of the Proposed Development:

- The SPA, which encircles Cruachan Reservoir and partially falls within the Site boundary, was designated as it regularly supports a population of European importance of golden eagle. In 2003, the SPA contained 19 active golden eagle territories, representing more than 4.2 % of the GB population of that species.
- The SAC has been designated for three main woodland habitat types, namely alder woodland on floodplains, western acidic oak woodland and mixed woodland on base-rich soils associated with rocky slopes, as well as the presence of otter. The notifiable feature within the Site is predominantly the acidic oak woodland.

9.4.5 With respect to nationally designated sites, the Coille Leitire Site of Special Scientific Interest (SSSI) is concurrent with the Loch Etive Woods SAC (see above), designated for upland oak woodland. Pearl-bordered fritillary butterfly is also mentioned in the citation, although this is not considered to be one of the notified features.

9.4.6 No non-statutory nature conservation sites, which in Argyll and Bute are known as Local Nature Conservation Sites (LNCSs), fall within the Site boundary, but there is one such site within 2 km of the Site. This covers Eilean Beith and Fraoch Eilean, both being islands within Loch Awe, 800 m south from the Site boundary at its closest point. No effects on this LNCS is expected.

9.4.7 Ancient woodland, predominantly of semi-natural origin, flanks much of the shore of Loch Awe and the lower slopes of the surrounding hills, including those within the Site. Much of this comprises the Coille Leitire SSSI and the Loch Etive Woods SAC.

9.4.8 Given the proximity of the Site to statutory nature conservation sites, these will need to be assessed in full in the EcIA. Because the designated sites also include Natura 200 sites, information needed to support a Habitats Regulations Assessment (HRA) will also be needed. For the SPA, this will link into the ornithological survey suite (see below).

Habitats

9.4.9 An expected range of upland habitat types were reported in the pre-existing surveys, including unimproved acid grasslands, wet heaths, bogs and marshy grasslands. Woodland habitats were present along the access track corridor. These were classified according to JNCC Phase 1 Habitat Survey codes and associated NVC communities.

9.4.10 Generally, the habitat surveys undertaken to date are considered to be robust in terms of the methodologies applied, and their seasonal timings. Unless there have been notable changes to the management practices covering the land within the relevant study areas, it is unlikely that there would be significant changes in the coverage and composition of the habitats in the intervening time period(s). However, there are spatial gaps in terms of the Site boundary for the Proposed Development, and these will need to be infilled. In addition, it is now generally accepted that the Phase 1 Habitat Survey technique is no longer fit for purpose for EcIA, and to that end it is recommended that habitats within the required study area buffers are reclassified using Scottish EUNIS as well as NVC. The updated habitat surveys will incorporate a 250 m buffer of the Site boundary where excavations will be undertaken, to accommodate the zone of influence relevant for groundwater dependent terrestrial ecosystems (GWDTEs). The buffer in other areas will be 100 m.

Non-avian protected species

9.4.11 The protected species surveys undertaken to date are considered to be robust in terms of the methodologies applied, and their seasonal timings. However, there are spatial gaps arising from the Site boundary for the Proposed Development, and a number of the surveys potentially may become restricted in terms of their temporal validity period within the timeframes expected for submission of the EIA Report.

9.4.12 The non-avian protected species can therefore be classified into four groups for the purpose of this scoping exercise:

- species for which survey or data searches have determined are likely to be absent and for which no further work is needed, and they can be scoped out of the EcIA, namely wildcat, freshwater pearl mussel, beaver and specially protected amphibians such as great crested newt;
- species for which survey or appraisals have determined that they should be considered in an EcIA, but which are likely to be present at a density below that for which survey would be useful, namely reptiles;
- species for which surveys or appraisal have been carried out, and although their survey validity period has expired, it is unlikely that update surveys will provide any new information regarding population spatial distribution or sizes, namely badger, bats and water vole, except in the context of the off-site compound where these surveys will be needed because this area has been omitted from surveys to date;
- species for which original or update surveys are likely to be needed for the new Site boundary, and which are known to be present and active within the study area, namely fisheries, freshwater invertebrates, otter, pine marten and red squirrel.

9.4.13 All protected species surveys will follow national survey protocol guidelines.

Ornithology

9.4.14 The ornithological surveys undertaken to date have been robust in their coverage, both spatially and temporally, and it is considered likely that the 2017-2018 data can be used in an EcIA to be submitted in 2022. Notwithstanding that, it is considered that the pre-existing ornithological data falls into three main categories:

- surveys which were undertaken in 2017 but, given the absence of species were not required to be undertaken again or updated, namely woodland point counts, migratory bird surveys and winter walkovers;
- surveys which were completed in 2017 and 2018 and which can be reused in an EcIA in 2021 without needing to be updated, namely the breeding bird survey (focus on upland waders and species of conservation concern) and breeding raptors other than golden eagle, as it is unlikely that new survey data will provide any additionally useful information for the assessment;
- surveys which were completed in 2017 and 2018 and which update data would usefully inform the EcIA and/or the HRA, namely breeding golden eagle, vantage point surveys for golden eagle (and indirectly white-tailed eagle), and black grouse.

9.4.15 The Argyll Raptor Study Group will also be consulted for any relevant breeding data for 2019-2021.

9.4.16 All ornithological surveys will utilise the same methodologies as those adopted in previous years, and will be in accordance with accepted survey protocols previously agreed with NatureScot.

9.5 Embedded Mitigation and Design Principles

9.5.1 The assessment of impacts and their effects will be undertaken in the context of the application of embedded mitigation which will reduce impacts associated with both the construction and operation of the Proposed Development. This embedded mitigation includes avoidance of IEFs during the design process, and the implementation of standard best practice mitigation during construction which would be secured in a CEMP.

Mitigation by design

9.5.2 During the design process, ecological constraints will be taken into consideration in order to minimise potential impacts on IEFs. These could include:

- Development configurations designed to avoid sensitive habitats and protected species licensing zones or zones of impact wherever possible.
- Development programmes designed to avoid key sensitive times of year for IEFs, such as the nesting season for birds.

Best practice during construction

9.5.3 A suite of standard measures will be in place during the construction phase which will ensure that construction complies with best practice. These measures may include:

- Requirement for an Ecological Clerk of Works (ECoW) to oversee all stages of construction, to ensure that good practice measures with regards to ecology are implemented.
- Pre-construction surveys will be carried out for protected species as deemed necessary and licensing and mitigation requirements will be reviewed throughout the construction phase as appropriate;
- The Site induction for construction personnel will include information regarding the IEFs on the Site and the importance of their protection and the legal requirements for this where appropriate;
- Work areas will be carefully marked out and delimited on the ground, with the assistance of the ECoW, to ensure no extraneous habitat loss;
- General good practice measures for working in and near to watercourses will be adhered to, for example, during construction, silt interception traps will be provided to minimise unchecked contaminated run-off. Appropriate artificial drainage must be designed and installed;

- Fuels and other chemicals will be stored securely within the Site construction compound;
- Appropriate wash-out facilities will be available for vehicles and machinery;
- Trenches and excavations will be covered at the end of each working day, or will include ramps, and stored pipes will be capped, to prevent entrapment of animals;
- If construction work is carried out during the hours of darkness, machinery and floodlights will be directed away from waterbodies and woodland edges; and
- A site speed limit of 15 mph for all construction traffic will be in place.

9.6 Potential Effects

9.6.1 Potential direct effects of construction include *inter alia*:

- Direct loss of habitat through land take for construction of the off-site and on-site compounds, jetty and storage areas or the dewatering of Cruachan Reservoir;
- Direct loss or harm of species through construction activities.

9.6.2 Potential indirect effects of construction include *inter alia*:

- Changes to the existing hydrology that could lead to detrimental changes in wetland flora and fauna as a result of increased drainage or dewatering;
- Disturbance effects to faunal species through noise, vibration, lighting or increased presence of humans or moving vehicles.

9.6.3 Potential operational phase effects include, *inter alia*:

- Habitat changes arising from the altering the high and low water levels in Cruachan Reservoir during drawn-down and pump up;
- Increased disturbance arising from increased use of access track by service vehicles.

9.7 Proposed Scope of Assessment

9.7.1 It is proposed that the EcIA will make a full assessment of the impacts and effects on:

- Sites designated for nature conservation;
- Habitats, including Annex 1 habitats and GWDTEs, and notable flora;
- Protected non-avian species including otter, pine marten, red squirrel, water vole, badger, reptiles, freshwater fisheries and freshwater invertebrates;
- Ornithological features including notable raptors, black grouse and the upland breeding bird assemblage.

9.7.2 IEFs scoped out of the assessment include freshwater pearl mussel, wildcat, great crested newt and beaver.

9.7.3 The proposed scope of this assessment has been discussed and agreed with NatureScot at a meeting held on 7th April 2021, as referenced in Table 4-1.

9.8 Proposed Assessment Methodology

9.8.1 The assessment methodology will be based on the 2018 CIEEM EcIA Guidelines, which can be summarised in six steps:

- identifying and characterising Important Ecological Features (IEFs);
- identifying and characterising impacts and their effects;
- identifying measures to avoid and mitigate impacts and their effects;

- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset still significant residual effects;
- identifying opportunities for ecological enhancement.

Identifying Important Ecological Features (IEFs)

9.8.2 The sensitivity, value or importance of ecological features can be related to a wide range of ecosystem services that they can provide to the environment, people or wider society. These benefits can include the conservation of genetic diversity, people's enjoyment or understanding of biodiversity, or the health benefits of biodiversity. A summary of an approach to valuing ecological features in Scotland can be found in Table 9-4. The table shows how ecological importance can be ascertained using a combination of statutory measures (legally protected sites and species) and non-statutory but widely accepted measures, such as the presence of notable habitats and species listed in biodiversity lists of local Biodiversity Action Plans (LBAPs). Use can also be made of the Ratcliffe assessment criteria for the selection of sites with nature conservation value (Ratcliffe, 1977) and certain protected species have their own frameworks for the assessment of the importance of on-site populations. All these criteria can vary at different geographical scales.

Table 9-4: An approach to assessing Important Ecological Features (IEFs) in Scotland.

Level of sensitivity or importance	Examples (not exhaustive)
International (including European)	An internationally designated site or candidate site (Special Protection Area (SPA),, Special Area of Conservation (SAC),, Ramsar site, Biogenetic Reserve) or an area which NatureScot has determined meets the published selection criteria for such designations, irrespective of whether or not it has yet been notified. A viable area of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of that ecological resource. A regularly occurring population of an internationally important species, i.e., those listed in Annex 1, 2 or 4 of the Habitats Directive.
National	A nationally designated site (SSSI), National Nature Reserve (NNR), Marine Nature Reserve or a discrete area which NatureScot has determined meets the published selection criteria for national designation irrespective of whether or not it has yet been notified. A regularly occurring population of a nationally important species i.e., a priority species listed in the former UK BAP, Scottish Biodiversity List and/or Schedules 1, 5 (S9 (1, 4a, 4b)) or 8 of the Wildlife and Countryside Act, or a UK Red Data Book species.
Council	Non-statutory designated wildlife sites (e.g., Local Wildlife Sites (LWSs), Sites of Nature Conservation Interest (SNCIs) and Site of Importance for Nature Conservation (SINCs)), and areas of semi-natural ancient woodland greater than 0.25 ha. Viable areas of key habitats identified in local BAPs or smaller areas of such habitats that are essential to maintain the viability of that ecological resource. Any regularly occurring, locally significant population of a species listed as being nationally scarce (occurring in 16-100 10 km squares in the UK) or in a relevant local BAP on account of its rarity or localisation.
Local	Other sites which the designating authority has determined meet the published ecological selection criteria for designation at the local level. Regularly occurring features or small population(s) of species that are scarce within the local area or which appreciably enrich the local area's habitat or species resource.

Level of sensitivity or importance	Examples (not exhaustive)
Site	Commonplace and widespread semi-natural habitats e.g., scrub, poor semi-improved grassland, coniferous plantation woodland and intensive arable farmland. Small numbers of species or small areas of habitat considered to be notable on account of its conservation importance, for example those that are scarce in the local area, those which appreciably enrich the local area's habitat or species resource, or those listed on a relevant LBAP.
< Site	Habitats of little or no ecological value e.g., amenity grassland or hard standing.

Identifying impacts and their effects

9.8.3 Characterising impacts refers to the changes expected in the extent and integrity of an IEF. It takes into consideration the fact that different impacts on different IEFs can result in permanent or temporary effects of differing magnitudes, and this is also dependent on their timing and/or frequency of occurrence, and whether or not they can be reversed.

9.8.4 Impacts will be defined in this EcIA as being high, medium, low or neutral, as summarised in Table 9-5. Impacts may be adverse (detrimental) or positive (beneficial).

Table 9-5: Criteria for describing impacts and effects on Important Ecological Features.

Impact type	Description
High	High impacts may include those that result in large-scale, permanent (i.e., within the lifetime of the Development) changes in an IEF, and likely to change its ecological integrity. These impacts are likely to result in overall changes in the conservation status of a species population or habitat type at the location(s) or geographical scale under consideration.
Medium	Medium impacts may include moderate-scale permanent (i.e., within the lifetime of the Development) changes in an IEF, or larger-scale temporary changes, but the integrity of the feature is not affected. This may mean that there are temporary changes in the conservation status of a species-population or habitat type at the location(s) or geographical scale under consideration, but these are unlikely to be irreversible or long-term.
Low	Low impacts may include those that are small in magnitude, have medium-scale temporary changes, and where integrity is not affected. These impacts are unlikely to result in overall changes in the conservation status of a species population or habitat type at the location(s) under consideration, but it does not exclude the possibility that mitigation or compensation will be required.
Neutral	There is no perceptible change in the ecological receptor.

9.8.5 Different impacts and their outcomes also have different probabilities of occurring. It is rarely possible to quantify probability accurately in the natural world in the absence of large, long-running data sets, and therefore for the purposes of this EcIA, probabilities are simply assessed qualitatively and relatively, using the terms defined in Table 9.6.

Table 9-6: Criteria for categorising the probability of effects occurring.

Probability	Description
Certain	It is reasonable to conclude that these effects will occur as a result of the proposals.
Likely	It is reasonable to conclude that these effects are more likely to occur than not occur.
Unlikely	It is reasonable to conclude that these effects are less likely to occur than to occur.

Significance of effects

9.8.6 In accordance with CIEEM (2018), a "significant effect" is one which supports (positive) or undermines (adverse) biodiversity conservation objectives for a stated IEF, or for biodiversity generally if this is more relevant to the circumstances being assessed. These significant effects are considered by an ecological professional to be sufficiently important to warrant explicit assessment and reporting so that a decision-maker is adequately informed of the environmental consequences of a proposed project.

9.8.7 The significance of an effect on an IEF is given with reference to a specific spatial scale, which may or may not be related to the geographical scale used to define the IEF. However, mitigation and compensation solutions may need to be applied so as to ensure outcome consistency with the scale at which the significant effect has been identified.

Mitigation and Enhancement

9.8.8 The EcIA process described above will be used to identify whether or not there are significant ecological effects of the Proposed Development which may need to be ameliorated. It would not be appropriate at this time to be prescriptive regarding what those effects will be but it is likely that a number of mitigation and/or enhancement measures will be incorporated into the proposals and/or will form commitments to be secured by Condition where necessary. The requirement for mitigation will be based on the established CIEEM (2018) mitigation hierarchy sequence of “avoid, mitigate, compensate, enhance”.

9.9 References

Arcus (2021) Cruachan Power Station – Extended Phase One Habitat Survey Report 2020. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.

Arcus (2021) *Cruachan Power Station – Protected Species Survey Report 2020*. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.

Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine. 3rd Edition.

Drax (2020) *Cruachan Expansion Project Hydro Ecology – Camera Trap Monitoring Report*. Unpublished contract report, dated March 2020.

ScottishPower Generation Ltd (2016) *Cruachan Power Station Extended Phase 1 Habitat and National Vegetation Classification (NVC) Survey Report*. Arcus consultancy Services Ltd. Unpublished contract report, dated 11 November 2016.

ScottishPower Generation Ltd (2017) *Cruachan Power Station Bat Survey Report*. Unpublished contract report, dated November 2017.

ScottishPower Generation Ltd (2017) Cruachan Power Station Bryophyte Survey Report. Unpublished contract report, dated November 2017.

ScottishPower Generation Ltd (2017) *Cruachan Power Station Protected Species Survey Report*. Unpublished contract report, dated November 2017.

ScottishPower Generation Ltd (2018) *Cruachan Power Station Fisheries Habitat & Fish Fauna Survey Report*. Unpublished contract report, dated January 2018.

ScottishPower Generation Ltd (2018) *Cruachan Power Station Ornithology Annual Report Year 2: October 2017 – September 2018*. Unpublished contract report, dated December 2018.

SEPA (2013). Pollution Prevention Guidelines.

10 Transport and Access

10.1.1 This chapter of the Scoping Report outlines the proposed scope of the EIA to assess likely significant effects from the Proposed Development on traffic and transport conditions at the Site and wider surrounding road network.

10.1.2 A supporting Transport Assessment (TA) will be prepared as an appendix to the EIA Report and will be subject to separate a scoping process with Transport Scotland (TS) and ABC.

10.2 Potential Effects

10.2.1 Having regard to the characteristics of the Site and the surrounding area (Chapter 2) and the Proposed Development (Chapter 3), the assessment of the construction and operation of the Proposed Development will review the following types of effects:

- Changes in vehicle flows and usage patterns within the road network (including A85, A82, A816 and A828 corridors, including for abnormal loads;
- Associated amenity and environmental effects, including:
  - Effects on driver delay;
  - Effects on pedestrian delay and amenity;
  - Effects on fear and intimidation;
  - Effects on severance; and
  - Effects on accidents and safety;
- Effects on public transport users;
- Effects on public access

10.2.2 As potential operational effects on traffic flows (e.g. from operational employees and maintenance contractors) would be de minimis (e.g. an extra 5-10 operational staff above existing levels at Cruachan 1) and as the extent of any future decommissioning is outwith the scope of the proposed EIA, this chapter focuses on considering potential construction phase effects.

10.3 Relevant Legislation, Guidance and Technical Standards

10.3.1 The assessment of likely significant effects will be undertaken in accordance with relevant and applicable legislation, policies and technical standards. In addition to the relevant legislation and policy consideration outlined in Chapter 6 – Legislative and Planning Policy Context, the assessment will be undertaken in accordance with subject specific legislation and best practice guidance including the following:

- Design Manual for Roads and Bridges (DMRB) "LA104 - Environmental assessment and monitoring"[2] and with guidance provided by the Institute of Environmental Management & Assessment (IEMA) .
- Transport Scotland's Transport Assessment Guidance (2012)[3]
- Design Manual for Roads and Bridges.
- National Roads Development Guide (2017)[4]

[2] Design Manual for Roads and Bridges (DMRB) "LA104 - Environmental assessment and monitoring", 0f6e0b6a-d08e-4673-8691-cab564d4a60a (standardsforhighways.co.uk)

[3] Transport Scotland's Transport Assessment Guidance, 2012, Source: https://www.transport.gov.scot/media/4589/planning_reform_-_dpmtag_-_development_management__dpmtag_ref__17__-_transport_assessment_guidance_final_-_june_2012.pdf

[4] National Development Guide, 2017, Source: http://www.scotsnet.org.uk/documents/national-roads-development-guide.pdf

- Volume 11 Sec 2 (LA 103 Revision 1, 2020)[5] in relevance to Trunk Roads.

10.4 Baseline Conditions

10.4.1 Vehicular access to Cruachan Power Station is via an access road linking to the A85 trunk road which connects Oban to the main road networkfor Scotland. From the Site, the A85, also, provides access to the nearby villages of Loch Awe (~4.5km to the east), Dalmally (~8km to the east), Bridge of Awe (~6km to the north west) and Taynuilt (~8.5km to the north west). The A85 continues to Tyndrum in the east where it meets the A82, and Oban in the west where it meets the A816. The upper reservoir is accessed via a private road from the A85. Further description of the strategic and local road networks, as well as their constraints, that need to be taken into consideration for planning purposes, will be included in the TA.

10.4.2 Currently pedestrian and cycle facilities are limited within the immediate locality of Cruachan Power Station. Loch Awe and Ben Cruachan are significant recreational assets and there is potential for an active travel route from Tyndrum to Oban and on to Mull and Iona. Description of walking and cycling facilities will be included in the Transport Assessment.

10.4.3 The nearest train station to Cruachan Power Station is Falls of Cruachan Station, located at the foot of Ben Cruachan, approximately 250m east of Cruachan Visitor Centre. This station is only open in the summer months. Falls of Cruachan railway station lies on the Oban branch of the West Highland Line which links Oban with Glasgow Queen Street.

10.4.4 The second nearest rail station to Cruachan Power Station is Lochawe Station, located approximately 5.3km east of Cruachan Visitor Centre. This distance corresponds to a 5-minute-drive and approximately a 10-minute- bus ride. Bus no 976, operated by Scottish Citylink, connects Loch Awe rail station with Cruachan Visitor Centre 3 times per day and for each direction. Loch Awe Station is also on the Oban branch of the West Highland Line and operates all year round.

10.4.5 Cruachan Power Station Visitor Centre is accessible also by bus. The nearest bus stops are located on the A85, 120m approximately east of the Cruachan Visitor Centre. Five buses currently serve the area and provide regular access to Glasgow, Oban, Dalmally, Dundee, Perth and Glenrothes. Further details on existing bus service provision will be included in the EIA Report and TA. Access from the rail and bus services to the power station is currently by foot from the base of Ben Cruachan.

10.5 Embedded Mitigation and Design Principles

10.5.1 The Proposed Development will incorporate a number of embedded mitigation measures to address potential effects. Of relevance to the assessment of traffic and transport effects, the embedded mitigation includes the following:

- Both the principle and detailed design of the A85 diversion would mitigate otherwise likely significant adverse effects if the road had to be closed during construction.
- The construction process for the development will consider and include where appropriate and feasible:
  - The minimisation of the use of materials;
  - the reuse of materials within the design of the development to reduce importing and exporting where viable; and

[5] DMRB Volume 11 Section 2 LA 103 Revision 1 Sustainability and environment, Appraisal; Scoping projects for environmental assessment (formerly HA 204/08, IAN 125/15, IAN 133/10), Source: https://www.thenbs.com/PublicationIndex/documents/details?Pub=HA&DocID=328523

- the use of environmentally sensitive transport methods – such as opportunities to move materials by non-road methods; and minimising workforce travel – such as the use of local accommodation.

- The works programme will be reviewed to seek to reduce effects on sensitive receptors and to consider where seasonal working might reduce the magnitude of effects.
- Prior to any remediation or construction taking place a Construction Traffic Management Plan will be prepared and subsequently implemented. This will include control measures, including robustly enforced traffic management measures, to control construction traffic movements in order to protect the environment, amenity, safety of local residents, businesses, and the general public;
- Given the rural location of the Proposed Development and its surrounding area, as well as shift patterns, it is anticipated, once operational, use of private car to access the site is likely and there are not anticipated to be any likely significant effects given the relatively small number of additional operational staff (5-10). However, the Transport Assessment will fully explore the potential to use all modes including walking and cycling, rail and bus as alternative means of accessing the Site. The pre-mitigation levels of traffic effects which will be predicted through the TA and reported within the EIA should therefore be considered as 'worst-case' potential effects;
- Consideration will also be given to the preparation of travel packs so that when the Site is built-out, there will be information available to employees advising them of the optimum travel options to and from the Site. Similar information would be provided to visitors through the centre's website; and
- Finally, consideration of impacts on local amenity will be considered and mitigated if possible.

10.6 Proposed Scope of Assessment

10.6.1 Having regard to the nature of the Proposed Development, key baseline characteristics and proposed embedded mitigation measures, at this stage it is considered that the following effects have some potential to be significant and therefore require further consideration through the EIA process:

- Effects on the Trunk Road network – the construction and operation of the Proposed Development would increase traffic flows on trunk roads and has the potential to result in associated amenity or environmental effects on the trunk road network which might be judged to be Significant. There is a possibility that there would be additional traffic flow generated from cumulative committed developments which would directly interact with traffic effects from the Proposed Development. During the scoping discussions with TS and with Argyll and Bute, it was confirmed that the Applicant will be made aware of such developments which will need to be included in the cumulative traffic impact assessment.
- Effects on traffic flows and usage patterns on the local road network, plus the associated potential for increased pedestrian severance, air pollution, driver delay and accident rates;
- Effects from changes to local road infrastructure as part of the Proposed Development;
- Effects on active travel infrastructure and public access;
- Effects on public transport users and patronage; and,
- Transfer of HGV movements from road-based to rail/water-based transport.

10.6.2 The Proposed Development has the potential to affect the strategic transport network due to its direct connection with the A85 that is part of the Trunk Road network, The A85 will be used for:

- Construction workforce, plant, equipment, material and vehicular movements during construction phase; and
- Permanent staff, visitors and service vehicle movements during the operational phase.

10.6.3 The effects on the wider Trunk Road network of the A82 to the south and east of the Proposed Development will be reviewed with TS, subject to the materials' handling strategy that is adopted for assessment. To the west and north of the development the effects on the A816 and A828 corridors will

be assessed where there is anticipated to be a measurable effect on those corridors as a consequence of the proposed arrangements for the transport and re-use of spoil as will be detailed in a OWMP.

10.6.4 The magnitude of these effects may be further scoped out on initial appraisal of the development impacts and travel strategies identified in the OWMP. The EIA Report will explain where types of effect are subsequently scoped out.

10.7 Proposed Assessment Methodology

Overview of Proposed Approach

10.7.1 At this stage, it is recommended that the Transport and Access EIA Report Chapter would be supported by a TA which would be presented as aa technical Appendix to the EA Report. . The Traffic and Transport Chapter will draw out the conclusions of the TA, assess those as effects, apply mitigation and come to a conclusion of significance of effects.

10.7.2 To allow for the effects of the COVID-19 pandemic, the baseline "do minimum" scenario for the construction year will be derived from the 2019 data observed at TS's fixed data site on A85 to the west of the development and used to factor up the 2017 traffic counts taken by the Applicant. That do minimum will represent the base year of start of peak construction – anticipated to be the middle year (2026-2027) of the 65 month construction programme which is proposed to start in quarter 1-2 of 2024.

10.7.3 The effects of the "construction do-something" year will then be assessed by applying the predicted traffic loading to the "do-minimum" scenario, representing the peak construction year – giving the reasonable worst case scenario.

10.7.4 The opening year for the development will be assessed for the equivalent types of effects to provide the "operational do-something" assessment year – comparing the effects derived during the normal operational state of the development and reflecting the estimation of increase in activity at the Visitors' Centre and the marginal increase in workforce. Commentary will be provided of the maintenance requirements, but it is anticipated that this will not create residual environmental effects that would be judged to be Significant.

10.7.5 In establishing the "do minimum" scenario, the assessment will take account of committed cumulative development and significant network changes, where advised by Argyll and Bute Council and TS.

10.7.6 Through the assessment commentary will be provided within the chapter on the consideration of seasonal variances and how those might impact on the assessment of effects.

10.7.7 Reasonable and appropriate alternative methods of movement and transport will be appraised and reported – including feasible technological changes. Where appropriate, embedded environmental benefits will be reported.

10.7.8 The geographic focus of the EIA Transport and Access chapter is anticipated to be focused on the A85 in the vicinity of the worksite immediately to the east of the existing Power Station and Visitors' Centre, at the point where the works access will be. The effects on the A85 at off-site compounds and temporary accommodation will be appraised and an assessment of effects undertaken where they are judged to be material. The sensitive receptors along the A85 would be the residential development at Loch Awe.

10.7.9 The materials handling strategy is to be defined and will inform where further assessment of effects is needed. This might include the junctions of A85 with A82 and at sensitive receptors located along the affected road corridors, such as Tyndrum. It is not anticipated that network capacity will be a challenge, but the effects of increased construction traffic on driver delay and safety will be an important focus.

10.7.10 The effects on receptors to the north and west of the development will be assessed if the materials handling strategy indicates substantive origins or destinations in that direction. The current assumption is that the focus of movements would be to the south and east of the development.

10.7.11 The most substantive material to be moved during the construction period will be the rock extracted from the caverns, shafts, and tunnels. It is estimated that approximately 1.5 million tonnes of rock will be removed from the development. Destinations are being researched for that material such that a

beneficial use can be established. Those destinations will inform the strategy for the movement of that material.

10.7.12 The strategy that would derive the largest effect on the transport network would be for the rock to be moved by road. In the absence of a robust alternative strategy the EIA Report Transport and Access Chapter will assess the 'all by road' scenario. It continues to be the aspiration to establish a viable solution that reduces the movement of material by road, seeking opportunities to move material by rail and/or marine operations. The use of rail or marine operations would be employed where there is a clear environmental, safety and risk reduction benefit. The strategy does also have to be commercially realistic, balanced against the scale of the development.

10.7.13 The construction phasing for the Proposed Development is anticipated to require temporary diversion or amendment to the alignment of A85 at the lower worksite. This scheme is being reviewed as part of the design fix and the preferred solution will be reflected in the EIA Report. As necessary the effects on the transport network will be appraised.

10.7.14 The movement of large plant and equipment, often as Abnormal Indivisible Loads, will be considered within the TA. It is not proposed that these loads will be specifically assessed within the EIA due to their low frequency and specifically managed movements.

10.7.15 Having assessed the construction do-something scenario the levels of significance of the effects will be conclude and an assessment made of the residual effects following embedded and applied mitigation.

10.7.16 The operational do-minimum will also be assessed, residual effects reported, and proposed mitigation set out.

10.7.17 It is not proposed that a design year assessment is carried out as there will be no projected growth in transport effects from the year of opening.

10.7.18 The proposals include for construction workforce temporary accommodation to be located at a compound located near B8077 (Stronmilchan Road). Crew buses are proposed to be provided to transport workers. That in turn will not add demand on the local bus or rail services and hence not create capacity issues on those services. Whilst the TA will include a review of the workforce transport patterns and provision, it is proposed that public transport effects are scoped out of the EIA Report transport chapter for both the construction phase and the operational phase.

Technical Consultations

10.7.19 The Applicant will continue to consult with TS and Argyll and Bute Council to agree the final scope of the EIA Transport and Access Chapter and the TA.

10.7.20 The Applicant will also engage with key stakeholders, including the Scottish Environment Protection Agency (SEPA), Network Rail, Sustrans, general public and local communities, to take into account their needs and priorities with respect to transport and travel and ensure effective collaboration and resolution of significant effects.

Information sources

10.7.21 Transport Scotland has provided the Applicant with access to its traffic count website. This database contains traffic demand, vehicle classification and speed information for various road links within Scotland. The nearest counter to the study area is located on the A85, 5.5km east of the B845 and approximately 14km west of Cruachan Power Station.

10.7.22 A 'Baseline Traffic and access report', produced by Arcus Consultancy Services Ltd in 2017 provides the baseline "do minimum" scenario data for the Environmental Impact Assessment and from which the development "do-something" scenarios will be developed. Traffic counts were undertaken in six locations in the area. Their specific locations are described below:

- **A85** – West of the power station and visitor centre accesses
- **A85** – East of dam access road
- **A819** – South of A85 junction
- **A85** – East of B8074 Glen Orchy Road

- **A82** – Between A85 junction and north of Tyndrum
- **A82** – North of A85 junction

10.7.23 Comparisons between baseline traffic flows and estimates of likely traffic flows on potentially affected roads will be made. It will then be established whether significant effects would be derived. This will take into account: the sensitivity of receptors; the resources likely to be affected; any potential for disruption to local routes; and any changes in the composition of traffic.

10.7.24 Discussions will be held with TS and ABC to identify any existing issues relating to traffic in the area. Information will also be sought on future projects in the area that could give rise to a significant cumulative impact when considered in conjunction with the Cruachan Expansion project. This will inform the "do-minimum" scenario.

10.7.25 An assessment of crash history in the local area will also be undertaken. Personal injury collision data will be obtained from the Department for Transport (DfT) database[6], for the most recent 5-year period. This will allow for recognition of accident clusters and any patterns of behaviour that may be affected by the Proposed Development so that these can be scrutinised as the plans develop for the Site. The crash data will be examined against the effects of the construction and the operational scenarios.

10.7.26 Finally, it is important to consider current travel to work movements and mode share in the context that commuters will be the main driver for the traffic demand to the Proposed Development during the operational phase. If this data is not available from the employees who currently work in Cruachan Power Station, travel to work data will be obtained from 2011 Census[7]. This analysis will inform the distribution of the movements made to and from the study area. Workforce travel during the construction period will be a combination of local movement from the temporary accommodation for the peak period shorter-term labour and the lesser movement from longer term accommodation within the area, for those people employed for the full project period.

Approach to assess the level and significance of predicted effects

10.7.27 The assessment will identify the likely significant environmental effects arising in the study area from the Proposed Development in respect of all modes of transport. It will be undertaken in accordance with the guidance set out within the IEMA document 'Guidelines on the Environmental Assessment of Road Traffic (Guidance Note 1)', 1993 and reflecting DMRB guidance.

10.7.28 In line with IEMA guidelines, further assessment will be undertaken on:

- Road links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%);
- Any specifically sensitive areas where the traffic flows have increased by 10% or more; and,
- Any non-road-based transport infrastructure (e.g. national cycle roads) where likely effects from the Proposed Development have the potential to be significant.

10.7.29 The assessment will consider the potential effects of both the construction and operational stages using a comparative prediction of local vehicle movements with and without the development, based upon the predicted number of movements generated and the likely modal share.

10.7.30 Within the EIA Report chapter, potential and residual effects will be defined as:

- Beneficial - Meaning that they are expected to produce environmental benefits in transportation terms, i.e. where overall traffic flows or percentage HGV movements decrease, or there are improved facilities for pedestrians, cyclists or public transport users.
- Negligible - Meaning that expected changes are too small to meaningfully measure, i.e. where changes in flows are typically less than 10%.

[6] 'Road Accidents and Safety Statistics', Source: https://www.gov.uk/government/collections/road-accidents-and-safety-statistics
[7] '2011 Census Travel to Work Data', Source: https://www.nomisweb.co.uk/census/2011/wu03uk

- Adverse - Meaning that they are expected to produce environmental dis-benefits in transportation terms, e.g. where overall traffic flows or percentage HGV movements increase, or there are reductions in facilities for pedestrians, cyclists or public transport users.

10.7.31 Beneficial and adverse effects will be further characterised as:

- Minor - Slight very short or highly localised changes of no significance and/or where changes in traffic flows/patterns are between 10% and 30%.
- Moderate - Limited change by extent, duration or magnitude which may be considered significant and/or where changes in traffic flows/patterns are between 30% and 60%.
- Major - Considerable change by extent, duration or magnitude of more than local significance or in breach of recognised acceptability, legislation, policy or standards, and/or where changes in traffic flows/patterns are greater than 60%.

10.7.32 A Significance matrix will be used to determine whether residual effects are Significant and require mitigation. That assessment will take account of embedded mitigation and further mitigation that might be proposed.

10.7.33 Where predicted increases in traffic flows are lower than the percentage-based thresholds, the IEMA guidelines suggest that the significance of effects can be stated to be low or insignificant and further detailed assessments are not required. Where predicted effects would breach the identified thresholds, further detailed assessment is required to define their significance in accordance with the IEMA guidelines and using professional judgement. This will involve consideration of the following factors:

- Characteristics / size/ activities / waste / risk of pollution / risk of accidents;
- Importance of the receiving environment;
- Likely scale of change following mitigation / number of people affected / degree of proposed change;
- Duration – temporary or permanent changes / cumulative impact in the short medium and long term;
- Trends e.g. seasonality, diversions, exceptional loads;
- Study area – direct and indirect impacts;
- Time period;
- Consideration of actions;
- Opportunities to improve conditions; and,
- Likelihood of problems occurring.

Approach to Cumulative Impact Assessment

10.7.34 The construction of the Proposed Development together with relevant cumulative developments could result in a temporary increase of HGVs and vehicles carrying construction workforce and materials on roads within the study area. If required, the EIA Report will therefore include consideration of any likely significant cumulative traffic effects during the construction phase of the Proposed Development. If no cumulative developments with the potential to generate cumulative traffic effects are identified, this element can be scoped out of the EIA Report.

10.7.35 The assessment of operational effects will use the baseline traffic data, previously outlined, to forecast growth (to be set out within the TA for the proposed planning application), which will take into account the traffic generation impacts of any relevant cumulative developments, at that point in time. The operational phase assessment presented in the EIA report will consider changes in traffic flows between the baseline and the assessment periods, both with and without the addition of the Proposed Development. This will negate the need for a separate cumulative impact assessment to be prepared.

Approach to identifying additional mitigation, enhancement, and monitoring requirements

10.7.36 Through the iterative EIA and design processes, opportunities to mitigate the effects of additional predicted traffic during the construction period will be identified and the use of non-road modes of transport will be maximised, paying particular reference to the ability to move materials and equipment from road to water or rail and to encourage further use of active travel routes for workers and visitors. Relevant mitigation and enhancement measures will be detailed in a dedicated subsection of the Transport and Access EIA Report chapter.

10.7.37 The main potential impacts on traffic movements are likely to be associated with the construction phase of the development. During this phase, there will be additional movements on the network that are associated with:

- material, equipment, and machinery to be transported to the Site; and
- material that will be exported from the caverns, shafts and tunnels' construction and needs to be deposited in the chosen permanent areas, temporarily stockpiled or for re-use in other projects.

10.7.38 Areas of where the exported material will be stored or placed will be included in this chapter, as well as the transport mode that will be used for its transportation. Depending on where the materials will be transported to, the following transport options are being explored currently:

- by road
- by road and rail
- by barge from a foreshore wharf to a new railhead with export via the rail network

10.7.39 Once the method of transport of exported materials is defined, the number of movements per day will be estimated. For each of the proposed transport methods, the following loads per transport mode is given below in approximation:

- 18t / lorry (rigid tipper)
- 60t / rail wagon
- +500t / barge (size dependent on fabrication at site)

10.7.40 These additional movements will be added to the baseline traffic flow, the impact of the total flow will be estimated and assessed, and mitigation measures will be suggested for the construction phase, where appropriate.

10.7.41 The operational period effects will be reported within the EIA report, however, it is anticipated that the increase in movements on the transport network is anticipated not to result in effects that would be judged to be Significant.

11 Noise and Vibration

11.1 Introduction

11.1.1 This chapter of the Scoping Report outlines the proposed scope of the noise and vibration assessment which would be undertaken for the Proposed Development. The assessment will consider likely significant noise and vibration impacts and effects caused by the construction and operation of the Proposed Development on nearby noise sensitive receptors (NSRs) within a defined study area.

11.2 Potential Effects

11.2.1 Key considerations in relation to construction effects from noise and vibration are likely to include noise and vibration associated with construction plant and activities, construction road traffic and operational noise from e.g. new operational plant. Potential effects have the potential to impact nearest sensitive residential and ecological receptors.

11.3 Relevant Legislation, Guidance and Technical Standards

11.3.1 The assessment of likely significant effects will be undertaken in accordance with relevant and applicable legislation, policies and technical standards. In addition to the relevant legislation and policy consideration outlined in Chapter 6 – Legislative and Planning Policy Context, the assessment will be undertaken in accordance with subject specific legislation and best practice guidance including the following:

- The Control of Pollution Act (COPA), 1974.
- Environmental Protection Act, 1990
- Planning Advice Note 1/2011: planning and noise
- Assessment of noise: technical advice note, 2011
- BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites, 2014
- BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound, 2019
- Design Manual for Roads and Bridges, LA 111 Noise and vibration (Revision 2), 2020

11.4 Baseline Conditions

11.4.1 A baseline environmental sound survey was undertaken by Arcus in 2017.Measurements were conducted at the six nearest noise sensitive receptors. Representative background sound levels were recorded between 28dB (night time) and 37dB (daytime).Due to the survey being undertaken in 2017 it is considered appropriate to repeat the measurements and update the baseline sound levels.

11.4.2 The closest NSRs to the Proposed Development include:

- Residential dwellings located on the A85 at Falls of Cruachan and Tigh Cherracar.
- Residential dwellings located in Loachawe.
- Residential dwelling of Castles Farm located adjacent to the proposed construction compound in the north east of the site.
- Residential dwellings located in Trevine.
- Hotel accommodation in Lochawe and in close proximity to the A85; and
- Ecological receptors located in close proximity to the Site.

11.4.3 Environmental sound levels at the Site and at the nearest noise sensitive receptors are likely to be dominated by noise associated with vehicular movements on the surrounding road network, namely the A85 and noise associated with the operation of the existing Cruachan 1 Power Station.

11.4.4 An environmental sound survey will be undertaken at the Site and in locations representative of the NSRs to establish the environmental sound climate for use within the assessment. The proposed measurement locations are indicated in Figure 11.1.

11.4.5 Due to the COVID-19 pandemic and the associated changes in traffic and activity levels it is possible that environmental sound levels are lower than would normally be expected. This would primarily be due to reduced vehicle movement in the vicinity of the Site.

11.4.6 At the time of writing, it is anticipated that the environmental sound survey will be undertaken in July/August 2021. During this time, it is anticipated that traffic flows are less likely to be affected by changes in traffic patterns due to COVID-19.

11.4.7 The Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments (2021), published by the Institute of Acoustics and the Association of Acoustics & Noise Consultants indicates that surveys undertaken during this time should be supplemented by additional information such as older survey data and/or acoustic modelling based on pre-lockdown traffic data.

11.4.8 In this instance, the sound survey data will be compared to publicly available data from recent planning applications in the area and historical environmental sound survey data obtained at the Site (undertaken by Arcus in 2017) in order to determine whether any corrections are required to the measured sound survey data.

11.5 Embedded Mitigation and Design Principles

11.5.1 Noise and vibration will be a consideration throughout the EIA and design process for the Proposed Development with embedded mitigation likely to involve the following:

- Locating the majority of the operation power station underground;
- Minimising the permanent design footprint as far as is possible; and
- Using best practice construction methods and good working practices to limit construction noise and vibration as far as reasonably practicable, secured through a CEMP.

11.6 Proposed Scope of Assessment

11.6.1 Based on the key parameters of the Proposed Development, the following likely significant effects will be considered in the EIA:

- Noise and vibration associated with construction plant and activities occurring at the Site;
- Noise and vibration associated with construction road traffic on the surrounding road network;
- Vibration associated with blasting and quarrying at the Site.
- Above ground noise associated with the operation of plant and activities occurring at the new Cruachan Expansion Project Power Station; and

11.6.2 Based on the location of the Site and the nature of the Proposed Development, which would require a limited number of additional staff and periodic maintenance, it is proposed to scope potential effects associated with operational road traffic noise out of the EIA scope.

11.6.3 Additionally, noise associated with falling water from Cruachan Reservoir into the River Awe via the Lower Inlet-Outlet Structure will be all sub-surface noise and any above ground noise at sensitive receptors will be imperceptible and will therefore be scoped out of the EIA.

11.7 Proposed Assessment Methodology

Study Areas

11.7.1 Based on the anticipated construction activities required and guidance provided within the Design Manual for Roads and Bridges (DMRB) LA 111, a 300 m study area (from the Site boundary) is proposed to be used to assess construction noise. If effects are anticipated outside of 300 m during blasting activities, this study area will be extended.

11.7.2 Based on the anticipated construction activities required and guidance provided within DMRB LA 111, a 100 m study area (from the Site boundary) is proposed to be used to assess construction vibration. If effects are anticipated outside of 100 m during blasting activities, this study area will be extended.

11.7.3 Based on guidance provided within DMRB LA 111, a 50 m study area (from the Site boundary) is proposed to be used to assess construction traffic noise.

11.7.4 At this stage the study area for operational noise is not known, as this would depend on existing background sound levels and anticipated operational noise levels. The study area will be defined to include any receptors anticipated to be subjected to noise effects. However, Figure 11.1 shows the location of nearest sensitive receptors where background monitoring will be undertaken.

Approach

11.7.5 A baseline environmental sound survey will be undertaken to establish the environmental sound climate at both the Site and in locations considered representative of the NSRs (as shown on Figure 11.1). The locations and durations of the survey will be agreed with the EHD at ABC.

11.7.6 The assessment of construction noise and vibration and subsequent determination of significant effects will be undertaken based on guidance outlined in parts 1 and 2 of BS5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites (British Standards Institution, 2014). The assessment of construction road traffic and determination of subsequent significant effects would be undertaken based on guidance outlined in the Design Manual for Roads and Bridges (DMRB) LA111 Noise and Vibration (Highways England, 2020). The assessment of blasting and quarrying activities would be undertaken in general accordance with BS6472-2:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings – Blasting (British Standards Institution, 2008).

11.7.7 The exact construction methodologies are unlikely to be defined until the construction contractor is appointed, which is likely to be after the submission of the planning application. However, in the absence of this data, an outline construction programme will be developed based on knowledge and experience of other similar developments to create reasonable worst case parameters. Additionally, the typical make-up of construction equipment will be ascertained in the same way. The quantification of impacts will be undertaken by comparison with relevant guidance and standards such as BS5228, or local legislative requirements. The assessment will outline suitable measures for the mitigation of construction impacts.

11.7.8 The assessment of operational noise from the Proposed Development and subsequent determination of significant effects will be undertaken based on the assessment methodology defined in BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound (British Standards Institution, 2019). The assessment will determine the rating level from operations at the Proposed Development and compare these to the background sound level at the NSRs. For significant effects, noise mitigation measures would be reviewed and specified in the chapter. It is proposed that the study area for this assessment shall be within 1 km of the Proposed Development.

11.7.9 The assessment of operational noise will incorporate a desk-based 3D acoustic model using SoundPlan modelling software. The acoustic model will be used to determine the noise levels at the nearest NSRs based on noise emission data for the proposed operations. The noise emission data will be obtained from the relevant equipment suppliers and may utilise data obtained by Stantec UK on similar projects.

11.8 References

Control of Pollution Act (CoPA) (1974). Available from https://www.legislation.gov.uk/ukpga/1974/40. (Accessed on 01/11/2020)

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British Standards Institution (2016) “BS6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings – Blasting”. BSI.

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British Standards Institution (2019) “BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound". BSI.

Institute of Environmental Management and Assessment. (2014) “Guidelines for Environmental Noise Impact Assessment”. Ruddocks.

The Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments (2021), Institute of Acoustics and the Association of Acoustics & Noise Consultants (2021). Available from https://www.association-of-noise-consultants.co.uk/wp-content/uploads/2021/01/Joint-Guidance-On-the-Impact-of-Covid.IOA-ANC-V6.pdf (Accessed on 07/07/2021)

12 Landscape and Visual

12.1 Introduction

12.1.1 This part of the Scoping Report discuses the proposed scope of the Landscape and Visual Impact Assessment (LVIA) which would be undertaken for the Proposed Development. The LVIA would be carried out by Chartered Landscape Professionals from ASH design + assessment Ltd (ASH), a registered practice with the Landscape Institute (LI).

12.1.2 The LVIA would include the consideration of potential effects to the fabric and character of the landscape resource and the visual amenity of residents, travellers and visitors present within a defined study area.

12.2 Potential Effects

12.2.1 Potential effects on landscape and visual amenity as a result of the Proposed Development could include:

- Temporary and longer term physical effects to landscape fabric, including potential tree removal, changes to vegetation cover, introduction of new features or removal of existing features;
- Temporary and longer term effects to landscape character, where changes to the landscape fabric may lead to changes in the landscape patterns and intrinsic experiential qualities of the landscape;
- Temporary and longer term effects to views obtained by residents, travellers and recreational users of the landscape; and
- Potential cumulative effects with other development within the study area of a similar type and appearance.

12.2.2 From these potential effects, this chapter identifies the scope of effects which at this stage have the potential to be significant and thus require detailed assessment through the EIA process, together with proposed assessment methodologies for assessing such effects. The assessment of the likely significant effects will be undertaken in accordance with the relevant legislation and policy considerations outlined in Chapter 6 – Legislative and Planning Policy Context.

12.3 Baseline Conditions

Landscape and Visual Context

12.3.1 The Proposed Development would be located on the northern shoreline and upper hills to the north of Loch Awe, Argyll and Bute in western Scotland. Loch Awe is a long, linear Loch with a south-west / north-east orientation, but with an additional arm reaching westwards at its northern end towards the Pass of Brander. The high craggy summits of Ben Cruachan and surrounding mountains rise steeply above this part of the loch shore and dominate the surrounding area whilst elsewhere, smaller scale landscapes of woodland, farmland and settlement characterise the loch-shore and surrounding straths, backed by a rugged landscape with a broad-scale pattern of moorland and commercial forestry.

Designated and Protected Landscapes

12.3.2 The Proposed Development would not be located within or close to any nationally designated landscapes. However, the Site lies close to the following non-designated landscapes identified as being of national importance as shown on Figure 12.1:

- Ardanaiseig House designed landscape (GDL), included on the Inventory of Gardens and Designed Landscapes, lies under 300m to the south of the Development Boundary; and
- Wild Land Area (WLA) 09. Loch Etive Mountains is situated to the north of the Proposed Development.

12.3.3 At a regional / local level, the Site is situated within the North Argyll Area of Panoramic Quality (APQ), identified by Argyll and Bute Council, which covers extensive areas encompassing the northern end of Loch Awe and the mountains, moorlands and strath areas to the north, south and east.

12.3.4 Although not comprising a formal designation, areas of woodland around Loch Awe are identified on the Inventory of Ancient and Long-Established Woodland (AWI).

Landscape Character Types

12.3.5 NatureScot has undertaken detailed review and classification of the various landscape areas and types of Scotland (SNH, 2019 [online]). The Proposed Development would fall within and directly influence three of these Landscape Character Types (LCTs), as shown on Figure 12.2, with the potential to indirectly influence a fourth as follows:

- LCT 35 – Rugged Mountains (direct);
- LCT 37 – Upland Glens (direct);
- LCT 40 – Craggy Upland (indirect); and
- LCT 53 – Rocky Coastland (direct).

Visual Amenity

12.3.6 Potential visual receptors who may gain views of the Proposed Development include residents, travellers and recreational users who may be present in and around nearby buildings and using roads and recreational resources as indicated on Figure 12.1.

12.3.7 Residential areas with potential views of the Proposed Development during construction and / or operation include the small scattered communities of Loch Awe village, alongside the north shore of Loch Awe, Stronmilchan and Dalmally to the east, Cladich and Ardbrecknish on the south-side of Loch Awe and properties around Tervine and Ardanaiseig to the south of the Pass of Brander. There would also be potential for views from other scattered properties outwith the main communities, alongside the main transport routes and in more remote locations.

12.3.8 Travellers who may gain views of the Proposed Development may be located on the A85, following the northern shore of Loch Awe, the A819 and B840 to the south and east of Loch Awe, the B8077 around the north-eastern end of Loch Awe and a minor road to Tervine.

12.3.9 The Site and surrounding area are popular for recreational use and there are a number of paths and routes into and up the mountains, as well as shorter more local routes such as those leading to Kilchurn Castle and the Duncan Ban McIntyre monument. A popular circular route around the ridge of Ben Cruachan, commencing at the Cruachan tailrace areas is particularly notable in relation to the Proposed Development, and the access route to the existing Cruachan Dam is also used by visually sensitive recreational users. Individuals boating and fishing on Loch Awe also have potential to be visually affected by the Proposed Development, as do visitors to the existing Cruachan Power Station Visitor Centre.

12.4 Embedded Mitigation and Design Principles

12.4.1 Landscape and visual issues would be a consideration throughout the EIA and design process for the Proposed Development with embedded mitigation likely to involve the following:

- The location of the majority of the Proposed Development underground;
- Considered positioning of permanent, above-ground features to minimise landscape and visual effect and optimise the opportunity for additional mitigation measures;
- Minimising the permanent design footprint as far as is possible; and
- Retention of existing trees which would help to limit the visual appearance of construction works and proposed features, and particularly woodland included on the Inventory of Ancient and Long-established Woodland, as far as possible.

12.5 Proposed Scope of Assessment

12.5.1 Based on the key parameters of the Proposed Development, the following likely significant effects will be considered in the EIA:

- Temporary and longer term physical effects to landscape fabric, including potential tree removal, changes to vegetation cover, introduction of new features or removal of existing features;
- Temporary and longer term effects to landscape character, where changes to the landscape fabric may lead to changes in the landscape patterns and intrinsic experiential qualities of the landscape;
- Temporary and longer term effects to views obtained by residents, travellers and recreational users of the landscape; and
- Potential cumulative effects with other development within the study area of a similar type and appearance.

12.6 Proposed Assessment Methodology

Proposed LVIA Study Area

12.6.1 The potential visibility of the Proposed Development, particularly the permanent features is likely to be limited by the surrounding landform. Therefore, a study area of 3.5km from the Proposed Development boundary to the north, east and west is anticipated to encompass all potential significant landscape and visual effects. It is proposed that the study area be locally increased to 6km from the Proposed Development to the south, in order to contain areas to the south of Loch Awe, where views of the temporary works at the upper inlet / outlet structure and pressure shaft may be obtained.

12.6.2 The study area has partly been defined by using a zone of theoretical visibility (ZTV). The ZTV is a computer generated diagram which uses a terrain model to indicate areas from which elements of proposed development would theoretically be visible. It is based on an estimate of the highest above ground structures at the Proposed Development, but does not take account of more local or temporary screening features such as trees or vegetation

12.6.3 The proposed LVIA study area is shown on Figure 12.1 and the ZTV is shown in Figure 12.3.

Scope of LVIA

12.6.4 The LVIA will be presented in two parts discussing the anticipated effects on the separate aspects of landscape character and visual amenity during both the construction and operational phases of the Proposed Development. The assessment of operational effects will assume the implementation of any mitigation measures proposed, with planting assumed to have been established for around 10 years.

12.6.5 The assessment will be supported by various figures as required.

Landscape Assessment

12.6.6 The Landscape Character Assessment will include assessment of the Proposed Development in relation to all the LCTs within the Study Area considering potential for effects on the fabric and character of the landscape. This will include the direct effect of potential physical change to landscape elements, experiential effects on the character of the Proposed Development site and surrounding areas, and potential indirect effects to the broader landscape resource.

12.6.7 The assessment of effects on landscape character will also consider the potential for effects to the Ardanaiseig House GDL and North Argyll APQ.

12.6.8 It is anticipated that the potential for longer term effects on WLA 09. Loch Etive Mountains would be limited because, excluding the surface opening of the pressure shaft, all permanent, above ground elements of the Proposed Development would be sited at the lower level near Loch Awe, and would therefore be likely to have limited intervisibility with the WLA. It is therefore proposed that a separate Wild Land Area Assessment should not be required as part of the LVIA. However, a review of the Proposed Development in relation to the WLA Key Qualities will be included within the main LVIA chapter.

Visual Assessment

12.6.9 The visual assessment will comprise a receptor-based assessment, considering the potential for effects on visual amenity within the study area. This will take into consideration visual receptors located at residential properties and workplaces, recreational sites and those using roads and Core Paths and other recreational routes throughout the study area using representative viewpoints. Consideration will also be given to potential visual effects on boat users in Loch Awe.

Visualisations

12.6.10 It is proposed that the LVIA will be supported by inclusion of at least one visualisation illustrating the Proposed Development. Due to the likely limited footprint of the permanent above-ground elements of the Proposed Development, and location within the constrained topography alongside Loch Awe, it is likely that there would be few publicly accessible locations affording a clear view of the Proposed Development. One visualisation is proposed, to be located in the vicinity of Tervine and the Ardanaiseig House GDL. This will be microsited to gain the best possible view of the Proposed Development through local vegetation, with the precise location to be agreed with Argyll and Bute Council and NatureScot.

12.6.11 It is proposed that the visualisation will be presented in accordance with current NatureScot standards for wind energy developments: Visual representation of wind farms - Feb 2017 (Scottish Natural Heritage, 2017a)

12.6.12 Visualisations will be designed to support the LVIA and the understanding of how the Proposed Development and suggested mitigation measures would appear. The locations for visualisations will not comprise viewpoints for a viewpoint-based visual assessment as the visual assessment will consider all likely visual receptors within the study area. The visualisations will show the Proposed Development during its operational phase only, with any proposed mitigation planting assumed to have established after around 10 years.

Cumulative Landscape and Visual Assessment (CLVIA)

12.6.13 Based on an initial review of other proposed projects within the study area, the potential for other development that may lead to significant cumulative effects is considered unlikely. It is therefore proposed that CLVIA is scoped out of the EIA. However, should evidence of other similar development which may lead to significant cumulative effects emerge during the course of the LVIA, the inclusion of this could be revisited.

12.6.14 The LVIA will be undertaken in accordance with the 3rd Edition of the Guidelines for Landscape and Visual Impact Assessment (LI and IEMA, 2013).

12.6.15 The LVIA will evaluate the sensitivity to change, magnitude and significance of effect for all landscape and visual receptors during construction and operational phases. The assessment of operational effects will assume the implementation of any mitigation measures proposed, with planting assumed to have been established for around 10 years.

12.6.16 Potential effects will be presented as ratings of Negligible, Minor, Moderate and Major, taking into account sensitivity and magnitude ratings and on the basis of professional judgement. Where appropriate, interim ratings will be allocated (e.g. Minor to Moderate or Moderate to Major). Effects identified as being at a level of Moderate or greater are considered significant in accordance with the EIA Regulations.

12.7 References

Argyll and Bute Council (2015), Argyll and Bute Local Development Plan, Adopted March 2015.

Argyll and Bute Council (2016), Argyll and Bute Local Development Plan Supplementary Guidance, Adopted March 2016.

Landscape Institute (LI) and Institute for Environmental Management and Assessment (IEMA) (2013): Guidelines for Landscape and Visual Effect Assessment (Third Edition). Routledge.

NatureScot (2020): Assessing Impacts on Wild Land Areas – Technical Guidance.

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Scottish Natural Heritage (2017a): Visual Representation of Wind Farms (Version 2.2).

The Scottish Rights of Way Society (2011): Scottish Hill Tracks (Fifth Edition) Scottish Mountaineering Trust.

Swanwick, C and Land Use Consultants (2002): Landscape Character Assessment: Guidance for England and Scotland, SNH / The Countryside Agency.

Argyll and Bute Core Paths - https://www.argyll-bute.gov.uk/core-paths [accessed June 2021]

Bing Mapping aerial photography - https://www.bing.com/maps/ [accessed June 2021]

Google mapping aerial photography - https://www.google.co.uk/maps/ [accessed June 2021]

Historic Environment Scotland Data Services - http://data.historic-scotland.gov.uk/pls/htmldb/f?p=2000:10:0 [accessed June 2021]

National Library of Scotland Mapping Services - http://maps.nls.uk/ [accessed June 2021]

NatureScot - https://www.nature.scot/ [accessed June 2021]

NatureScot: Scottish Landscape Character Types Map and Descriptions - https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions [accessed June 2021].

Walk Highlands - https://www.walkhighlands.co.uk/ [accessed June 2021].

13 Cultural Heritage

13.1 Introduction

13.1.1 This chapter identifies the proposed scope of the EIA in respect of cultural heritage. It sets out the proposed methodology and approach to be adopted in respect of baseline studies and impact assessment, and identifies the likely significant effects of the Proposed Development that will be considered by the assessment. It also identifies likely mitigation measures.

13.1.2 The Cultural Heritage assessment will consider potential effects upon:

- Designated assets comprising World Heritage Sites, Scheduled Monuments, Listed Buildings, Inventoried Gardens and Designed Landscapes (GDLs), Inventoried Battlefields and Conservation Areas;
- Non-designated assets (including above and below ground assets) as recorded by the local Historic Environment Record (HER), cartographic record, photographic record, or identified through the walkover survey; and
- The potential for unknown (buried) archaeological remains to survive within the Site.

13.2 Potential Effects

13.2.1 The Proposed Development may affect the physical fabric and setting of heritage assets during its construction phase. At this stage the only identified physical effect relates to the interconnecting tunnels joining the Proposed Development to Cruachan 1 Power Station. These will necessarily entail the removal of a small part of the fabric of the Cruachan 1 Turbine Hall, which is a Category A Listed Building and an access portal into the main access tunnel of Cruachan 1. Aside from this, physical effects may occur as a result of groundworks associated with the access roads and infrastructure, depending on the design of these. Setting effects in respect of designated assets may occur as a result of the appearance of access tracks, infrastructure and the quayside or the movement of plant and vehicles, and associated noise and vibration.

13.2.2 Given the largely subterranean character of the Proposed Development it is unlikely to affect heritage assets during its operational phase.

13.3 Relevant Legislation, Guidance and Technical Standards

13.3.1 The assessment of likely significant effects will be undertaken in accordance with relevant and applicable legislation, policies and technical standards. In addition to the relevant legislation and policy consideration outlined in Chapter 6 – Legislative and Planning Policy Context, the assessment will be undertaken in accordance with subject specific legislation and best practice guidance including the following:

- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- Historic Environment (Amendment) (Scotland) Act 2011;
- Historic Environment Policy for Scotland
- Planning Advice Note 2/2011

13.3.2 The impact assessment will be undertaken with reference to:

- HES & SNH 2018 EIA Handbook: Appendix 1 – Cultural Heritage Impact Assessment; and
- HES 2020 Managing Change in the Historic Environment: Setting

13.3.3 The archaeological DBA will be prepared in accordance with Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA, 2020).

13.4 Baseline Conditions

13.4.1 There are five Listed Buildings within the Site Boundary:

- St Conan's Church, Lochawe (Category A, LB4700);
- Loch Awe House, Lochawe (Category C, LB4701);
- Falls of Cruachan Railway Viaduct (Category A, LB50811);
- Ben Cruachan Hydro Electric Scheme – Cruachan Dam (Category B, LB51687); and
- Ben Cruachan Hydro Electric Scheme – Turbine Hall (Category A, LB51688).

13.4.2 Within 1km of the Site boundary there are four further designated heritage assets, comprising three Scheduled Monuments and one GDL:

- Castles Farm dun (SM3772);
- Lochawe crannog (SM4194);
- Kilchurn Castle (SM90179); and
- Ardanaiseig House (GDL00018).

13.4.3 A range of features are recorded by the National Record of the Historic Environment (NHRE) and the West of Scotland Archaeology Service (WoSAS) Historic Environment Record (HER) within the Site Boundary. Most of these are modern and of little relevance in the current context. However, there is also an 18th century military road, traces of rig and furrow, a farmstead and 18th century charcoal burning platforms. These demonstrate the historic focus of activity has been along the lochside and at the convergence of Glen Strae and Strath of Orchy, with little activity taking place on higher ground in the vicinity of the reservoir. It may be assumed that earlier, hitherto unrecorded, archaeology is most likely to lie in these lower areas.

13.5 Embedded Mitigation and Design Principles

13.5.1 The interconnecting tunnels will be placed in order to avoid loss of significant historic fabric in Cruachan 1 Power Station and measures will be put in place to protect the historic fabric during construction thereby preventing accidental damage. Works affecting the fabric of Cruachan 1 Power Station will be subject to an application to ABC for Listed Building Consent.

13.5.2 Cultural heritage assets will be mapped and impacts upon them will be avoided as far as reasonably practicable through design measures.

13.5.3 Construction compounds will be reinstated at the end of the construction phase.

13.6 Proposed Scope of Assessment

13.6.1 Having regard to the characteristics of the Site and the Proposed Development, relevant policy requirements (Chapter 5 – Legislative and Policy Context) and all proposed embedded mitigation measures, at this early stage it is considered that the following effects are either likely to or have some potential to be significant in the context of the EIA Regulations during the construction or operational phases of the Proposed Development and therefore require further consideration through the EIA process:

- Potential removal or disturbance of non-designated heritage assets during the construction phase;
- Potential impacts upon the following assets as a result of change in their setting during the construction phase:
  - St Conan's Church, Lochawe (Category A, LB4700);

- Falls of Cruachan Railway Viaduct (Category A, LB50811);
- Loch Awe House (Category C, LB4701);
- Castles Farm dun (SM3772);
- Kilchurn Castle (SM90179); and
- Ardanaiseig House (GDL00018).

13.6.2 Such impacts may arise as a result of the proposed construction infrastructure being visible from or in combination with these assets or as a result of plant and vehicle movement and associated noise and vibration.

13.6.3 It is proposed to scope Cruachan 1 Power Station out of the assessment. Embedded mitigation and protective measures secured by conditions attached to Listed Building Consent result in there being no likely significant effects resulting from physical loss, whilst operations relating to power station construction could not be seen as having an adverse impact upon its setting.

13.6.4 It is proposed to scope Loch Awe crannog (SM4194) out of the assessment. Construction operations are unlikely to be visible from the crannog or to otherwise affect its setting or hydrology, hence significant effects are unlikely.

13.6.5 Given the characteristics of the Proposed Development and its minimal visibility in the landscape upon completion, it is considered that there is no potential for significant effects to occur during the operational phase. It is therefore proposed to scope operation phase effects out of the assessment.

13.6.6 Given the anticipated lifespan of the Proposed Development, it is proposed to scope decommissioning out of the assessment.

13.7 Proposed Assessment Methodology

13.7.1 Baseline data will be gathered for the Site and surrounding 1km from the following sources:

- HES databases, including NHRE;
- WoSAS HER;
- Maps held by the National Library of Scotland
- Scottish Government LiDAR data; and
- Readily available published sources.

13.7.2 The above desk-based work will be augmented and verified by walkover survey and site visits to gather setting baseline data. The results of the baseline study will be presented as a technical appendix to the EIA Report.

13.7.3 The impact assessment will be undertaken with reference to EIA Handbook: Appendix 1 – Cultural Heritage Impact Assessment (HES & SNH, 2018) and the assessment of setting impacts will be undertaken with reference to Managing Change in the Historic Environment (HES, 2020). At present it is not proposed to produce any cultural heritage specific visualisations.

13.7.4 The sensitivity of heritage assets will be determined with reference to their importance. In respect of designated assets, importance will be determined by their designation. The importance of non-designated assets will be determined by reference to local categorisation, i.e. WoSAS' Non-Statutory Register, and relevant designation criteria guided by professional judgement. Guideline sensitivity criteria which will inform this assessment are set out in Table 13-1 below.

Table 13-1: Guideline Sensitivity Criteria

Sensitivity	Guideline Criteria
High	Internationally and nationally important designated assets (world heritage sites, scheduled monuments, Category A-listed buildings, IGDLs and inventory battlefields) or assets meeting the criteria for national importance; all assets rated 'C' or 'V' by WoSAS' Non-Statutory Register (NSR)

Sensitivity	Guideline Criteria
	are considered to be of national importance. Some conservation areas are of national importance.
Medium	Heritage assets of regional importance, comprising Category B and C listed buildings, some conservation areas and undesignated cultural heritage assets of regional importance.
Low	Undesignated cultural heritage assets of local importance

13.7.5 The predicted magnitude of change as a result of the Proposed Development will be considered in terms of the likely change in the cultural significance of the affected heritage assets. The guideline criteria to be applied are set out in Table 13-2 below.

Table 13-2: Guideline Magnitude Criteria

Magnitude	Guideline Criteria
Substantial	Complete or near complete loss of fabric or change in setting such that significance is completely or almost completely lost.
Major	Major alteration to key elements of the asset or its setting, such that post-development cultural significance of the asset will be fundamentally changed.
Moderate	Partial loss or alteration to one or more key elements of the asset or its setting, such that post-development cultural significance of the asset will be materially changed.
Minor	Change in the asset's fabric or setting resulting in the asset's cultural significance being slightly diminished.
Negligible	Change in the fabric or setting leaving the asset's significance unchanged.

13.7.6 The predicted significance of the effect will be determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of change and guided by the matrix provided in Table 13-3 below. All effects at 'moderate' or above levels will be considered to be significant in the context of the EIA Regulations.

Table 13-3: Guideline Sensitivity Criteria

		Magnitude				
		Substantial	High	Medium	Low	Negligible
Sensitivity	**High**	Substantial	Substantial/ Major	Major	Moderate/ Minor	Negligible
	Medium	Major	Moderate	Moderate/ Minor	Minor	Negligible
	Low	Major/ Moderate	Moderate/ Minor	Minor	Negligible	Negligible

13.8 References

CIfA, 2020, Standard and Guidance for Historic Environment Desk-Based Assessment

HES & SNH, 2018, EIA Handbook: Appendix 1 – Cultural Heritage Impact Assessment;

HES, 2020, Managing Change in the Historic Environment: Setting.

14 Socioeconomics

14.1 Introduction

14.1.1 This chapter identifies the proposed scope of the EIA to assess likely significant socio-economic, tourism and recreation effects from the Proposed Development.

14.1.2 The assessment will consider potential socio-economic, tourism and recreation effects that may occur from the Proposed Development. This includes potential effects (beneficial or adverse) on the local tourism economy, business interests, public access and tourism and recreation interests and potential income, employment, and other effects on the local economy.

14.2 Potential Effects

14.2.1 Having regard to the characteristics of the site and the surrounding area (Chapter 2) and the Proposed Development, including the upper and lower site compounds (Chapter 3), the construction and operation of the Proposed Development has the potential to result in the following types of effects:

Construction

- Effects on the labour market including direct, indirect and induced employment effects with associated economic and expenditure effects;
- Effects on the performance of key business sectors including;
  - Construction sector;
  - Hospitality sector;
  - Tourism and recreation sector including accommodation; and,
  - Housing Market.
- Effects on recreational access and activities.

Operation

- Effects on labour market including, direct, indirect and induced employment effects, with associated economic and expenditure effects;
- Effects on key business sectors including;
  - Renewable energy sector; and,
  - Tourism and recreation sector.
- Effects on recreational access and activities; and,
- Net economic benefits of the Proposed Development on local communities.

14.2.2 From these potential effects, this chapter identifies the scope of effects which at this stage have the potential to be significant and thus require detailed assessment through the EIA process, together with proposed assessment methodologies.

14.2.3 As detailed further in Section 14.6, the assessment will be focused on the temporal and spatial scales at which there is the potential for likely significant effects to occur from the Proposed Development. Study Areas corresponding to standard statistical geographies maintained by the Scottish Government have been adopted to ensure accurate use of data.

14.2.4 Two Study Areas have been defined and adopted in this assessment:

- Tourism and Recreation Area: 3.5km from the Proposed Development boundary to the north, east and west is anticipated to encompass potential tourism and recreational receptors as well as key settlements such as Dalmally. It is proposed that the Study Area be locally increased to 6km from the Proposed Development to the south, in order to include areas to the south of Loch Awe, which may have views of the site. This approach aligns to the approach taken for the Landscape Study Area set out in Chapter 12 of the Scoping Report.; and,
- Labour Market Area: Argyll and Bute Local Authority Area.

14.3 Baseline Conditions

14.3.1 The site is on the banks of Loch Awe and extends up the hillside of Ben Cruachan, the highest point in Argyll and Bute. The site lies between the village of Dalmally to the east and the town of Oban to the west. Running between Loch Awe and the hillside is the A85 and the West Highland Railway Line. The A85 provides the principal road access route from Central Scotland to Oban on the west coast where onward travel to the Inner and Outer Hebrides is possible by ferry. The West Highland Line connects Glasgow to Oban. The site is therefore located in proximate location to two strategic transport routes utilised by residents, tourists and freight traffic.

14.3.2 Argyll and Bute is a popular tourist destination owing to its high quality natural environment, heritage attractions and onward travel connections to the Western Isles and Inner Hebrides and as a result the site is proximate to various tourism and recreation resources/receptors including:

- Falls of Cruachan Waterfall located within the site;
- Ben Cruachan located north west of the site;
- Cruachan Power Station Visitor Centre located within the site;
- St Conan's Kirk, located within the site at Lochawe
- Kilchurn Castle situated south of the site on the banks of Loch Awe;
- Bonawe Historic Iron Furnace located west of the site in Taynuilt;
- Numerous accommodation sites on the banks of Loch Awe within the site; and
- Other visitor attractions and tourism developments located at greater distance from the site within the Study Area.

Socio-economic Characteristics

14.3.3 A detailed socio-economic baseline of the area surrounding the site will be collated to establish the areas key characteristics and socio-economic function(s). Initial analysis undertaken to date indicates the following:

Population

14.3.4 The population demographics across the Study Area(s) exhibits the following features:

- Population estimates for 2021 indicate the population of Argyll & Bute is some 85,000, accounting for 1.5% of Scotland's population. Projections suggest that the population of Argyll & Bute is anticipated to decline by almost 12% to circa 75,000 by 2040, while the national population is expected to increase by a total of 1.8% over the same period.

- Within Argyll & Bute the estimated population change is being driven by decreases in the number of children (-24.2%) and working age (-21.1%) people. Simultaneously, the population of people who are of pensionable age is anticipated to increase by 15.6%.

- These expected changes will distort the population structure and have implications for the labour market.

- Similar population trends are anticipated to occur at the Scotland level, with an overall decline in the number of children and working age persons accompanied by an increase in number of people of pensionable age.

- Comparatively, the reduction (-10%) in children and working age people (-3.8%) expected in Scotland are proportionally less than what is predicted for Argyll & Bute, while the increase in people of pensionable age (29.9%) is larger. The net effect is that within Argyll & Bute the anticipated change within the different age groups will result in overall population decline, whereas at the Scotland level there is projected to be a slight overall increase.

Labour Market

- The labour market within Argyll & Bute is diverse. There are a higher proportion of people employed in primary industries and seasonal tourism related activity. Employment is concentrated in sectors related to tourism (retail, accommodation, food & beverage), public sector activity (public administration, education, health), and primary sector activity (agriculture, forestry, fishing).

- These sectors reflect the nature of Argyll & Bute – it has an abundance of natural capital which supports primary sector activity and which is a significant attraction to visitors.

- Argyll & Bute does not have a major population centre and is instead a collection of small towns and villages spread throughout the mainland and islands, the largest being Helensburgh with circa 15,000 residents.

- The lack of a major population centre or city reflects the relatively low levels of employment in sectors such as finance & Insurance (0.5%) or information & communication (1.1%) which are concentrated in Scotland's major cities.

- The economic activity rate in Argyll & Bute is on average within 1% of the Scottish national average economic activity rate, fluctuating between a low of 75.7% in 2012 and a high of 80.7% in 2016. The Local Authority's unemployment rate has consistently been below the Scottish and UK average rates over the past 10 years, with 2020 data indicating an unemployment rate of just 2.1%.

- The combination of normal economic activity rate and low unemployment rate suggests that the labour market is engaged and operating near capacity.

- The Proposed Local Development Plan 2 identifies broad growth corridors across the Argyll and Bute area which are considered to have potential to accommodate opportunities for economic growth and sustain and grow the population of Argyll and Bute. The proposed development lies within the Tobermory-Dalmally Growth Corridor and whilst there will likely be focus on the larger settlements such as Oban the corridor is expected to deliver economic growth opportunities in Food and Drink, Tourism and education sectors.

Education and Skills

- In general, qualifications attainment within Argyll & Bute has been trending upwards over the course of the past decade, while the proportion of the population with no qualifications or other qualifications is falling. These trends are also observed at both the Scottish and UK levels.

- The percentage of those aged 16 – 64 gaining NVQ Levels 1 – 3 in Argyll and Bute is at its highest since 2010 and those achieving NVQ Level 4 or above has increased significantly between 2013 (36.7%) and 2020 (48.5%).

Earnings

- The median gross weekly wage for people working in Argyll & Bute in 2020 (£495) is below the Scottish (£592) and UK (£585) national averages. Between 2010 and 2020 the median gross weekly wage in Argyll & Bute was 4.7% below the Scottish average, and 5.7% below the UK average.

- This data is consistent with the high proportion of service sector employment supporting tourism and the visitor economy.

Key Business Sectors

Construction

14.3.5 Initial analysis of the construction sector across Argyll and Bute indicates the following features:

- The construction sector supported 5.5% of all employment in the Local Authority in 2019, equivalent to the proportion engaged in the construction sector across Scotland (5.5%) and above the UK rate (5.0%).

- Of the construction employment in Argyll and Bute in 2019, 500 worked in civil engineering and 800 in specialised construction. On a project of Cruachan's scale and complexity, these are the construction sub-sectors most likely to be engaged. It is also likely that many staff working in the Argyll and Bute construction sector will be employed at or near full capacity servicing the local requirements and this may limit the extent to which they engage with the project.

Tourism and Recreation

14.3.6 Given the importance of tourism and recreation to Argyll and Bute, the baseline will identify the characteristics of the tourism sector and consider its importance on an area-wide scale. The baseline will also identify relevant visitor attractions within the Study Area as potential tourism and recreational receptors.

14.3.7 Notwithstanding the unique characteristics and offering of individual tourism assets across the Study Area, the key components of the tourism sector can be categorised into seven broad groupings:

- Designated walking and recreational routes: such as Core Paths (protected under the Land Reform (Scotland) Act 2003, heritage paths, public rights of way and promoted paths;

- Outdoor tourist destinations: established outdoor attractions which tourists choose to visit owing to their special features or characteristics;

- Indoor tourist destinations: established indoor attractions which tourists choose to visit owing to their special features or characteristics;

- Hospitality: bars and restaurants;

- Visitor Accommodation: overnight facilities such as hotels; guest houses; bed & breakfasts; hostels; self-catering and camping facilities;

- Recreational activities in the open countryside: areas of open countryside (land and water); and,
- Tourists travelling through the open countryside: acknowledging that travelling to, from or between tourist destinations, recreational activities or hospitality/accommodation itself forms part of the overall tourism experience.

Table 14:1: Tourism Sector Receptor Groupings

Receptor Group	Baseline Information
Designated walking and recreational routes	The audit has identified 18 Core Paths and one National Cycle Network Route within the Tourism and Recreation Study Area.
Outdoor tourist destinations	There are a limited number of outdoor tourist destinations across the Tourism and Recreation Study Area owing to the area being characterised by large expanses of open and uninhabited countryside. Those that have been identified include Kilchurn Castle, and Ardchattan Priory and Gardens.
Indoor tourist destinations	The most prominent indoor tourist destination is the Cruachan Power Station Visitor Centre. Other key indoor tourist destinations include, St Conan's Kirk, Bonawe Historic Iron Furnace and Inverawe Smokehouses.
Hospitality	There are a number of hospitality facilities close to the site. The majority are concentrated in the closest settlements of Loch Awe, Dalmally and Taynuilt.
Visitor Accommodation	There are accommodation facilities close to and within the site. Most are concentrated in the closest settlements of Loch Awe, Bridge of Awe, Taynuilt and Dalmally. The area exhibits a mix of facilities including self-catering properties, B&Bs and guesthouses, holiday parks and small to medium sized hotels and inns.
Recreational activities in the open countryside	Open countryside extends across the Tourism and Recreation Study Area. Key geographical features include Loch Awe, the River Awe, Loch Etive, the River Orchy, Falls of Cruachan and Ben Cruachan. There are 12 launch points onto bodies of water in the Tourism and Recreation Study Area.
Tourist travelling through the open countryside	Major tourist routes include the A85 and West Highland Railway Line. Dalmally, Loch Awe, Falls of Cruachan and Taynuilt Railway stations are within the Tourism and Recreation Study Area.

14.4 Embedded Mitigation

14.4.1 Embedded Mitigation measures are defined as those designed to be an inherent part of the scheme for which consent is sought (e.g. location of inlet/ outlet structures, access roads and accommodation for construction workers).

14.4.2 The Proposed Development will incorporate a number of embedded mitigation measures to achieve its design objectives and avoid, prevent or minimise likely significant adverse environmental effects. Where significant adverse effects are predicted (even taking account of embedded mitigation), additional mitigation measures to address them will be outlined. Mitigation measures will be split into those relating to construction and those relating to operation depending on the nature of the impacts identified.

14.5 Potential Effects Proposed to be Scoped out of Further Assessment

14.5.1 Having regard to the characteristics of the site and the Proposed Development, key baseline characteristics and proposed embedded mitigation measures, at this stage it is considered that the potential effects listed below have no potential to be significant and can therefore be scoped out of requiring further assessment.

Construction

- Renewable Energy – effects on the energy sector relate to the provision of new renewable energy generating capacity and thus would only occur in the operational phase following the full commissioning of the Proposed Development. Chapter 15 – Climate Change considers the role of the Proposed Development in supporting decarbonisation efforts.

- Indoor Destinations Component of Tourism and Recreation – Of the seven identified components of the sector it is proposed to scope out potential effects on the indoor tourism destination receptor grouping, as such destinations are not likely to experience a significant effect on their visitor attractiveness or tourism potential. This is owing to the main features of such destinations being experienced indoors, often on a localised or special interest basis, and therefore being unrelated to the surrounding landscape. Their indoor focus inherently means that any change in external visual amenity would be unlikely to result in a change in the visitor attractiveness of such destinations.

- Housing Market – the proposals include accommodation at the upper and lower site compounds for workforce during the construction period. As a result there is unlikely to be additional pressure for housing accommodation as a result of the proposed development.

Operation

- Effects on recreational access and activities - Effects on public access to recreational routes and activities will be assessed during the construction phase only, as any such effects would relate to individual recreational routes which intersect with the site and would cease upon the completion of construction activities.

- Indoor Destinations component of Tourism & Recreation – as detailed above.

14.5.2 To avoid duplication with other technical assessment chapters and maintain assessment proportionality, the following aspects are also proposed to be scoped out of this assessment based on the professional judgement of the EIA team:

- Visual amenity, traffic and noise effects on local residents, individual tourists and the local community as such effects will be assessed elsewhere in the EIA Report where relevant.

Decommissioning

- Owing to the operational lifespan of the development, over 25 years, it is proposed that any effects from decommissioning be scoped out of this assessment.

14.6 Proposed Scope of Assessment

14.6.1 All new infrastructure developments have the potential to generate socio-economic effects at the local, regional and/or national level, principally in relation to changes in economic development, employment opportunities and tourism or recreational activities. The assessment, to be reported in a Socio-economics, Tourism and Recreation chapter of the EIA Report, will therefore consider:

- Direct effects resulting from investment and expenditure decisions of the Applicant, with associated indirect and induced supply chain effects; and,

- Indirect effects resulting from 'secondary' changes in social or economic activities or market behaviour (e.g. changes in visitor attractiveness) catalysed by 'primary' changes in environmental or physical conditions attributable to the construction or operation of the proposed development (e.g. changes in visual amenity). These effects have the potential to alter the performance of specific aspects of the economy, each of which will be considered as a potential receptor for the purposes of the assessment. This differs from other impact assessments concerning likely effects

on individual environmental assets/features or on the amenity of individual users of such assets (e.g. road users, hill walkers, etc.).

14.6.2 As part of preparing the socio-economic, tourism and recreational impact assessment the project team will seek to consult the following stakeholders:

- Argyll and Bute Council (as Local Authority);
- Visit Scotland (as national tourism lead body);
- Forestry and Land Scotland;
- Business associations representing: the local accommodations sector; angling associations; other marine business interests; local retailers and food and drink operators; and identified visitor attractions in the area; and
- Local and regional interest groups representing the interests of recreational users of the area including; walkers, boaters, fishing and other marine interests.

14.6.3 Having regard to the characteristics of the site and the Proposed Development, key baseline characteristics and the proposed embedded mitigation measures, at this early stage it is considered that the following effects are likely to have some potential to be significant and therefore require further consideration through the EIA process:

Construction

- Direct, indirect and induced employment / labour market effects with associated economic and expenditure effects;
- Effects on recreational access and activities; and
- Effects on the performance of key business sectors including:
  - Construction sector; and,
  - Tourism and recreation sector (including seven identified receptor groups).

Operation

- Effects on the performance of Energy sector and infrastructure;
- Direct, indirect and induced employment / labour market effects with associated economic and expenditure and community effects.

14.7 Proposed Assessment Methodology

Overview of Approach

14.7.1 An assessment of the likely significant effects and impacts associated with the Proposed Development will be undertaken in accordance with relevant and applicable legislation, policies and technical standards. The following activities will be undertaken to complete the assessment.

- Stakeholder engagement and discussions;
- Reviewing relevant legislation and policies;
- Establishing baseline conditions within relevant Study Areas to identify potential receptors and receptor groupings for consideration in the assessment;

- Defining receptor sensitivity to likely changes (e.g. in employment, business sector performance or visitor attractiveness) resulting from the proposed development;
- Examining likely socio-economic, tourism and recreation changes from the proposed development on identified receptors and receptor groupings, with consideration given to the magnitude, duration (e.g. short/long term, temporary/permanent) and nature (i.e. adverse/beneficial) of change;
- Determining the likely level of socio-economic, tourism and recreation effects from the proposed development, having regard to both receptor sensitivity and the characteristics of predicted changes;
- Identifying the significance of likely socio-economic, tourism and recreation effects in the context of the EIA Regulations;
- Identifying mitigation measures to address any likely significant adverse socio-economic, tourism and recreation effects, and to enhance the performance of the proposed development in relation to these effects; and,
- Identifying likely residual socio-economic, tourism and recreation effects from the proposed development taking account of all mitigation and enhancement measures.

14.7.2 The assessment will draw upon relevant conclusions from other technical assessment chapters of the EIA Report, in particular regarding likely 'primary' environmental or physical effects arising from changes in public access, landscape character, visual amenity or the setting of heritage assets which may lead to secondary socio-economic effects on the tourism and recreation sector.

Relevant Technical Guidance and Standards

14.7.3 There are no specific methodological guidelines or requirements for socio-economic assessments within the context of EIA. However, the proposed assessment methodology has been informed by the principles outlined in The Green Book: Appraisal and Evaluation in Central Government (HM Treasury, 2020).

Technical Consultations

14.7.4 The assessment will be carried out based on relevant requirements and guidance contained in an EIA Scoping Opinion to be adopted by the Scottish Ministers in response to this EIA Scoping Report.

14.7.5 If required, additional consultation will be undertaken with relevant consultees to clarify aspects of the assessment methodology (e.g. any survey requirements) and address topic-specific issues.

Information Sources

Desktop Study

14.7.6 A detailed socio-economic baseline of the assessed Study Areas will be collated to establish the sensitivity of the labour market receptor and the characteristics of identified key business sectors. The following key secondary data sources will be reviewed to identify and analyse the relevant baseline characteristics of the site and the surrounding environment:

- Open source Office for National Statistics (ONS) datasets, including:
  - Business Register and Employment Survey;
  - Annual Survey of Hours and Earnings;
  - Mid-year Population Estimates;
  - Annual Business Statistics; and

- UK business; activity, size and location statistical bulletins.

- Consultation with relevant stakeholders; and
- Scottish Government and Argyll and Bute Council publications.

Field Surveys / Modelling

14.7.7 Relevant socio-economic data will be inputted to a bespoke economic model to predict the gross and net socio-economic effects, including with respect to expenditure and employment, from the construction and operation of the Proposed Development. This model will incorporate economic multipliers and additionality assumptions.

14.7.8 Tourism receptor groups identified through the desk-based review will be validated by a drive-through of the site and surrounding area.

Approach to Assessment of Effect Level and Significance

14.7.9 The level and significance of likely effects will be judged with reference to the following factors, as detailed below:

- Sensitivity of affected receptor; and
- Predicted magnitude of change.

14.7.10 Receptor sensitivity to potential effects will be fixed in baseline reporting, leaving the magnitude of predicted socio-economic changes to be identified through the impact assessment.

Labour Market Effects

14.7.11 Direct employment effects from the construction phase of the Proposed Development will be calculated based on the estimated construction cost figures and the average construction spend required to support one-person year of construction employment.

14.7.12 Direct construction employment effects will be adjusted for additionality factors, namely:

- **Deadweight:** the proportion of direct employment effects on site that would have been induced in the absence of the proposed development;
- **Leakage:** the proportion of direct employment effects accessed by people living outside the relevant study area;
- **Displacement:** the proportion of the direct employment effects accounted for by a reduction in direct employment effects elsewhere; and
- **Multiplier:** an estimation of further economic activity associated with additional income and supplier purchases (i.e. indirect and induced expenditure).

14.7.13 Deadweight, leakage, and displacement will be applied as percentage adjustments to direct employment effects. An understanding of the relevant Study Areas' socio-economic characteristics detailed in the baseline analysis section of the EIA Report will inform the values for these additionality factors.

14.7.14 Multipliers will be sourced from the input-output tables published by the Scottish Government and applied to direct employment effects. Type II multipliers will be used to capture the following effects:

- **Direct:** the change in employment;
- **Indirect:** the supply chain effects to meet that demand; and
- **Induced:** the effects of wages earned in the direct and indirect supply chain that are used to buy goods and services in the economy.

14.7.15 The significance of potential effects on the labour market will be defined by the combination of:

- The sensitivity of the labour market receptor (as per the criteria in **Table 14:2**); and
- The magnitude of change upon them (as per the Criteria in Table **14:3**).

Table 14:2: Labour Market Sensitivity Criteria

Sensitivity	Definition
High	There is a shortfall of appropriate labour and skills. The Proposed Development would therefore lead to excessive labour market pressure and substantial distortions (i.e. skills and capacity shortages, import of labour, wage inflation).
Medium	There is a low supply of appropriate labour and skills. The Proposed Development may therefore lead to labour market pressure or distortions.
Low	There is a readily available supply of appropriate labour and skills. The Proposed Development is therefore unlikely to lead to labour market pressure or distortions.
Negligible	There is an existing surplus of readily available labour with directly relevant and transferable skills. The Proposed Development would therefore not lead to labour market pressure or distortions.

Table 14:3: Employment Effects Magnitude of Change Criteria

Magnitude of Change	Type of Change	Criteria
High	Adverse	The number of jobs lost in the Study Area would be 250 or greater (based upon the EU definition of small and medium enterprises (European Commission, 2003)).
	Beneficial	The number of jobs created in the Study Area would be 250 or greater.
Medium	Adverse	The number of jobs lost in the Study Area would be 50 or greater, but fewer than 250.
	Beneficial	The number of jobs created in the Study Area would be 50 or greater, but fewer than 250.
Low	Adverse	The number of jobs lost in the Study Area would be greater than 10, but fewer than 50.
	Beneficial	The number of jobs created in the Study Area would be greater than 10, but fewer than 50.
Negligible	Adverse	The number of jobs lost in the Study Area would be less than 10.

	Beneficial	The number of jobs gained in the Study Area would be less than 10.
No Change		No change would be perceptible, either beneficial or adverse.

Effects on Key Business Sectors

Construction Sector

14.7.16 The sensitivity of the construction sector will be examined in the baseline analysis section of the EIA and will consider the relative productivity, concentration, existing activity and employment characteristics of the sectoral labour market. Net employment effects from the construction phase of the Proposed Development and the associated impacts on gross value added will be assessed in relation to these factors.

Tourism Sector

14.7.17 The assessment of likely effects on the tourism sector will be underpinned by examining the seven relevant key components of the sector (**see Section 14.3**) as they relate to the assessed Study Area. The sensitivity of each component (receptor grouping) will be assigned based on both the importance of identified tourism assets within the relevant Study Area *and* the susceptibility of changes in the visitor attractiveness of such assets ultimately catalysing changes in visitor numbers and tourist expenditure. The assessment will therefore capture the elasticity of demand of each receptor grouping and will consider the following key question:

> "*To what extent would any change in the visitor attractiveness and tourism potential of this component of the tourism sector (i.e. this receptor grouping) be likely to result in a change in visitor numbers and expenditure?*"

EIA Significance Matrix

14.7.18 A matrix-based approach will be adopted to consider the sensitivity of identified receptors in tandem with the likely magnitude of socio-economic change resulting from the Proposed Development. This method, informed by the professional judgement of the EIA team, allows the level and significance in EIA terms of all predicted socio-economic effects to be determined on a consistent basis. The EIA significance matrix that will be used in this assessment is shown in **Table 14:4** below.

Table 14:4 EIA Significance Matrix (Socio-economic)

Sensitivity	**Magnitude of change**			
	High	Medium	Low	Negligible
High	Substantial	Moderate/Substantial	Moderate	Slight
Medium	Moderate/Substantial	Moderate	Slight/Moderate	Slight
Low	Moderate	Slight/Moderate	Slight	Negligible
Negligible	Slight	Slight/Negligible	Negligible	Negligible

14.7.19 For the purposes of the assessment, major and moderate effects denoted by shaded areas are considered significant in the context of the EIA Regulations.

Identification of Further Mitigation and Enhancement Measures

14.7.20 The level and significance of likely residual effects will be determined taking account of any proposed further mitigation and enhancement measures as identified through the assessment.

14.7.21 The development is likely to benefit the regional economy directly in terms of jobs related to construction, operation and maintenance of the Proposed Development. Skills development and training programmes to increase local take up of training and apprenticeship and employment opportunities associated with the Proposed Development may be developed.

14.7.22 Where possible, construction materials will be sourced locally to support local supply chain businesses and enhance potential effects of the Proposed Development on the local labour market. Employment and income effects may also be generated through the supply of hospitality related goods and services during the construction phase of the proposed development.

14.7.23 Taking account of the design strategy and all proposed embedded design principles and measures, at this early stage no further mitigation or enhancement measures are considered necessary.

14.8 References

Argyll and Bute Economic Strategy 2019-2023

Argyll and Bute Local Development Plan 2015

Argyll and Bute Proposed Local Development Plan 2 (2019)

Business Register and Employment Survey 2019 (Nomis)

Annual Population Survey 2019 (Nomis)

Annual Survey of Hours and Earnings 2020 (Nomis)

15 Climate Change

15.1 Introduction

15.1.1 This chapter of the Scoping Report discusses the proposed scope of the climate change assessment which will be undertaken for the Proposed Development.

15.1.2 The Proposed Development has the potential to deliver significant benefits with regards to climate change and reducing greenhouse gas (GHG) emissions associated with electricity grid. The Proposed Development will target using excess renewable power generation from the electricity grid to pump and store water within the Cruachan reservoir. At periods of peak power demand, the gravitational energy from stored water will be used to return the power back into the Transmission Network, displacing fossil fuel energy generation assets. It is estimated that the Proposed Development will deliver 61,413 MWh of renewable energy in grid decarbonisation benefits. This will significantly contribute to Scotland's Emission Reductions Targets to reach net zero by 2045.

15.1.3 In accordance with statutory requirements including Regulation 4(2)(c) of the EIA Regulations and relevant guidance, the climate change assessment for the Proposed Development will consider two separate aspects:

- GHG Emissions Assessment (the impact of the Proposed Development on climate change); and
- Climate Adaptation and Resilience (the impact of climate change on the Proposed Development).

15.1.4 The proposed scope of assessment to address these aspects is detailed below in turn.

15.2 Potential Effects

15.2.1 The World Business Council for Sustainable Development (WBCSD) / World Resources Institute (WRI) Greenhouse Gas Protocol (the GHG Protocol) (WBCSD and WRI, 2019) categorises direct and indirect emissions into three broad scopes:

- Scope 1: all direct GHG emissions;
- Scope 2: indirect GHG emissions from consumption of purchased electricity, heat or steam; and
- Scope 3: other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc.

15.2.2 Potential effects will occur as a consequence of generating GHG emissions from activities during construction and operation, such as transport and combustion of fuels on site (Scope 1), purchased electricity (Scope 2) and embodied carbon (Scope 3).

15.2.3 It is important to acknowledge that no new reservoir is proposed as part of the Proposed Development, nor any changes proposed to the volume of the reservoir. Traditionally, a key source of GHG emissions associated with hydropower development is the removal of vegetation and the flooding of terrestrial land, which causes the decomposition of flooded organic material, releasing GHG emissions (IHA, 2020). As there will be no new reservoir built as part of the Proposed Development, there will be no Scope 1 GHG emissions in this regard.

15.2.4 The Proposed Development will store renewable energy to be fed directly into the National Grid when required. The increasing share of low carbon, renewable energy sources feeding into the national electricity grid, with a corresponding decrease in the use of fossil fuels, is termed "decarbonisation". Therefore, the emissions per unit of electricity generated (grams of carbon dioxide per kilowatt hour) is reducing. This is a vital step in meeting the emissions reductions target set by the Climate Change (Emission Reduction Targets) (Scotland) Act 2019.

15.3 Relevant Legislation, Guidance and Technical Standards

15.3.1 The assessment of likely significant effects will be undertaken in accordance with relevant and applicable legislation, policies and technical standards. In addition to the relevant legislation and policy consideration outlined in Chapter 6 – Legislative and Planning Policy Context, the assessment will be undertaken in accordance with subject specific legislation and best practice guidance including the following:

- Regulation 4(2)(c) of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 requires significant effects on climate to be considered, as appropriate, within the EIA process. In addition, Schedule 4 to the 2017 EIA Regulations requires likely significant effects resulting from "the impact of the project on climate…and the vulnerability of the project to climate change" to be addressed within an ES.
- Climate Change Act (2008) (2050 Target Amendment) Order 2019;
- Carbon Budget Orders 2009, 2011 and 2016;
- Climate Change (Scotland) Act (2009);
- Climate Change (Emissions Reduction Targets) (Scotland) Act 2019;
- IEMA (2017). EIA Guidance on assessing greenhouse gas emission and significance;
- The Climate Change Committee's report 'The Sixth Carbon Budget The UK's path to Net Zero' (CCC, 2020);
- Scottish Government Update to the Climate Change Plan 2018-2032;
- International Hydropower Association (IHA) Hydropower Sustainability Guidelines (IHA, 2020); and
- Argyll and Bute Local Development Plan Supplementary Guidance (2016) Sustainability Checklist.

15.4 Baseline Conditions

15.4.1 This section establishes the existing GHG emissions at a national and regional level. GHG emissions do not have a local receptor as, once they are emitted, they are not limited to geographic boundaries.

15.4.2 Table 15-1sets out the UK carbon budgets from 2008 until 2017.

Table 15-1 - 2008-2017 UK Carbon Budget

UK Budget	Carbon budget level (million tonnes carbon dioxide equivalents - MtCO2e)	Reduction below 1990 levels	UK Emissions
1st carbon budget (2008 to 2012)	3,018 MtCO2e	25%	2,982 $MtCO_2e$
2nd carbon budget (2013 to 2017)	2,782 MtCO2e	31%	2,398 $MtCO_2e$

15.4.3 From a national perspective, in 2019, UK total GHG emissions were estimated to be 454.8 million tonnes carbon dioxide equivalents (MtCO2e), a decrease of 2.9% compared to 2018 (DBEIS, 2021). National GHG emissions in 2019 have decreased by 43.8% since 1990 (DBEIS, 2020).

15.4.4 The Department for Business, Energy & Industrial Services (DBEIS, 2020) sets out the CO_2 emissions estimates from a number of sources for 2005-2018, and is available for the UK, Scotland, and Argyll and Bute. The CO_2 estimates for 2018 is presented in Table 15-2 below.

Table 15-2 - National, Scottish and Argyll & Bute CO2 estimates for 2018

	Industry and Commercial ($ktCO_2$)	Domestic ($ktCO_2$)	Transport ($ktCO_2$)	Land Use, Land Use Change and Forestry ($ktCO_2$)	Total ($ktCO_2$)
UK	133,293.3	96,429.8	126,801.1	-11,699.9	344,824.3
Scotland	13,020.0	8,707.4	11,042.8	-4,181.7	28,588.5
Argyll & Bute	202.7	166.8	198.9	-510.8	57.5

15.4.5 Current Scope 1 GHG emissions on site include emissions associated with the existing reservoir (IHA, 2020). These emissions may comprise of:

- Diffusive influx, where CO_2 and methane (CH_4) diffuse slowly from the sediment through the water column;
- Bubbling, where CH_4 accumulates in the sediment in shallow littoral areas, and can be periodically liberated in the water column; and
- Degassing, where the thermal stratification within the reservoir creates deep and anoxic water layers that have higher methane production, which can be emitted when dams release water from low level outlets.

15.4.6 As the reservoir has been operational since 1965, it is likely that Scope 1 GHG emissions generated as a result of decomposition of sediment would have decreased over time.

15.4.7 There will be Scope 1 GHG emissions associated with the machinery of the hydropower station. A limited amount of GHGs will be emitted from using diesel for ancillary works, as well as standby works power. There are also back-up diesel generators on site in the instance of a power outage, however these will not generate GHG emissions while the hydropower plant is operational. Scope 2 emissions will be generated as Cruachan 1 imports electricity from the distribution network operator e.g. for lighting. There will also be Scope 3 GHG emissions from employees at the existing Cruachan power station driving to and from the Site.

15.4.8 The Site is largely comprised of acid and marshy grassland and a mix of heath species. There are limited trees on Site, with small patches of broadleaved semi natural woodland along the A85. It is therefore anticipated that there is limited GHG sequestration on the Site.

15.5 Embedded Mitigation and Design Principles

15.5.1 A Construction Environmental Management Plan (CEMP) will be prepared and submitted as part of the application. The CEMP will include several mitigation measures covering transport, materials, waste and air quality during construction, such as staff travel, waste and recycling in welfare buildings. Measures that will reduce GHG emissions during construction include, for example, no unnecessary idling of engines, maintenance of plant equipment to check they are operating optimally and efficient use of materials to reduce waste.

15.5.2 The design of the Proposed Development has undergone an iterative process to refine and improve the proposals in relation a range of design requirements and criteria, including the consideration of sustainability, material use and construction efficiency. This includes the following design mitigation measures and improvements:

- There will be no new reservoir as part of the proposals, nor any changes to the volume of the existing reservoir. As noted above, the primary source of GHG emissions associated with hydropower development is the removal of vegetation and the flooding of terrestrial land, which results in the decomposition of flooded organic material, releasing GHGs. As the Proposed

Development will utilise the existing reservoir, no additional emissions will be generated in this regard.

- The iterative design process has sought to reduce the Proposed Development footprint without compromising safety and the long term security of the infrastructure. This will result in a reduction of raw materials required to construct the Proposed Development, reducing GHG emissions associated with the raw extraction and processing of materials, as well as transport emissions associated with material import. Additionally, there is a reduced area requiring excavation and less waste generated, reducing GHG emissions associated with these activities and waste transportation. These principles will be adopted during the detailed design of the Proposed Development as the individual elements are further refined.
- The design has sought to align with Cruachan 1, and utilise existing elements where possible to avoid the need to construct new infrastructure. The Proposed Development will make use of the existing accesses and tunnel infrastructure of Cruachan 1, reducing the number of new tunnels to be created and avoiding additional excavation. As the design progresses, there will be further opportunity to explore options for utilising elements of Cruachan 1, as appropriate and where technically feasible.
- The Proposed Development will seek to reuse excavated material wherever possible, for example as aggregate for concrete. This will reduce the amount of waste transported off the Site, thereby reducing GHG emissions associated with transport during construction.
- The Proposed Development will avoid impacts on peat as the works for the power station will be underground. The British Geological Survey (BGS, 2021) shows there is no peat within the Site boundary, and therefore the temporary construction compounds are not anticipated to impact peat soils. A peat probing exercise will be carried out to confirm the absence of peat.
- During the design process, due regard has been given to Hydropower Sustainability Guidelines (IHA, 2020). This document sets out international good practice throughout the lifecycle stages of a hydropower project, and includes a section on Climate Change Mitigation and Resilience. It includes a series of design and construction measures to reduce GHG emissions and improve the climate resilience of a hydropower project.

15.6 Proposed Scope of Assessment

15.6.1 IEMA guidance (IEMA, 2017) identifies that all GHG emissions will contribute to climate change and thus might be considered significant. It therefore suggests the impact of a development on climate should be based on its potential to emit GHGs. GHG emissions have a global effect, rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global climate will therefore be treated as a single receptor.

15.6.2 The scope of the GHG Emissions assessment is set out in Table 15-3 below.

Table 15-3 - GHG Emissions Sources and Qualitative Scope

Stage of Development	GHG Protocol	Activity Assessed
Construction	Scope 1	Enabling activities, land clearance and construction processes such as emissions resulting from the combustion of fuels in vehicles, plants or equipment used for construction of the Proposed Development.
	Scope 2	Emissions associated with electricity needed for plant and welfare facilities.
Operation	Scope 1	Emissions sequestered from landscaping and soil stabilisation.

Stage of Development	GHG Protocol	Activity Assessed
	Scope 2	Emissions associated with electricity usage e.g. lighting

15.6.3 During the operation of the Proposed Development, it is anticipated that there will be limited Scope 1 GHG emissions from the power station itself. In the event of a power outage, there will be minor diesel generators on site which will result in Scope 1 GHG emissions. However, these are emergency back-up for small consumption use such as lighting only, and will not be used when the power station is operational. It is considered that their emissions would be insignificant as they would be operational for a very limited time.

15.6.4 Indirect Scope 3 emissions are emitted from activities which are predominantly outside of the Applicant's control, for example, waste disposal and emissions related to the supply chain of construction materials. It is therefore difficult to accurately and meaningfully assess these at the early stage of a project and it is not considered appropriate or proportionate in the context of the Proposed Development and the EIA Regulations. IEMA guidance recognises that the assessment of GHGs should be proportionate in the context of EIA. It is therefore proposed that Scope 3 emissions are scoped out of further assessment as it is not considered proportionate to the Proposed Development within the context of the EIA. Embedded and further mitigation that reduces GHGs, including indirect Scope 3 emissions, associated with the Proposed Development will be considered within the EIA Report. Therefore, the EIA Report will demonstrate how the Proposed Development addresses GHG emissions through mitigation, as recommended by IEMA guidance.

15.7 Proposed Assessment Methodology

15.7.1 There is no nationally adopted method for assessing climate change within EIA and therefore the assessment approach draws upon IEMA guidance.

15.7.2 The methodology for undertaking the GHG emissions assessment will follow the methodology outlined by the Institute of Environmental Management and Assessment (IEMA) guidance on assessing GHG emissions (IEMA, 2017). The scope of emissions within the assessment aligns with the World Business Council for Sustainable Development (WBCSD) / World Resources Institute (WRI) Greenhouse Gas Protocol (the GHG Protocol) (WBCSD and WRI, 2019) and consideration of the International Hydropower Association (IHA) Hydropower Sustainability Guidelines (IHA, 2020) methodology, and considers both the construction and operation stages of the Proposed Development.

15.7.3 IEMA guidance emphasises that a proportionate and appropriate assessment should be undertaken to inform decision making and recognises that qualitative assessments are acceptable where mitigation has been agreed early on in the design phase with design and engineering teams.

15.7.4 The GHG emissions assessment will be based on the broad parameters of the Proposed Development, as detailed design will be developed at the next stage. The Proposed Development has embedded several measures to reduce GHG emissions associated with the design and construction, outlined in 15.5 above. In addition, there is anticipated to be limited emissions on Site once the Proposed Development is operational.

15.7.5 It is therefore considered that a qualitative GHG assessment is appropriate and proportionate in the context of the EIA Regulations.

15.7.6 The following methodology for assessment is proposed:

- Review of policy context for the assessment with reference to National and Local policy;
- Qualitative review of potential GHG emission sources during construction and operation of the Proposed Development, as outlined above. The qualitative assessment will adopt emission boundaries (i.e. scope of the emissions) that align with Greenhouse Gas Protocol. Consideration will also be given to the Hydropower Sustainability Guidelines Climate Change Mitigation and Resilience section (IHA, 2020); and

- Identification of embedded and further mitigation measures to reduce the GHG emissions associated with the Proposed Development.

15.7.7 Due to the subjectivity of defining the degree of significance (i.e. substantial, major, moderate, minor or negligible) for GHG assessments, significance will be determined by professional judgement with due regard to IEMA guidance, based on the and magnitude of impacts outlined in Table 15-4 and the sensitivity of the receptor. The magnitude of impacts takes into consideration the impact of GHG emissions generated by the Proposed Development on national, regional and local GHG emissions targets. The level of effect will be based on IEMA guidance, professional judgement and the matrix in Table 15-5 below.

Table 15-4 - Magnitude of Impacts

Magnitude	Measure of Impact
Large	A large impact considered to be of national scale.
Moderate	A moderate impact considered to be of regional scale.
Small	A small impact considered to be of local scale.
Negligible	An impact considered to be beneath level of perception.

15.7.8 GHG emissions have a global effect rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global climate has therefore been treated as a single receptor. Given the global scale and severe consequences of climate change and limited recoverability, the receptor sensitivity is considered to be high.

Table 15-5 - Significance of Effects Matrix

Magnitude	Receptor Sensitivity
	High
Large	Major to Substantial
Moderate	Major
Small	Minor to Moderate
Negligible	Negligible to Minor

15.8 Potential Effects

15.8.1 During the construction phase it is anticipated that the risk of climate hazards, for example from heatwaves or periods of heavy precipitation, may increase. However it is expected that these will be managed through standard construction and health and safety practices, such as securing material/equipment and not undertaking works during periods of extreme rainfall. Therefore, the vulnerability of the Proposed Development to climate change during construction will be scoped out of the assessment for the EIA Report.

15.8.2 During the operation phase, the Proposed Development is unlikely to be vulnerable to varying future climate conditions as the majority of the infrastructure is underground, and no changes are proposed to the reservoir or dam.

15.8.3 As noted in Chapter 8 Hydrology, the Proposed Development would only be at risk of flooding from a failure of the reservoir and/or power station infrastructure, which would be considered very unlikely,

given that the Applicant will operate the Proposed Development in accordance with the requirements of the Reservoirs Act (1975).

15.8.4 There is also the potential for climate change, and in particular changes to seasonal patterns, to exacerbate the effects on environmental receptors to an extent that a new or previously identified effect in other topic chapters becomes significant. These are referred to as in-combination climate change impacts, and will be addressed in the Impact Interactions chapter of the EIA Report.

15.9 Policy and Guidance

15.9.1 Legislation and planning policies that are relevant to the Proposed Development and climate change include:

- National Planning Framework (NPF3) (2014);
- Position Statement on National Planning Framework (NFP4) (2019);
- Scottish Planning Policy (2014)
- Argyll and Bute Local Development Plan (2015) Policy LDP 10 – Maximising our Resources and Reducing Our Consumption, POLICY LDP STRAT 1 – Sustainable Development, Policy LDP 3 – Supporting the Protection, Conservation and Enhancement of our Environment; and
- Argyll and Bute Local Development Plan 2 Proposed Plan (2019) Policy 05 – Design and Placemaking, Policy 06 – Green Infrastructure and Policy 57 – Risk Appraisals.

15.9.2 Oher relevant publications include:

- IEMA (2020) EIA Guide to Climate Change Resilience and Adaptation;
- International Hydropower Association (IHA) Hydropower Sustainability Guidelines (IHA, 2020);
- Climate Ready Scotland: climate change adaptation programme 2019-2024; and
- Argyll and Bute Local Development Plan Supplementary Guidance (2016) SG LDP SERV 7 - Flooding and Land Erosion – The Risk Framework for Development and Sustainability Checklist.

15.10 Baseline Conditions

15.10.1 The IEMA guidance (IEMA, 2020) recommends that the climatic baseline should consider extremes in short-term weather events, such as heatwaves; long-term climatic variability, such as seasonal changes in precipitation; and average climate norms, such as ambient temperature.

15.10.2 Historic climate averages during the period 1981-2010 for the closest climate station to the Site (Dunstaffnage), obtained from the Met Office website (Met office, undated), indicates the following:

- Average annual maximum temperature was 12.4°C;
- Warmest month on average was July (mean maximum temperatures of 17.9°C);
- Coldest month on average was January (mean minimum temperature of 7.3°C);
- Average total annual rainfall was 1,661.3 mm;
- Wettest month on average was January (average monthly rainfall of 198.9 mm); and
- Driest month on average was May (average monthly rainfall of 77.3 mm).

15.10.3 The SEPA Flood Maps indicate that the Cruachan Reservoir and Loch Awe have a Low-High likelihood of fluvial flooding and Low-High likelihood of surface water flooding, where a High Likelihood indicates a 10% annual probability of flooding, whilst Low Likelihood indicates a 0.1% annual probability.

15.11 Embedded Mitigation and Design Principles

15.11.1 The following embedded design principles have been incorporated to improve the climate resilience of the Proposed Development:

- There are no proposed changes to the reservoir and no changes to the volume of water, which has avoided the need for changes to carry out works on the hillside. This will reduce risk of any geotechnical hazards (e.g. landslides) at the Site.
- The design has sought to mirror Cruachan 1 in terms of design to utilise the most ideal rock type for the key infrastructure. The geology of the Site is appropriate for this infrastructure and can provide long term stability.
- A Flood Risk Assessment (FRA) will be carried out and appended to Chapter 8 Hydrology which will include climate change considerations in line with SEPA guidance and policy, and will set out how the Proposed Development will prevent an increase in flood risk to the surrounding land.
- The proposals do not require the need for any biodiversity or ecological enhancement measures as the works are underground. This avoids the need to prepare planting schemes with consideration of climate change (i.e. the need to plant climate resilient species such as drought tolerance). The intention is to limit disturbance on the existing habitats. Chapter 9 Ecology will include a section on the implications of climate change to address this.

15.12 Proposed Scope of Assessment

15.12.1 Due to the relatively short-term nature (in terms of climate change) of the construction phase, it is considered unlikely that there will be significant changes to the climate during this period. It is expected that risks from climate hazards will be managed through standard construction and health and safety practices through the use of a CEMP. Measures may include, for example, securing material/equipment and not undertaking works during storms or high winds, managing and reducing water use and providing shading for workers. These mitigation measures would be considered as an integral part of the Proposed Development. Any vulnerability associated with flooding will be assessed within the FRA that will be submitted with the planning application. Significant effects during construction of the Proposed Development are therefore not expected and will be scoped out of the EIA Report.

15.12.2 During operation, effects may arise from a change to long term climatic norms, seasonal changes and climate hazards. Consideration of climate change will be embedded into each stage of the project design. Potential climate related flood risks will be considered within the FRA that will be submitted with the planning application. In accordance with SEPA's Climate change allowances for flood risk assessment in land use planning guidance (SEPA, 2019), any surface water drainage required, for either temporary or permanent works, will be designed for 1 in 200 year allowance plus 55% climate change.

15.12.3 It is considered that sufficient resilience measures would be incorporated into the design of the Proposed Development to reduce the risk from climate change during operation to a level that is not significant. Therefore, impacts of climate change on the Proposed Development are unlikely to be considered significant and will not be considered further within the EIA or reported in the EIA Report.

15.13 References

DBEIS (2020) UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018 *Department for Business, energy & Industrial Strategy,* National Statistics [online] Available at https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018

DBEIS (2021) 2019 UK Greenhouse Gas Emissions, Final figures, Department for Business, energy & Industrial Strategy, National Statistics [Online] Available at: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019

IEMA (2017). EIA Guidance on assessing greenhouse gas emission and significance.

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Met Office (2018). UK Climate Projections 2018. Available: https://www.metoffice.gov.uk/research/collaboration/ukcp

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SEPA (2019) Climate change allowances for flood risk assessment in land use planning. Available: Climate change allowances for flood risk assessment in land use planning (sepa.org.uk)

World Business Council for Sustainable Development (WBCSD) / World Resources Institute (WRI) (2019) Greenhouse Gas Protocol. Available: http://ghgprotocol.org/about-us

16 Topics to be Scoped out of the EIA

16.1 Introduction

16.1.1 The EIA Report should be focused, documenting only the assessment of likely significant environmental effects, both adverse and beneficial. Therefore, those effects which are not likely to be significant should not be included in the EIA Report, i.e. they should be scoped out of the EIA. The following section sets out those topics that have been determined not to be significant and therefore are not included in the EIA,. The rationale for scoping these topics out of the EIA is also provided.

16.2 Air Quality

16.2.1 Potential receptors which may experience adverse effects in terms of air quality include Glen Etive and Glen Fyne SPA, Coille Leitire SSSI and Loch Etive Woods SAC. There are no residents within close enough proximity to the Proposed Development that they could be affected by changes to air quality.

16.2.2 The construction phase has the potential to generate the following effects on local air quality:

- Increased nitrogen dioxide (NO2) and fine airborne particle (PM10 and PM2.5) concentrations from road traffic; and,
- PM10 and dust effects from construction activities, including engineering works and the potential working of borrow pits (referred to collectively as 'construction dust impacts').

16.2.3 Dust soiling effects due to demolition and construction phase works will be of a temporary nature. Furthermore, it is considered that potential dust impacts during the demolition and construction phase can be managed by appropriate mitigation measures from the Institute of Air Quality Management (IAQM) guidance on the assessment of dust from construction and demolition (IAQM 2014). These measures will be set out in the Construction Environmental Management Plan (CEMP). With effective mitigation applied through the CEMP, the likely effect from the demolition and construction phase is not considered to be significant.

16.2.4 The traffic flows for the Proposed Development are currently unknown, however it is expected that there will be no significant change in traffic flows during the operational phase of the development compared to those generated by the existing development as routine operation and maintenance visits can be combined with Cruachan 1 and an additional 5-10 operational staff would be required. It is expected that the Proposed Development will result in a temporary increase in traffic flows on the surrounding road network during the demolition and construction phase, however it is considered that the traffic generation will not be sufficient to cause a significant deterioration in air quality and does not represent a likely significant effect. Traffic flows on the existing road network are relatively substantial and air quality is not close to any trigger level for concern. It is not anticipated that significant changes to these traffic flows will be caused by the Proposed Development. However this may be re-assessed if, upon further assessment the traffic generation for the Proposed Development exceeds the IAQM/EPUK or Natural England criteria, due to e.g. transport of spoil.

16.2.5 Overall, it is considered that the potential air quality effects associated with the Proposed Development are not likely to be significant and should be scoped out of the EIA.

16.3 Waste Management

Policy and Guidance

16.3.1 Scottish Government planning policy on waste is defined in a series of policy documents, including but not limited to:

- Scottish Government (2020): Scottish Planning Policy, Revised December 2020;

- Scottish Government (2014): Ambition - Opportunity – Place, Scotland's Third National Planning Framework, June 2014;
- Scottish Government (2010): Zero Waste Plan;
- Scottish Government (2021): Managing Waste, online resources.

16.3.2 The Scottish Government's Third National Planning Framework (NPF3) recognises that waste is a resource and an opportunity, rather than a burden. Scotland has a Zero Waste Policy, which means wasting as little as possible and recognising that every item and material used, either natural or manufactured, is a resource which has value for our economy. Planning plays a vital role in supporting the provision of facilities and infrastructure for future business development, investment and employment (Scottish Government, 2020).

16.3.3 Furthermore, Scottish Government (2020) continues to outline the following key planning principles on waste, in that the planning system should:

- promote developments that minimise the unnecessary use of primary materials and promote efficient use of secondary materials;
- support the emergence of a diverse range of new technologies and investment opportunities to secure economic value from secondary resources, including reuse, refurbishment, remanufacturing and reprocessing;
- support achievement of Scotland's zero waste targets: recycling 70% of household waste and sending no more than 5% of Scotland's annual waste arisings to landfill by 2025; and
- help deliver infrastructure at appropriate locations, prioritising development in line with the waste hierarchy: waste prevention, reuse, recycling, energy recovery and waste disposal.

16.3.4 Scottish Government planning policy in turn guides local waste policy and decisions within the jurisdiction of Argyll and Bute Council, where a new waste strategy is under development. However, the current draft Argyll and Bute Waste Strategy is limited to general recycling/recovery and associated commercial contract approaches.

16.3.5 It can be summarised that Scottish Government policy on waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Where this is not possible, waste management regulation ensures that waste is treated and/or disposed of in a way that is least damaging to the environment and to human health. Sustainable waste management is implemented through the "waste hierarchy", which sets out the priorities that must be applied when managing waste:

- Prevention
- Preparing for reuse
- Recycling
- Other recovery e.g. Energy
- Disposal

16.3.6 The Applicant outlines its own commitments to sustainability and waste in the following corporate policies and statements:

- Climate Policy
- Group Environment Policy Statement
- Environmental Impact

Assumptions

16.3.7 In the context of waste management, the Proposed Development is likely to generate waste streams during the various phases:

- Construction - by differing construction activities: turbine chamber construction; tunnelling; and access infrastructure and enabling works; and

- Operation – as part of inspection, maintenance and refurbishment works (this is considered to be minimal and with therefore be scoped out of the assessment); and
- Decommissioning – It is assumed that the Applicant would seek to maintain and upgrade existing assets rather than decommission once the assets reach the end of their operational life and so this has not been considered further.

16.3.8 Bulk wastes generated during the construction phase will likely comprise:

- Bulk excavation arisings – from tunnelling and excavation.

  Comprising approximately 1.2M tonnes of excavated spoil (depending on detailed design). Arisings anticipated to comprise geological materials comprising Diorite, Quartz Diorite and the Easedale Subgroup. The initial assumption is that this material would be non-hazardous and likely 'inert' if classified on the basis of prevailing WM3 guidance for disposal to landfill).

  It is anticipated that arisings will take the form of rock 'chippings' likely in various size fractions ranging from gravel to boulders.

  Arisings assumed to be generated over an approximate 4 year construction programme early 2022 through to mid 2026. Arising production is anticipated to peak at up to 2,500 tonnes per day.
- Materials (concrete) – from construction and temporary activities.
- Aggregates – resulting from temporary construction activities and infrastructure.

16.3.9 Construction during the project would require facilities for the removal of waste rock spoil at either the lower Loch or upper Reservoir areas of the proposed project. The primary potential impact is that, depending on physical and chemical composition, suitable end uses which accord with the waste hierarchy will be identified which may include:

- Non-waste reuse: The most sustainable option in terms of the waste hierarchy and Scottish and local Government policy. If arisings can be demonstrated to meet appropriate End of Waste (EoW) criteria and can be reused or released to market for a specific purpose then the material may never become waste in the first instance.
- It is important to note that the Waste Framework Directive which is transposed into Scottish Law defines waste as:

  "…any substance or object which the holder discards or intends or is required to discard…"
- On-Site re-use/recovery within the Proposed Project (under the CL:AIRE Development Industry Code of Practice or an appropriate Waste Management Licence);
- Off-Site material re-use/recovery at a suitable receiving Site under an appropriate (under the CL:AIRE Development Industry Code of Practice or an appropriate Waste Management Licence); and
- Off-Site material disposal at a suitable receiving Site (inert landfill) which has adequate capacity to accept the material under and appropriate Waste Management Licence.

Proposed Approach to Waste and Materials Management

16.3.10 As noted in Chapter 7, an Outline Waste Management Plan (OWMP) will be developed and implemented as an embedded mitigation measure to address spoil arisings from tunnelling and other bulk excavations during the construction phase.

16.3.11 To maintain assessment proportionality the OWMP will form an appendix to and will closely inform the assessment of likely ground condition effects, but it is not proposed to assess the environmental effects of waste separately or to define the significance of waste impacts within the context of the EIA Regulations. With reference to Schedule 4, paragraph 5(c) of the EIA Regulations, it is therefore proposed to describe waste management arrangements through a OWMP but for effects resulting from waste disposal and recovery to be 'scoped out' of the EIA.

16.3.12 It is recognised there is a significant interface between waste and transport elements of the Proposed Development with waste removal and transport to site(s) of reuse being a significant matter to consider

in EIA. The effects of transporting spoil arisings is a transport matter and therefore forms part of the proposed scope of assessment for Transport and Access aspects within this EIA. In addition, the project description chapter of the EIA Report will describe in more detail how spoil will be stored, the hydrology chapter which will set out mitigation measures to prevent pollution from e.g. runoff from stockpiles, and the ground conditions chapter will describe and characterise the make-up of the arisings.

16.4 Risk Management

16.4.1 The inclusion of risk and vulnerability as assessment topics within the EIA Regulations represents a relatively *new aspect* of EIA practice, which to date has largely been concerned with assessing likely significant effects rather than also the risks and vulnerabilities which may give rise to such effects.

16.4.2 The EIA Regulations, under Schedule 4, part 8 require an EIA Report to provide:

> *"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned".*

16.4.3 Although only the resulting expected significant adverse environmental effects (together with any required prevention, preparedness, mitigation and response measures) need to be addressed, it is first necessary to identify a project's vulnerability (i.e. identification of relevant risks). The second stage is then to determine whether this would result in likely significant environmental effects.

16.4.4 The terms risk, vulnerabilities, major accidents and disasters are all undefined within the 2017 EIA Regulations. To remain proportionate, consideration of this topic should focus on the risks of major accidents and/or disasters which have the potential to result in serious damage, which for this EIA is defined as:

> *"The loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor which cannot be restored through minor clean up and restoration efforts."*

Potential Effects

16.4.5 Taking account of the location and characteristics of the Proposed Development, and the likelihood of significant environmental effects outlined in this scoping report, the major risks in EIA terms identified relate to:

- Potential accidents during the construction phase resulting in disturbance, injuries and/or fatalities to construction workers or members of the public
- Structural failure from e.g. access tunnel collapse, collapse of part of the turbine cavern or collapse of works on inlet / outlet structure;
- Affecting the integrity of the existing structures at Cruachan 1 (e.g. dam and tunnels) through construction of the Proposed Development; and
- Pollution incidents to ground and watercourses during the construction phase, resulting in potential pollution migration and adverse effects on specific receptors including soils, habitats, and species.

Justification for scoping topic out of the EIA

16.4.6 Key environmental risks will be described within Chapter 3 of the EIA Report (the Proposed Development) and will provide sufficient information upon which the assessment of such issues can take place. This will also describe the key legislation and safety procedures under which construction and operation of the Proposed Development will take place.

16.4.7 The IEMA document 'Risk of Major Accidents and Disasters in EIA: A Primer (September 2020)' offers an assessment methodology based on known current practice within the UK to date and identifies key terminology that can be used in assessments. It offers a proportionate method for considering major accidents and/or disasters through screening, scoping and assessment.

16.4.8 The IEMA Primer recognises that mitigation of a development's vulnerability to major accidents and/or disasters, is covered by a wide range of other safety and non-safety-related legislation. This mitigation is generally sufficient to manage vulnerabilities to major accidents and/or disasters without the need for secondary mitigation in most circumstances.

16.4.9 Health and safety are a key consideration in the construction sector and will be managed in accordance with legal requirements and best practice.

16.4.10 In terms of the potential effects identified above, these will be mitigated as follows:

- Potential accidents during the construction phase – This will be mitigated through Construction Design and Management (CDM) regulations, construction health and safety practices (e.g. health and safety at work act) and standard best practice construction working methods which would be common on any large construction projects in the UK.
- Structural failure – This will be mitigated through robust design processes including detailed structural design and risk assessments such as rock formation and integrity. A trusted and experienced contractor would be used that has experience of developing similar projects. Civil and structural design engineers, who have information of the site from the design process and ground investigations would be involved at all stages of design. The residual risk of structural failure would be negligible. If there was any remaining residual risk before construction proceeding, the Proposed Development would not be allowed to progress.
- Affecting the integrity of the existing structures at Cruachan 1 – Although the tunnels will be connected, risks with this part of the design would be mitigated as described above. No structural work, enhancements or modifications are proposed to the operation of Cruachan 1, including the dam.
- Pollution incidents will be mitigated through standard best practice construction methods outlined in a CEMP, as described in Chapters 7 and 8 of this Scoping Report.

17 Summary and Next Steps

17.1 Overview

17.1.1 This EIA Scoping Report has:

- Explained the design strategy and key development parameters selected for the Proposed Development;
- Provided information to facilitate input from key consultees to the revised design strategy, resulting in an optimal design of the Proposed Development;
- Identified the nature and extent of likely effects on the environment from the Proposed Development, which at this stage have the potential to be 'significant' and therefore require detailed assessment through the EIA process;
- Outlined the proposed methodology to identify, assess and address likely significant environmental effects from the Proposed Development through the EIA process; and,

17.1.2 In accordance with Regulation 12 of the EIA Regulations, this EIA Scoping Report has been prepared to facilitate the adoption by the Scottish Ministers for a formal EIA Scoping Opinion for Cruachan Expansion Project (the Proposed Development). The EIA Scoping Opinion will form the basis of an EIA which is being undertaken for the Proposed Development. Full details of the EIA will be reported within an EIA Report which will formally accompany an application to be made to the Scottish Ministers under Section 36 of the Electricity Act 1989 for consent to construct and operate the Proposed Development, together with a request for deemed planning permission, and any other consents required.

17.2 The Environmental Impact Assessment Report

17.2.1 An EIA Report will be prepared in compliance with the EIA Regulations which achieves the following:

- Describes the Proposed Development;
- Outlines the reasonable alternatives considered;
- Describes the baseline environment;
- Describes the likely significant effects of the Proposed Development and the methods used to identify such likely significant effects;
- Describes the measures proposed to avoid, minimise, mitigate or offset likely adverse effects;
- Describes any proposed monitoring arrangements; and,
- Includes a non-technical summary.

17.3 Next Steps

17.3.1 The next steps in the EIA process for the Proposed Development as described in this Scoping Report are as follows:

- Submission of Cruachan Expansion Project Scoping Report to the ECU;
- Continued consultation with key stakeholders;
- Further environmental surveys including ecology and ground investigations surveys;
- Receipt of formal EIA Scoping Opinion from the Scottish Ministers; and
- Submission of Section 36 application and accompanying EIA Report for the Proposed Development to the Scottish Ministers.

17.4 Contact Details

17.4.1 Whilst all EIA Scoping consultation responses should be provided to the Scottish Government's Energy Consents Unit for inclusion within their Scoping Opinion, any pre-application advice, or queries regarding the contents of this EIA Scoping Report should be directed to consultant acting for the Applicant:

Mark Johnston, Director of Planning
Stantec
5th Floor
9 George Square
Glasgow
G2 1DY
Info.glasgow@stantec.com

Appendix A Figures

Appendix B Project Team Experience

Stantec has co-ordinated the production of this Scoping Report and is acting as Agent and EIA Co-ordinator for the Applicant. This report also contains inputs from relevant technical consultancies as detailed in **Table B.1**.

EIA Topic	Organisation	Relevant Expertise
EIA Co-Ordination Planning, Ground Conditions, Hydrology, Transport and Access, Noise & Vibration, Socio-economics, Waste Management, Climate Change, Risk Management	Stantec	Stantec is a founder member of the Institute of Environmental Management and Assessment's (IEMA) EIA Quality Mark scheme for quality in EIA. Stantec has a dedicated EIA team that specialises in leading the EIA process for development projects, including land development, regeneration, energy and infrastructure projects. Stantec typically leads 10-20 EIA projects each year. Each of Stantec's EIA team have suitable academic and professional qualifications, with professional qualifications including Principal EIA Practitioner, Practitioner and Associate membership of IEMA, member of Royal Town Planning Institute and Chartered Environmentalist.
Ecology	Applied Ecology Ltd	AEL is a specialist ecological consultancy founded in 2005, operating across the UK from bases in Cambridge and Glasgow. It is a Registered Practice with the Chartered Institute of Ecology and Environmental Management (CIEEM) and is run by Full members of CIEEM who are either Chartered Ecologists or Chartered Environmentalists. All staff hold membership of CIEEM at a level relevant to their grade, and the practice undertakes 175-200 projects every year, including the provision of assessments for EIARs of major infrastructure projects, renewable energy schemes, new towns and large-scale multi-use redevelopment masterplans.
Landscape and Visual	ASH	ASH is a Registered Practice with the Landscape Institute and a member of the IEMA Quality Mark scheme for quality in EIA. ASH's team of Landscape Professionals and other support staff have considerable experience in undertaking landscape and visual impact assessment (LVIA), cumulative landscape and visual assessment (CLVIA) and wild land assessment for large scale hydroelectric and pumped storage schemes, wind farms and other large development types, as well as the development and monitoring of appropriate mitigation measures. ASH's specialist landscape team is built of experienced, professionally qualified, Chartered Members of the Landscape Institute (CMLI) and Associate Members of the Landscape Institute (AMLI).
Cultural Heritage	RPS	RPS is a Registered Organisation of the Chartered Institute for Archaeologists (CIfA). The RPS heritage team is one of the largest in the country and its highly experienced staff have suitable academic and professional qualifications, including Member and Associate of the CIfA and Member of the Institute of Historic Building Conservation (IHBC). RPS provide cultural heritage support to a wide range of sectors, including energy, residential, regeneration, logistics and infrastructure, and have extensive experience in the preparation of cultural heritage impact assessment throughout the UK.

Appendix C Understanding the likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe'

Authors:		Contributors:		Craig Scott (Stantec); Steve Marshall (Drax)	
File:	mem_WaterLevelsEIA_v4	1.	Date:	2.	May 28, 2021

Cruachan Expansion Project - understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe

BACKGROUND

The existing Cruachan power station (Cruachan 1), owned and managed by Drax, is a pumped storage hydroelectric plant. It draws on water from Loch Awe to store potential energy in Cruachan Reservoir, which it subsequently releases in periods of high energy demand from the National Grid; the difference in water level between the two water bodies is approximately 350m.

The locations of Loch Awe and the Cruachan Reservoir are shown in Figure 1. Loch Awe has a topographical catchment area of ca. 813 km^2, which is fairly steep-sided, and encompasses narrow valleys, steep grass-covered slopes and two natural lakes: Loch Tulla and Loch Avich. Cruachan Reservoir is impounded by the Cruachan Dam and has a much smaller topographical catchment area of ca. 5.87 km^2. Its catchment is also steep-sided and grass-covered. The effective catchment area of the Cruachan Reservoir is, however, increased due to the presence of aqueducts, which transfer water via gravity from rivers in adjacent catchments (this is discussed further below).

ENVIRONMENTAL IMPACT ASSESSMENT

Drax Hydro Ltd. is planning to construct a new pumped storage hydro power station, the Cruachan Expansion Project (the Proposed Development), which will provide an additional 600MWe power generation capacity alongside the existing 440 MWe Cruachan 1 power station. Although the Proposed Development will be separate from the existing Cruachan 1 power station, it will use Loch Awe for abstraction and the Cruachan Reservoir for storage and generation, and as such the principles of its operating regime will be similar to that of Cruachan 1. The proposals for the Cruachan Expansion project do not involve increasing the maximum storage capacity currently available within the Cruachan Reservoir or increasing the storage volume available within Loch Awe.

The Proposed Development has, however, triggered the requirement for an Environmental Impact Assessment (EIA). The impact of the scheme on the water environment has been scoped in as part of the EIA. The water environment chapter of the EIA will, therefore, need to consider the impact of the Proposed Development scheme on: water resources; the potential for pollution of the water environment; and flood risk.

OBJECTIVES

The objective of this Technical Note is to establish the impact that the Proposed Development will have on water resources. Specifically, the impact that the scheme will have on water level variability within Cruachan Reservoir and on Loch Awe have been examined. This has been achieved through the analysis of historical water level time series data for Cruachan Reservoir and Loch Awe. The causal mechanisms driving historical water level variability within each water body are explained and the interdependency between the water level time series quantified. The likely impact of the Proposed Development, therefore, been assessed within the context of these causal mechanisms and water level interdependency.

IMPACT ON WATER LEVELS WITHIN CRUACHAN RESERVOIR

Overview

Cruachan 1 functions as a load-leveler to the National Grid, using excess energy during periods of low demand to pump water up from Loch Awe to the Cruachan Reservoir, then releasing it through the turbines to generate energy during periods of high demand.

With the Proposed Development in place, overall power generation will increase from 440 to 1040 MWe. As power generation is directly related to the rate and volume of water discharge, this means that the combined existing and proposed power stations will be able to drain and fill Cruachan Reservoir more quickly than at present.

Cruachan Reservoir has an operational water level range of between 380.64m AOD (Black Start level) and 399.90m AOD (maximum operational level); this is a maximum water level range of almost 20m. Water level variability within the reservoir is changeable and governed by demand and antecedent conditions, although typically water levels pass through much of this range and back once or more per week and, at times, more frequently. The maximum and minimum operational water level boundaries will be maintained with the Proposed Development.

The inflows to the reservoir include, in order of magnitude: water pumped up from Loch Awe; water imported by gravity drainage from adjacent catchments via the Main, Brander and Awe Village aqueducts; and natural rainfall-runoff from its modest topographical catchment. The outflows from the reservoir include the discharge for power generation back to Loch Awe (losses via evaporation and leakage are not thought to be significant by comparison).

Timeseries Analysis

Drax has provided a time series of water levels within the Cruachan Reservoir from 2015 to present. The time step for the water level data is 6 hours; sufficient to discern sub-daily variation. Figure 2 shows a collection of timeseries plots of water levels within the Cruachan Reservoir. The time series demonstrates how water levels within the reservoir pass through much of the operational range on a regular, near-cyclical basis.

The amplitude and frequency of variation in water level are both significant. The rate and extent of water level rise and decline within the reservoir far exceeds that which might be expected to occur within a ‘natural’ system. The time series displays frequent examples of near-weekly cyclicity in water level variation: water levels in the reservoir can rise at the start of a week as water is abstracted from Loch Awe and the reservoir fills; water levels fall towards the end of the week as water is released back into Loch Awe to generate energy.

Water Balance Analysis

Drax has also provided data on daily abstractions from Loch Awe to the Cruachan Reservoir; daily generation discharges from the reservoir back to Loch Awe; daily inflows from the three gravity aqueducts; and daily rainfall. Figure 3 shows the results of a monthly water balance analysis undertaken using these data[8].

The current operation of Cruachan 1 (i.e. pumping from Loch Awe and discharges for power generation) comprises the near-totality of the monthly water balance (Figure 3). The pumped inflows and discharges for power generation are the dominant features of the water balance; they are many times greater in magnitude than the other components. Over a monthly timescale, net storage change mostly cancels out. The aqueducts provide a smaller but significant inflow although natural runoff from the topographical catchment is less significant in comparison.

[8] For this analysis, it was assumed that 100% of all rainfall falling within the modest topographical catchment draining to the Cruachan Reservoir is converted directly to runoff. This assumption is likely to over-estimate the contribution of natural runoff to the Cruachan Reservoir water balance.

Statistical Analysis

The dominance of the current operation of Cruachan 1 on the water level regime at Cruachan Reservoir is further demonstrated by statistical analysis. Plotting water level change within a day (midnight to midnight) against daily flow components reveals correlations between water level and flow components. The correlation can be quantified by the R^2 metric (for which 0 represents no correlation and 1 represents a perfect linear relationship). This analysis is shown in Figure 4. Of all the contributing factors analysed, the power station operational balance (pumping minus generation) shows the greatest correlation with water level variation, giving an R^2 of 0.81. Inflows from the gravity aqueducts and natural catchment runoff both appear to have little influence on the rate of water level change in the reservoir (with R^2 values at ca. 0.04 and 0.01 respectively).

Conclusion

The rate and extent of water level rise and decline within the reservoir far exceeds that which might be expected to occur within a 'natural' system. The amplitude and frequency of variation in water level are both significant. Water levels within the reservoir pass through much of the operational range (i.e. between 380.64m and 399.90m AOD) on a regular, near-cyclical basis.

The water balance analysis concludes that the water level regime in Cruachan Reservoir is almost entirely artificially controlled. The statistical analysis shows that water level rise and fall in Cruachan Reservoir is closely controlled by the operation of Cruachan 1 (i.e. pumping from Loch Awe and discharges for power generation), and not significantly influenced gravity inflows from the aqueducts or by natural rainfall-runoff.

The operational water level range within the reservoir will not change with the Proposed Development scheme in place. Similarly, the proposals for the Proposed Development do not involve increasing the maximum storage capacity currently available within the Cruachan Reservoir or increasing the storage volume available within Loch Awe.

The principal impact of the Proposed Development scheme will be that the rate at which water levels within the reservoir could rise and fall in the future could be more rapid than the significant water level dynamics shown in Figure 2 above. The maximum and minimum operational water levels that would be achieved with the Proposed Development in place would, however, be constrained within the reservoir's operational levels as illustrated by the black lines shown in Figure 2, as has been the case to date. Therefore, the nature of the water level regime in Cruachan Reservoir will not fundamentally change with the Proposed Development, with artificial factors already being dominant over naturally driven variation.

IMPACT ON WATER LEVELS ON LOCH AWE

Loch Awe is impounded by the Loch Awe Barrage. The barrage is operated by Scottish and Southern Electricity (SSE). The barrage controls water levels within Loch Awe to provide working storage for hydropower generation at SSE's Inverawe Power Station. SSE operates the barrage to maintain target water level ranges for power generation of between 36.27 to 37.06m AOD (from April to November), and 35.96 to 36.57m AOD (from December to March).

The barrage operates in 'flood-release' mode when water levels within Loch Awe exceed 37.06 and 36.57m AOD during these two respective periods. During periods of low rainfall or drought conditions, SSE either limits or halts power generation at its Inverawe Power Station, and modulates the outflow rate from the barrage, until water levels within the Loch recover to within the aforementioned ranges. The barrage appears to have a minimum invert level of 35.35m AOD.

Relative to the Cruachan Reservoir, Loch Awe has a large surface area, topographical catchment, and storage volume. Drax has provided a time series of water levels recorded within Loch Awe. The water level gauge from which this time series is sourced is located close to the existing inlet/outlet of Cruachan 1. The following timeseries and statistical analyses examine the interdependencies between the current

operation of Cruachan 1 and water levels within Loch Awe, and between natural rainfall-runoff within the Loch Awe catchment and its attendant water level variability.

Timeseries Analysis

The responses of water levels within Loch Awe to rainfall and the operation of Cruachan 1 can be illustrated by investigating sections of the timeseries data. Figure 5 illustrates that periods of rainfall in early September and late October 2020 produced a clear high water level response in Loch Awe. However, during a period of no rainfall between 12th and 18th October, Loch Awe's water level showed almost no variation despite the ongoing operation of Cruachan 1, as shown by the water level variability in Cruachan Reservoir.

Figure 6 shows water levels within Loch Awe responding to rainfall events on the 17th and 23rd May 2020, but not to the strong net abstraction from Loch Awe that resulted in a rise in water levels within the Cruachan Reservoir between the 22nd and 24th May.

Statistical Analysis

Statistical analysis has been used to demonstrate that the observations from the timeseries apply to the whole data period. Daily water level data for Loch Awe are held from 2013 to 2020; daily abstraction returns by Cruachan 1 (including the pumping and power generation flows) are held from 2014 to 2020; and rainfall data are held from 2017 to 2020 (inclusive in all cases). The following analysis is based on the period of overlapping data, covering the four years from 2017 to 2020 inclusive.

It is possible to show from statistical analysis that the operation of Cruachan 1 probably has negligible influence on water levels within Loch Awe, compared with natural rainfall-runoff inputs (and possibly the controlling influence of the Loch Awe Barrage). Figure 7 shows the linear regressions between water level and the previous 7 days' accumulated rainfall and between water level and the previous 7 days' net inflow from the power station (in both cases, the correlation is best – that is, R^2 is highest – when taken against the previous 7-day accumulations rather than a longer or shorter accumulation period). There is a much stronger correlation with rainfall and there is not a significant statistical relationship between water level and the power station operation.

The statistical correlation between rainfall and Loch Awe water level is considered significant, even though 0.48 would be a relatively low value for R^2 in other contexts. 7-day accumulated rainfall has been used in an attempt to account for the natural lag between rainfall events and increases in loch water level (the topographical catchment area of Loch Awe is relatively large and there will be a delay between rainfall events and upturns in water level). Only data on total rainfall accumulations were available for this study. Not all rainfall events result in the generation of rainfall-runoff. Runoff within the Loch Awe catchment will only occur after soil moisture deficits have been replenished. The use of Hydrologically Effective Rainfall would be expected to generate a higher R^2 value, although these data are currently unavailable. Water levels on Loch Awe are also modulated by the Loch Awe Barrage; this influence may also help to explain the R^2 value.

Ideally, the daily water level change would be compared against net inflows from the pumping station within a shorter period, because over 7 days, the inflows and outflows from the power station would tend to cancel out. However, there are no midnight water level readings from Loch Awe as there are for Cruachan Reservoir (in fact, the timings of the readings are not given for Loch Awe), so this is not feasible. Nonetheless, there are enough occasions where there is a significant positive or negative accumulation of flow from Cruachan 1 (this can be seen in the distribution in **Figure 7**) to give confidence that water level is not noticeably influenced by the power station's operation.

If water levels within Loch Awe were significantly influenced by the operation of Cruachan 1, then the near-weekly cyclicity in water levels within Cruachan Reservoir (described above) would be mirrored in the daily water level series on Loch Awe.

This analysis can also be placed into context through a simple calculation. The Cruachan Reservoir has a total available volume of ca. 7 million m^3. The Loch Awe surface area is ca. 38km^2, within which the water level gradient is reasonably flat (controlled largely by the Loch Awe Barrage). If the total volume

of the Cruachan Reservoir was released into Loch Awe (in the absence of any natural inflows or outflows on the loch), this would result in a water level rise of ca. 220mm.

Water Velocity

In terms of water velocity at the proposed Cruachan Expansion Project intake (which will also be the new outlet when generating), the new smolt screens have been designed such that maximum velocities through the screens will not exceed 0.3 m/s; a velocity that is unlikely to cause additional scour or morphological damage to the bed and banks of Loch Awe.

Conclusion

Given that there is no significant water level response within Loch Awe to the current operation of Cruachan 1, even at a water level monitoring point close to the inlet/outlet point, it is reasonable to conclude that the Proposed Development will not result in a discernible impact on Loch Awe water levels. This is because the main impact of the Proposed Development will be to increase the rate of level rise and fall within the Cruachan Reservoir, rather than increase its storage volume (and thus total volume abstracted from, and discharged back to, Loch Awe).

FIGURES

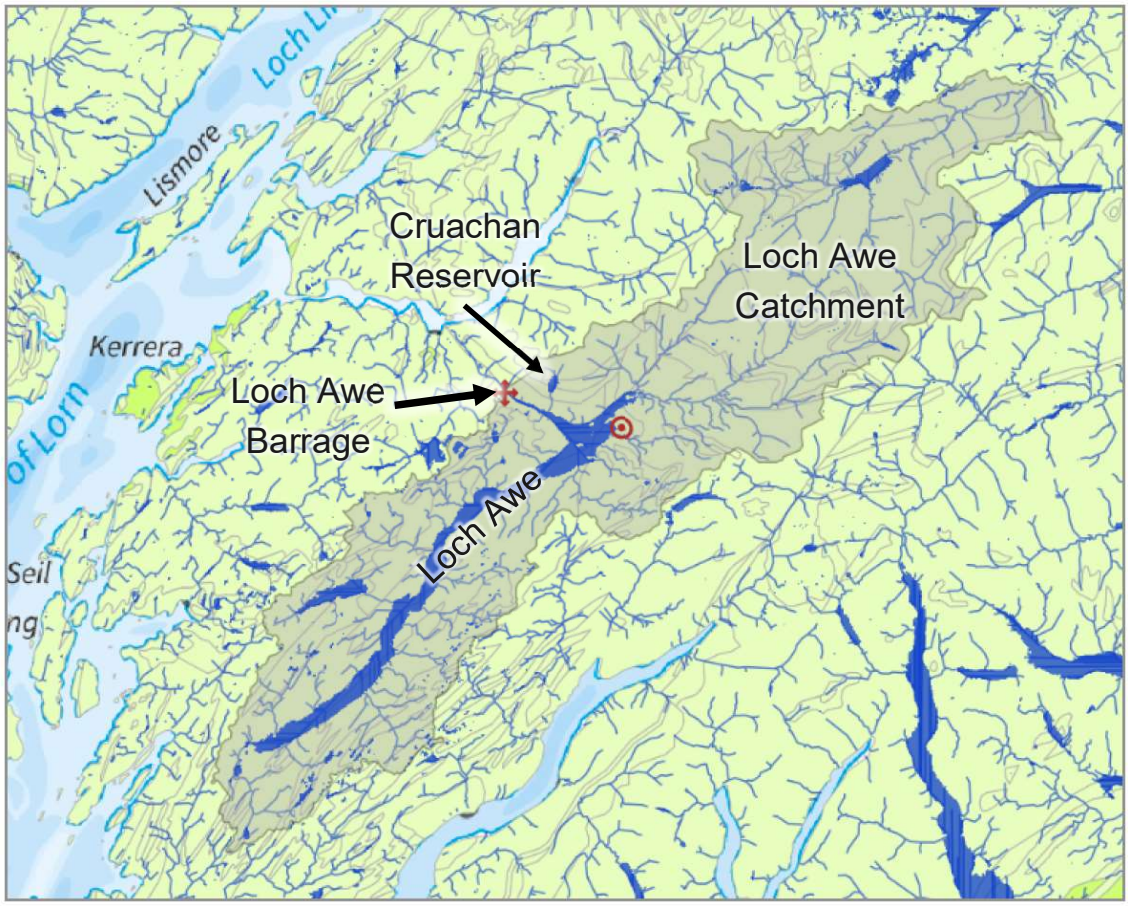
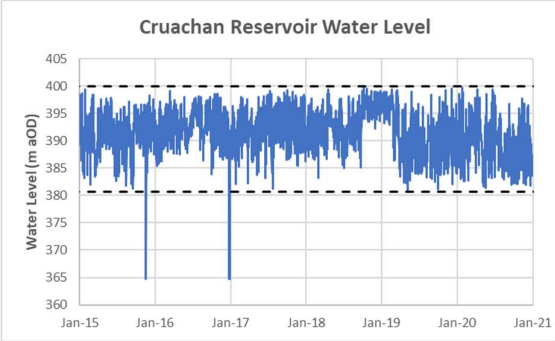
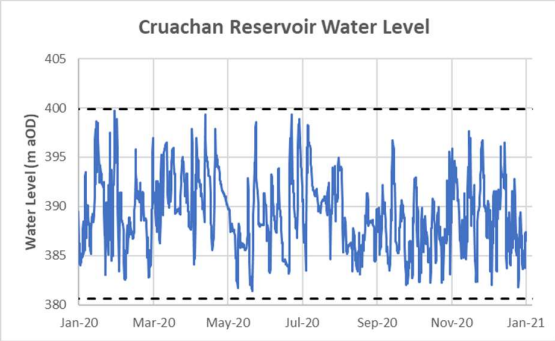


Figure 1: Cruachan Reservoir and Loch Awe setting

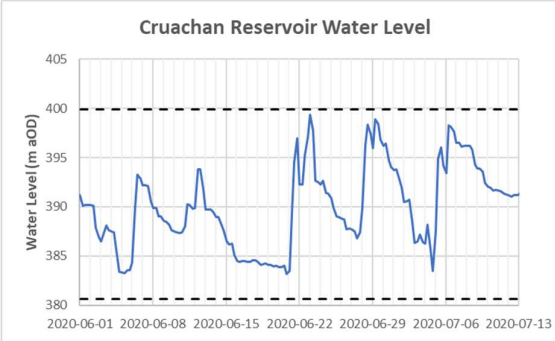
Whole Data Period



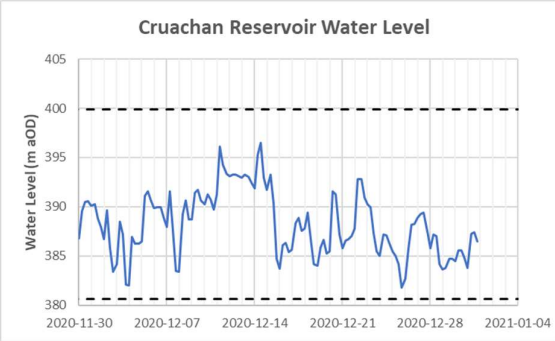
2020



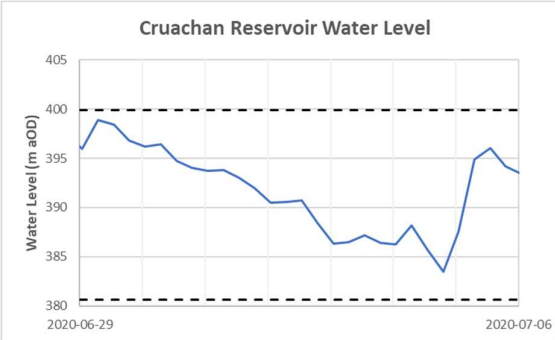
June 2020[1]



December 2020[1]



Example week in June 2020[1]



Example week in December 2020[1]

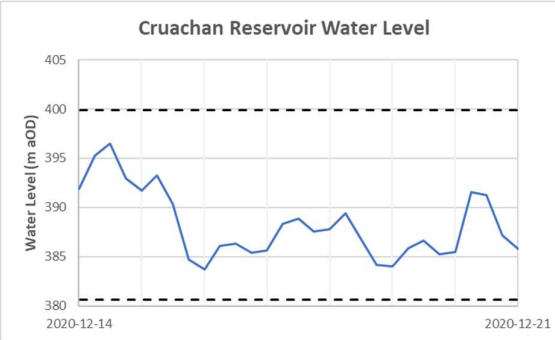


Figure 2: Cruachan Reservoir Water Level Timeseries plots

The 1-week and 1-month plots each start on a Monday, with gridlines marking days.

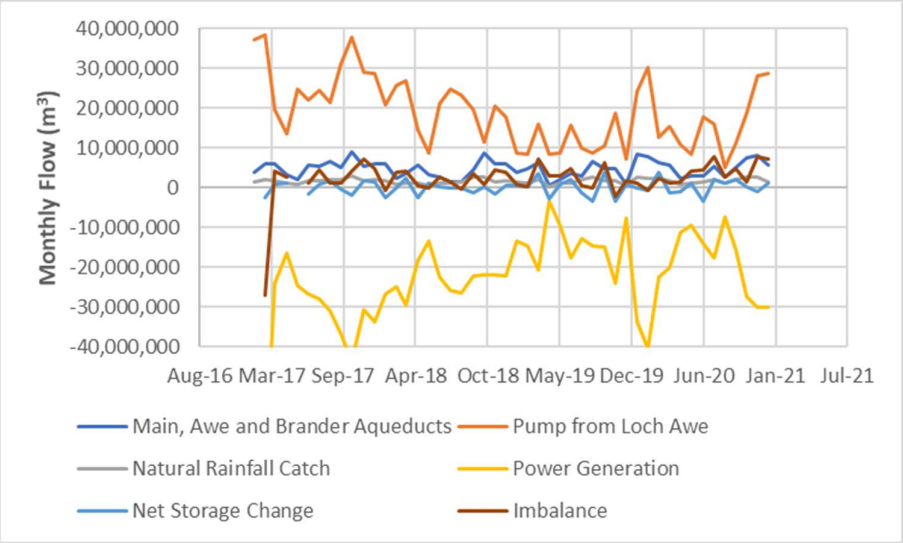


Figure 3: Cruachan Reservoir Monthly Water Balance

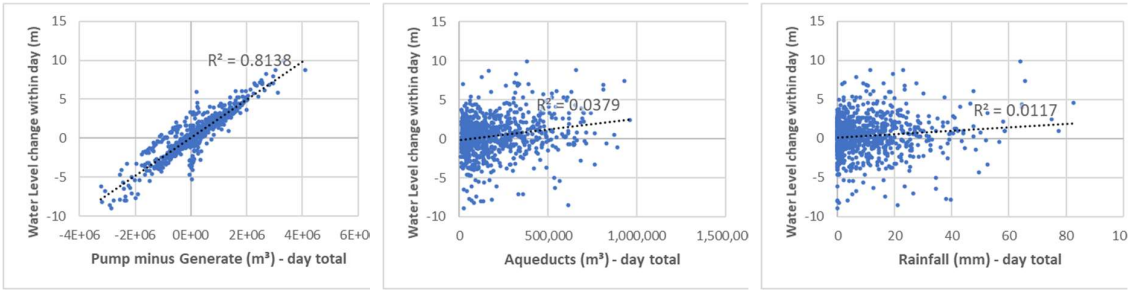


Figure 4: R^2 Analysis of Cruachan Reservoir Water Level against Preceding Flow Components

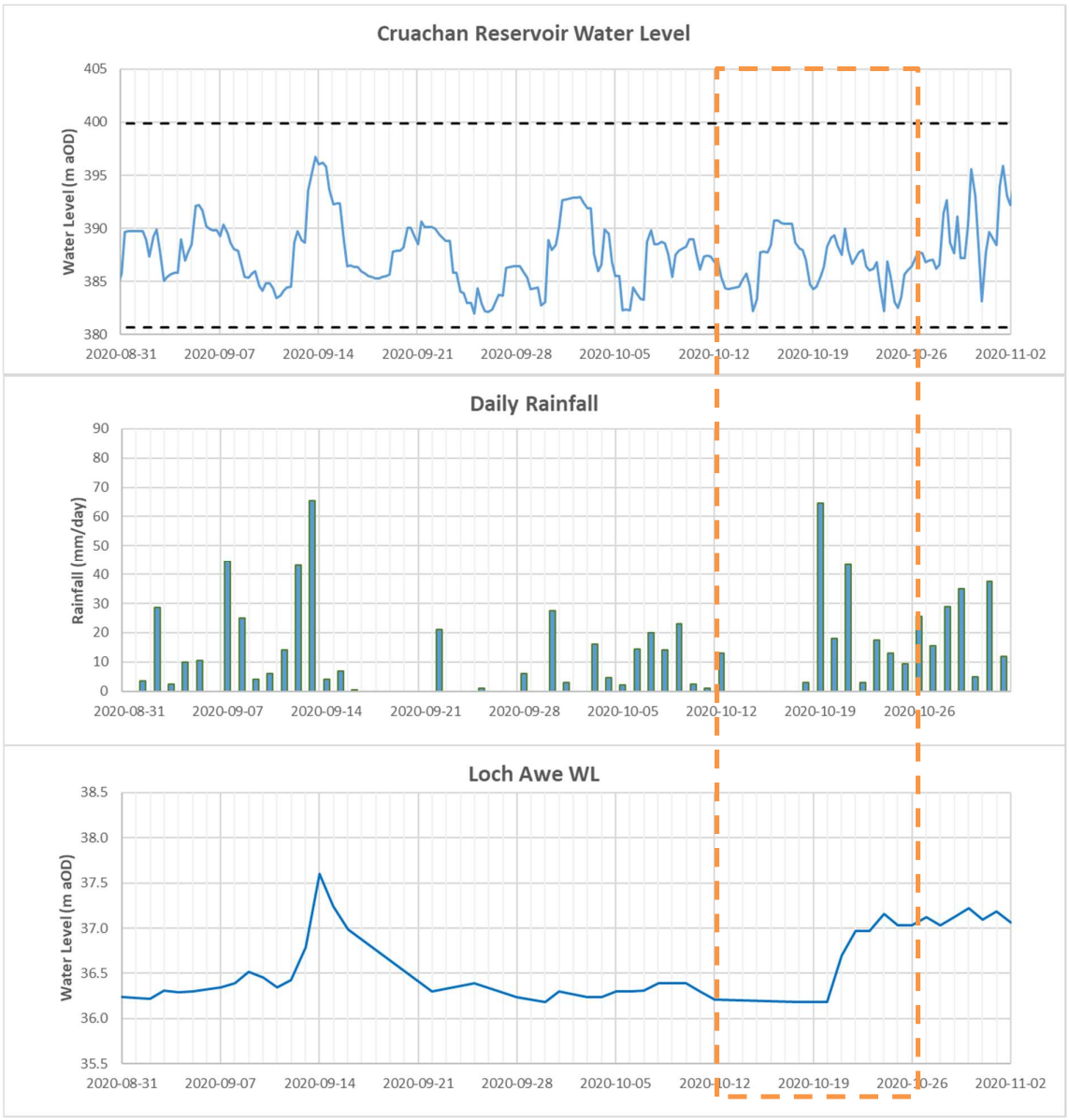


Figure 5: Loch Awe Water Level compared to Rainfall and Cruachan Operation, September to October 2020

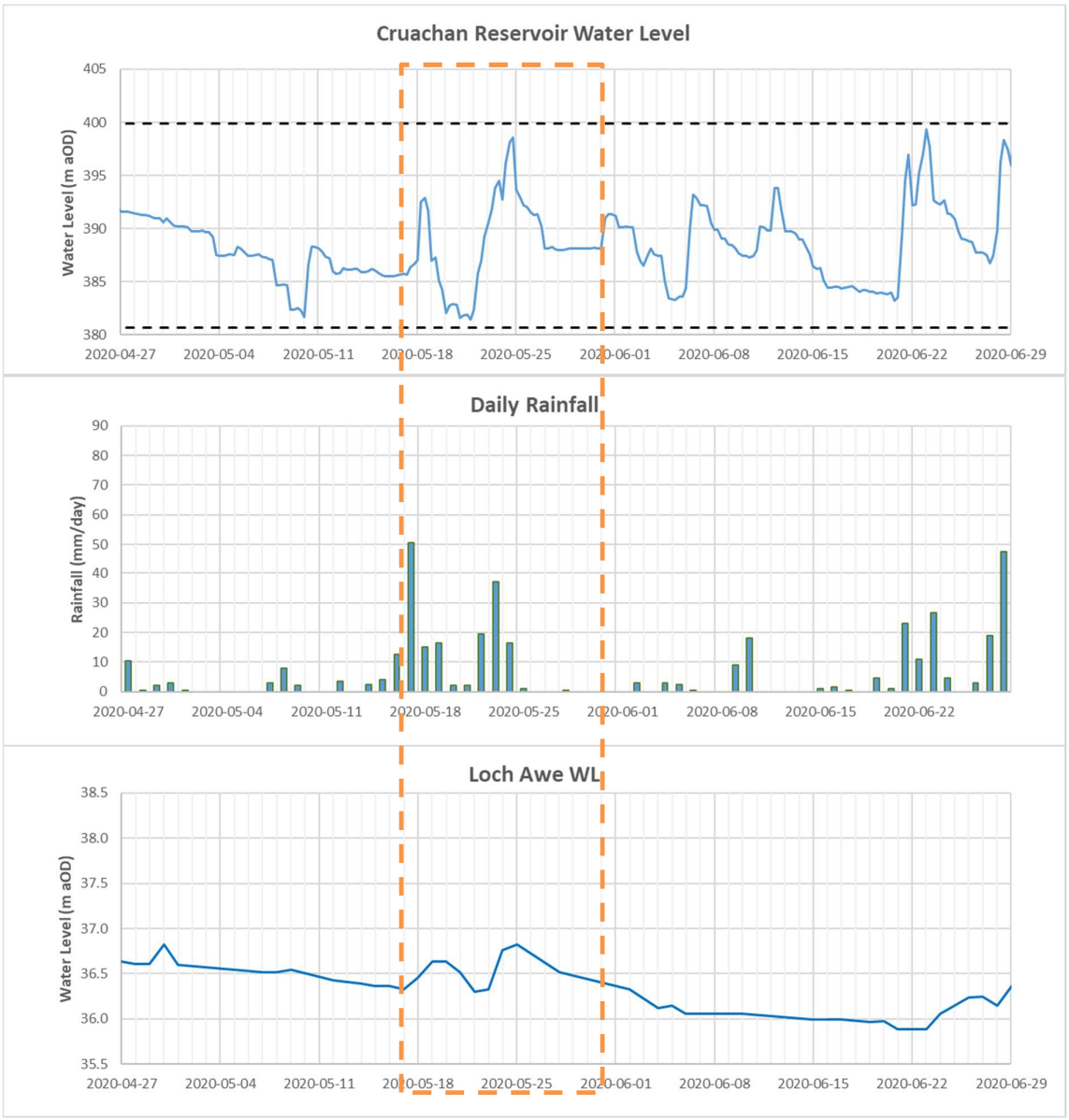


Figure 6: Loch Awe Water Level compared to Rainfall and Cruachan Operation, May to June 2020

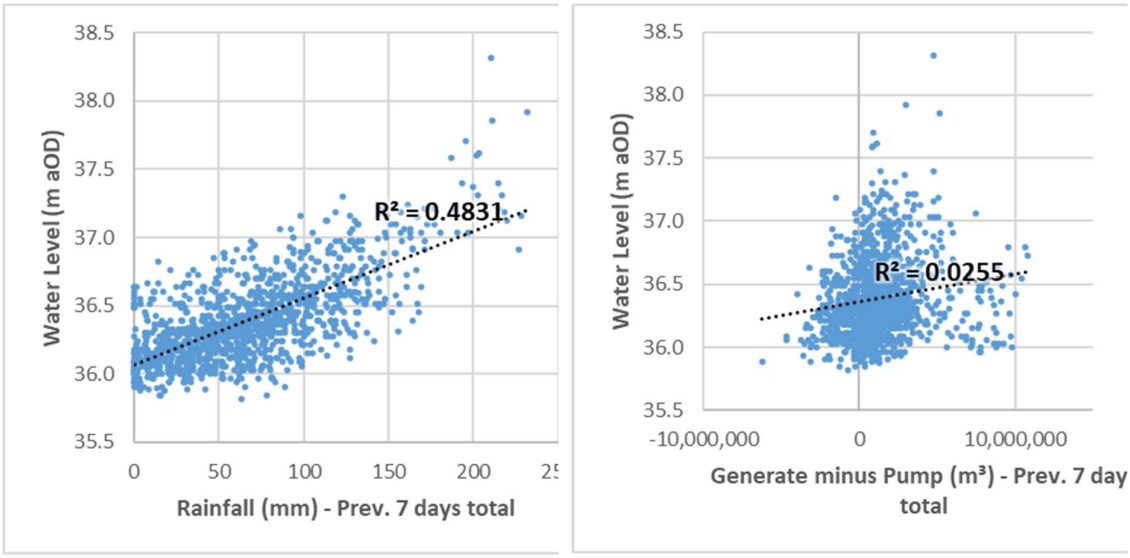


Figure 7: Correlations between Loch Awe Water Level and 7-day Flow Accumulations

Appendix D Glossary

Acronym	Full Name	Description
ABC	Argyll and Bute Council	Argyll and Bute Council, the local planning authority in which the Proposed Development sits
The Applicant	The Applicant	Drax Hydro Ltd
baseline	baseline	Environmental conditions at specific periods of time, present on, or near a site, against which future changes may be measured or predicted.
CEMP	Construction Environmental Management Plan	Strategic document setting out best practice methods to minimise environmental impacts during construction.
CIEEM	Chartered Institute of Ecological and Environmental Management	A professional body for ecological and environmental practitioners.
Cruachan 1 Power Station	Cruachan 1 Power Station	The existing Cruachan power station
Cruachan Expansion Project	Cruachan Expansion Project	The name of the Proposed Development
CSM	Conceptual Site Model	The objective of constructing a Conceptual Site Model is to record all the potential pollutant linkages between the source of contamination and the receptors, i.e. the reasonably possible ways in which the receptors may experience exposure and consequent adverse effects.
cumulative effects	cumulative effects	The summation of effects that result from changes caused by a development in conjunction with other reasonably foreseeable development that is either consented but not yet constructed or is in the process of seeking consent.
dB(A)	A-weighting sound level measured in decibels	The A-weighting is applied to measured or calculated sound pressure levels so that these levels correspond more closely to the response of the human ear. A-weighted sound levels are often denoted as dB(A).
DBA	Desk Based Assessment	Research based primarily on database and internet data gathering methods.
DMRB	Design Manual for Roads and Bridges	A widely used methodology for Environmental Impact Assessment which is used to assess some impacts of the Proposed Development (in particular traffic

Acronym	Full Name	Description
		and transport) with appropriate modifications.
EcIA	Ecological Impact Assessment	A recommended procedure for the ecological component of Environmental Impact Assessment, as formally required by EIA regulation.
ECU	Energy Consents Unit	Consenting unit of the Scottish Government that will be responsible for consenting the Proposed Development.
Effect	Effect	The consequent implication in environment terms (e.g. the loss of a potential species).
EIA	Environmental Impact Assessment	The assessment of the likely significant environmental effects of the Proposed Development. Undertaken in accordance with the relevant EIA Regulations.
EIA Regulations	EIA Regulations	Environmental Impact Assessment (Scotland) Regulations 2017' – The regulations under which this Scoping Report has been undertaken
EIA Report	EIA Report	The report which will be produced setting out the results of the EIA.
FRA	Flood Risk Assessment	A study which considers the contributing factors and predicts / quantifies the risk of flooding to and from a proposed development, identifies a water level in the event of flooding and sets out the details of any proposed mitigation measures.
GHG	Greenhouse Gas	Gasses (e.g. CO2) which can cause the earth to warm if they are released into the atmosphere in large quantities.
HES	Historic Environment Scotland	Historic Environment Scotland
IEF	Important Ecological Features	Features (e.g. habitats) which are afforded ecological protection.
LCRM	Land Contamination Risk Management	Sets out a process based on a tiered risk assessment with increasing level of detail required to progress through the tiers.
LPA	Local Planning Authority	The local authority or council that is empowered by law to exercise statutory town planning functions for a particular area of the UK.
LVIA	Landscape and Visual Impact Assessment	A tool used to identify and assess the likely significant effects of change resulting from development both on the landscape as an environmental

Acronym	Full Name	Description
		resource in its own right and on people's views and visual amenity.
MW	Megawatt	Unit of electricity generation
NPF	National Planning Framework	Provides a statutory framework around which to orientate Scotland's long-term spatial development.
NSR	Noise Sensitive Receptor	Property, feature or person which is potentially sensitive to impacts from construction and operational noise.
OWMP	Outline Waste Management Plan	Document focused on methods to deal with bulk Construction and Excavation arisings
PAN	Planning Advice Note	Set out detailed advice in relation to relevant planning issues
the Proposed Development	The Proposed Development	the development for which Section 36 consent and deemed planning permission is sought;
Ramsar site	Ramsar site	Wetlands of international importance, designated under the Ramsar Convention, which receive statutory protection under the Wildlife & Countryside Act 1981, as amended.
SAC	Special Area of Conservation	Areas of protected habitats and species as defined in the European Union's Habitats Directive (92/43/EEC).
Section 36	S36	The consenting route for the Proposed Development, via the ECU.
SEPA	Scottish Environmental Protection Agency	Scottish Environmental Protection Agency
the Site	The Site	The area within the consenting application boundary as shown in Appendix A
SPA	Special Protection Area	Classified for rare and vulnerable birds, and for regularly occurring migratory species, as defined in the EC Birds Directive (2009/147/EC).
SPP	Scottish Planning Policy	Sets out national planning policies which reflect Scottish Ministers' Priorities for operation of the planning system and for the development and use of land.
SSSI	Site of Special Scientific Interest	A site statutorily notified under the Wildlife and Countryside Act 1981 (as amended) as being of special nature conservation or geological interest. SSSIs include wildlife habitats, geological features and landforms.

Acronym	Full Name	Description
TA	Transport Assessment	A quantitative assessment of the transport effects of construction and operational phases of the Proposed Development.
ZTV	Zone of Theoretical Visibility	Areas from which a specified element of a development may be visible. Hence, the development would not visible beyond the ZTV.