



Cruachan Expansion Project – EIA Report

Volume 1 – Main Report

May 2022

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1 Introduction

1.1 Introduction

- 1.1.1 This Environmental Impact Assessment (EIA) Report has been prepared by Stantec UK Limited (Stantec) on behalf of Drax Cruachan Expansion Limited (‘the Applicant’) for the proposed ‘Cruachan Expansion Project’ a pumped storage electricity generating station (referred to hereafter as ‘the Proposed Development’). This EIA Report formally accompanies an application for consent under section 36 of the Electricity Act 1989 to the Scottish Ministers in accordance with Regulation 5 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the ‘EIA Regulations’).
- 1.1.2 The EIA Report has been co-ordinated by Stantec on behalf of the Applicant, with input from suitably qualified technical assessment specialists as detailed in **Appendix 1.2**.

1.2 Purpose of this EIA Report

- 1.2.1 The purpose of this EIA Report is to present the findings of the environmental assessment carried out for the Proposed Development. In doing so, the EIA Report identifies the likely significant environmental effects of the Proposed Development during construction and operation.
- 1.2.2 The EIA Report has been prepared in accordance with the EIA Regulations which are applicable to the determination of the section 36 application for the Proposed Development. Given the scale of the Proposed Development the Applicant has voluntarily undertaken an EIA, and therefore an EIA screening request was not submitted.
- 1.2.3 Running concurrently with the design process, the EIA has sought to:
- Identify the likely environmental effects of the Proposed Development.
- 1.2.4 Define appropriate design and construction measures and good practice to mitigate likely significant environmental effects and maximise opportunities for environmental enhancements resulting from the construction and operation of the Proposed Development; and
- Determine the level and significance in the context of the EIA Regulations of the likely residual environmental effects from the Proposed Development remaining after all proposed mitigation and enhancement measures have been taken into account.
- 1.2.5 A formal request for an EIA Scoping Opinion, in the form of a Scoping Report (Stantec, 2021) was submitted to the Scottish Government Energy Consents Unit (ECU) on 30th June 2021¹. Subsequently, the ECU adopted a formal EIA Scoping Opinion on behalf of Scottish Ministers on 29th October 2021 to define the required scope of the EIA Report. The Scoping Opinion draws upon EIA scoping consultation responses provided by relevant consultees, including Argyll and Bute Council (ABC), who are the relevant local planning authority.
- 1.2.6 The relevance and implications of the EIA Regulations are detailed further in **Chapter 4 – Assessment Methods**.

1.3 Overview of Site and Proposed Development

The Site

- 1.3.1 The Proposed Development will be located on land around and to the east of the existing Cruachan pumped storage hydro power station (‘Cruachan 1’) on the northern banks of Loch Awe in Argyll and

¹ Energy Consents Unit: <https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00003298&T=5>

Bute (National Grid Reference for Cruachan Reservoir: NN 080 282). The Site is located within the administrative boundary of ABC. A detailed description of the Site and surrounding area is provided in **Chapter 2 – The Site and Surrounding Area**, with a Site Location Plan provided in **Figure 1.1** within **Appendix 1.1**.

- 1.3.2 The Site comprises all areas needed for construction and operation of the Proposed Development. The Site area is broad and includes a corridor of land running from Cruachan Reservoir, extending into Loch Awe.
- 1.3.3 The Site encompasses the existing Cruachan 1 facilities, including Cruachan Reservoir, the underground power station, and the visitor centre. Existing private and public roads which connect the A85 to Cruachan Reservoir (including St Conan's Road), a small section of the A85, Falls of Cruachan railway station, part of the Oban to Glasgow railway line, and parts of Loch Awe also lie within the boundaries of the Site.
- 1.3.4 Cruachan Reservoir, which provides the upper reservoir of Cruachan 1, 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 Allt Cruachan Burn. A path around the reservoir is part of the route used by the public to access the summit of Ben Cruachan.

The Proposed Development

- 1.3.5 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 of additional new generating capacity. The Proposed Development will be operated independently of the existing 440 MW Cruachan 1. Both power stations will use Loch Awe as the lower reservoir and Cruachan Reservoir as the upper reservoir. A full description of the Proposed Development is provided in **Chapter 3**.

1.4 Terms and Definitions

- 1.4.1 For ease of reference, the following terms have been used in the EIA Report:
 - The Applicant – Drax Cruachan Expansion Limited;
 - The Site – The area of land around to the east of the existing Cruachan Power Station (Cruachan 1) where the Proposed Development will be located, as outlined in **Figure 1.1 – Site Location Plan (Appendix 1.1)** and as described in **Chapter 2 – The Site and Surrounding Area**;
 - The Proposed Development – The construction and operation of a new underground power station and associated infrastructure adjacent to Cruachan 1, as described in **Chapter 3 – The Proposed Development**;
 - The EIA Regulations – The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. These regulations are directly applicable to this EIA Report for the Proposed Development;
 - Cruachan 1 – The existing 440MW pumped storage hydro Cruachan Power Station;
 - The EIA Scoping Report – The EIA Scoping Report submitted to Scottish Ministers in June 2021 in accordance with Regulation 12 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
 - The EIA Scoping Opinion – The EIA Scoping Opinion adopted by Scottish Ministers on 29th October 2021 in response to the EIA Scoping Request.

1.5 The EIA and Related Documents

- 1.5.1 The EIA Report comprises the following volumes:

- Volume 1 – Main Text;
 - Volume 2 – Appendices; and
 - Non-Technical Summary.
- 1.5.2 The other principal documents submitted with the application for Section 36 consent include:

- Flood Risk Assessment;
- Loch Awe Water Levels Report;
- Species Reports: Bat, Otter, Ornithology, Fisheries, Badger, Red Squirrel, Pine Martin;
- Ecological Constraints Plan;
- Habitats Regulation Assessment;
- Transport Assessment;
- Draft Construction Traffic Management Plan;
- Noise Monitoring;
- Draft Peat Management Plan;
- Cultural Heritage Assessment;
- Listed Buildings Consent;
- Draft Construction Environmental Management Plan;
- Schedule of Mitigation;
- Planning Statement;
- Design Statement; and
- Statement of Consultation and Engagement.

1.6 Project Team

1.6.1 This EIA Report has been prepared on behalf of the Applicant, Drax Cruachan Expansion Limited.

1.6.2 The organisations involved in the preparation of this EIA Report and the undertaking of individual topic assessments are listed below:

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

1.6.3 In accordance with the EIA Regulations, a statement detailing the relevant qualifications and expertise of the individual members of the EIA project team is provided in **Appendix – 1.2**. In the

context of the EIA Regulations, the EIA project team members are considered to be competent experts in relation to their specific contributions to this EIA Report.

1.7 Structure of the EIA Report

1.7.1 The remainder of this EIA Report is structured as follows:

Volume 1 – Main Report

- **Chapter 2** – Provides a description of the Site and the surrounding area;
- **Chapter 3** – Provides a description of the physical, construction and operational characteristics of the Proposed Development;
- **Chapter 4** – Provides an overview of the methodology and assessment methods adopted to undertake the EIA for the Proposed Development;
- **Chapter 5** – Summarises the legislative and policy context applicable to this EIA, of relevance to the Site and to the Proposed Development;
- **Chapters 6-15** – Comprise the technical assessment chapters; and
- **Chapter 16** – Provides an assessment of impact interactions.

Volume 2 – Technical Appendices

1.7.2 **Appendices 1.1 to 15.1** provide further contextual, baseline and assessment information to support the assessment of likely significant effects as set out within Volume 1 – Main Text. In accordance with the EIA Regulations, Volumes 1 and 2 of this EIA Report are supported by an **EIA Report Non-Technical Summary (NTS)** document.

2 Site and Surrounding Area

2.1 Overview

- 2.1.1 This chapter outlines the key environmental characteristics of the Site and the surrounding area which have informed the EIA Report. Details of the characteristics and sensitivities of the individual receptors which have been identified within relevant topic-specific Study Areas and used to assess likely environmental effects from the Proposed Development are then provided in **Subsection X.5** (Current Baseline Conditions) of **Chapters 7-15**. An overview of environmental designations can be found in the Environmental Constraints Plan at **Figure 2.1, Appendix 1.1**.

2.2 The Site

Site Location, Context and Access

- 2.2.1 The Site, shown on the indicative Site Location Plan (**Figure 1.1**) in **Appendix 1.1**, 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 application boundary is approximately 447 hectares (ha) in size.

Site Use and History

- 2.2.2 Cruachan 1 is a pumped storage hydro-electric facility and one of four large-scale pumped storage facilities in the UK. It currently operates with a nominal maximum output of 440 MW in full generation mode with an average annual generation output of circa 300 GWh/year. The 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; and
 - Single 6.8 m horseshoe shaped tailrace tunnel and inlet/outlet structure on the bank of Loch Awe.
- 2.2.3 The reservoir receives natural inflows from its 5.7 km² direct catchment and is supplemented by a series of indirect catchments that discharge at three principal locations around the shoreline of the upper reservoir.
- 2.2.4 Cruachan 1 opened in 1965. Its design by James Williamson responded to the challenge of developing a nationally significant power station in an area renowned for scenic beauty with two monumental and pioneering pieces of civil engineering. The turbine hall is concealed deep underground, minimising the visual impact of the scheme, whilst the buttressed dam, sitting back from the entrance to Coire Cruachan, appears almost a part of the landscape, the angle of the buttresses being close to that of the adjacent slopes. All the operational equipment is contained

within the dam to negate the need for towers and hence to provide a clean, sweeping line (Fleetwood 2009).

- 2.2.5 The concern for aesthetics was not restricted to the dam. The turbine hall includes a large mural by Elizabeth Faulkner, depicting a mythologised retelling of the history of the area and the coming of hydro power, and careful attention has been paid to the lighting and acoustic design and the overall appearance of the turbines and control equipment. The clean lines of the equipment in the turbine hall are juxtaposed with bare unfinished rock at its ends. The overall quality of the design reflects the pride in this nationally important project, which played and continues to play an important role in the UK's power supply and helped finance the supply of electricity to remote areas.
- 2.2.6 The design also deployed a highly innovative solution to one of the key brakes on the adoption of pumped hydro. This was the use of reversible turbines, which negated the need for separate pumping equipment which added greatly to the cost of such facilities at the time. In the context of the Cruachan scheme, this also allowed the pumping/generation element to be substantially more compact, reducing the volume of material that had to be excavated. The four 100MW Francis turbines originally installed were world firsts and their success paved the way for the construction of similar schemes elsewhere. These innovative design measures contribute substantively to the power station's historic interest and hence value at a national level.

Environmental Characteristics

- 2.2.7 The area is characterised as Scottish Highlands, with high mountains, steep rocky outcrops and narrow Lochs scattered within the valleys. The area is generally remote, with small villages scattered around the area.
- 2.2.8 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. (Environmental Constraints Plan, **Figure 2.1 in Appendix 1.1**)
- 2.2.9 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.
- 2.2.10 SEPA Flood Maps indicate that the area has a Low-High likelihood of fluvial flooding. Areas surrounding Loch Awe at the watercourse from Cruachan Reservoir down to the Loch are at High Likelihood, whereas the areas of high ground across the mountain are Low Likelihood. High Likelihood indicates a 10% annual probability of flooding, Medium Likelihood indicates a 0.5% annual probability of flooding, whilst Low Likelihood indicates a 0.1% annual probability.

2.3 The Surrounding Area

- 2.3.1 It is anticipated that there will be a requirement for off-site storage for the storage and transhipment of equipment being prepared for transporting to the Site (this will be at existing remote storage sites and is not part of the Site for the purposes of the EIA Report and is not shown on the Site Location Plan in **Figure 1.1**).
- 2.3.2 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 near Castle Farm will be accessed via the B8077.
- 2.3.3 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 Allt Cruachan Burn. A path around the reservoir is part of the route used by the public to access the summit of Ben Cruachan.

- 2.3.4 In relation to build heritage, the Category A-listed Ben Cruachan Hydro Electric Scheme Turbine Hall and the Category B-listed Ben Cruachan Hydro Electric Scheme Cruachan Dam, are within the site. Adjacent to the Cruachan 1 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 (designated in the Inventory of Gardens and Designed Landscapes) is located on the opposite side of Loch Awe, approximately 0.8km south east of the Site. Category B listed St. Conan's Kirk is located close to the junction of the Access Road to the dam and the A85, to the east of the Proposed Development. Kilchurn Castle Scheduled Monument (ruins of 15th Century Castle) is located approximately 700m south of the location proposed for the construction compound.

3 Proposed Development

3.1 Introduction

- 3.1.1 This chapter provides an overview of the key construction and operational characteristics of the Proposed Development.

3.2 Description of the Proposed Development

- 3.2.1 The principles of pumped storage hydro projects are relatively simple. Two reservoirs at different altitudes are required (in the case of the proposed development, the upper reservoir is Cruachan Reservoir, and the lower reservoir is Loch Awe. When the water is released from the upper reservoir to the lower reservoir, energy is created by the downflow, which is directed through an intake in the upper reservoir, down through a series of underground waterways, and into a powerhouse cavern where the water drives a turbine and generator to create electricity. The water is then released into the lower reservoir via an outlet structure. Water can also pump back to the upper reservoir from Loch Awe using the pump/turbines in reverse. Pumped storage hydropower provides a dynamic response and offers critical back-up during periods of excess demand. It can also operate in different modes to maintain grid stability.

- 3.2.2 The Proposed Development will comprise the following main elements:

- **Upper Control Works** – A new intake structure including tower, screens, gates, gate hoisting arrangement, etc. would be located within and adjacent to the Cruachan Reservoir to direct water into a new headrace tunnel and 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 powerhouse cavern;
- **Powerhouse Cavern** – 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 enable construction;
- **Substation** – The existing substation compound requires to be extended in order to install two new 275kV circuit breakers and associated disconnectors, with each circuit breaker to be T-connected onto the existing 275kV overhead lines at the Cable Sealing Ends to provide a suitable connection to the existing 275kV circuit that connects to Dalmally sub-station, located some 7km to the east;
- **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 275kV cable from the transformers to cable sealing ends/sub-station;
- **Tailrace Tunnel** – A concrete-lined low-pressure tunnel including a downstream surge shaft will conduct water between the pump-turbines and Loch Awe, the lower reservoir. Upstream of the lower control works, the tailrace will contain an underground gate chamber and gate shaft, housing the tailrace tunnel gate;
- **Lower Control Works** – Comprising screened inlet / outlet structure and stop logs, positioned in Loch Awe at the end of the tailrace tunnel below the water level. These structures would channel water in and out of Loch Awe;

- **Quayside** – Constructed on the northern shore of Loch Awe to facilitate the construction of the underground access tunnels, waterway system and powerhouse cavern, and the temporary storage of spoil prior to its off-site removal;
- The quayside would also house a canopy structure, covering the stockpiles of spoil. The canopy structure would be enclosed on 3 sides by brick / concrete walls and have a corrugated roof. The primary purpose of this structure would be to prevent silt from stockpiles mobilised by wind / rainfall from entering Loch Awe and the surrounding landscape. An indicative layout of the structure is shown on Figure 3.1 in Appendix 1.1 and a further description is provided in Chapter 7 – Hydrology;
- **Administration Building** – Above ground administration and workshop buildings required for day to day operational and maintenance tasks – located on the quayside;
- **Storage Buildings** – Above ground buildings required for storage and plant and equipment required for regular plant maintenance – located on the quayside;
- **Access Tunnels** – A main access tunnel of some 1450m in length would be constructed to provide access to the underground power plant, close to the shore of Loch Awe. This will cross connect to the existing Cruachan 1 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 generating 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 to be used for construction laydown and concrete batching plant 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 will be established to the North East of Lochawe village, with access from the junction of the A85 and B8077 (Stronmilchan Road) (as shown on Figure 1.1 in Appendix 1.1). Once construction work is complete, this compound would be removed, and the land restored. The total area required for this compound would be approximately 9ha; and
- A temporary diversion of the A85 using an existing car-parking layby at the Falls of Cruachan Station would be required in order to facilitate construction of the initial sections of the main access tunnel and lower control works. The A85 would revert to its current alignment once the bridge structure within the A85 has been complete (after a period of approximately 3 months). The re-alignment is shown on Figure 3.5.

3.3 Design Strategy and Evolution

3.3.1 This section outlines the design strategy informing the Proposed Development and sets out how the design has evolved from the maximum development parameters set out within the Design Basis Report (2020) and that were subject to EIA Scoping in 2021, and subsequent Gatecheck 1 (March 2022), to reach a final design freeze for the Section 36 submission.

Background

3.3.2 The facility is owned and operated by Drax Hydro Ltd (Drax), whose parent company acquired the facility in 2018. Prior to this, the station was owned by Iberdrola/ Scottish Power, who undertook initial feasibility studies in 2012, including creating a new dam. This proposal faced resistance by

several heritage groups. The study was revisited in 2016 when further financial and business case modelling was undertaken, resulting in a strategy that did not rely upon creation of a new dam, but that increased power output only.

- 3.3.3 Following the acquisition, Drax commissioned Stantec in 2019 to investigate options for increasing the storage capacity of the Cruachan Reservoir for pumped storage hydropower. This assessment led to a further study to provide conceptual design services for the infrastructure required to increase generating capacity at the facility from 440MW to 1040MW, by considering a new separate underground power station linked between the existing Cruachan reservoir and Loch Awe.
- 3.3.4 The Stantec Design Basis Report 2020 concluded that the most suitable location for new plant would be to the east of the existing power station. This outcome was based on the more favourable geology, the ability to develop infrastructure in Loch Awe, and a less complicated means of access for the new Main Access and Tailrace Tunnels to be routed under the A85 and Glasgow- Oban railway line.
- 3.3.5 In 2021, work commenced to progress the Section36 application on the basis of this design.

Design Evolution

- 3.3.6 The key elements of the proposed development are listed in Section 3.2 above, however the main principles of the design and minimising visual impact are based on the following:
- As with Cruachan 1, the Proposed Development will largely be subterranean, and constructed within Ben Cruachan mountain;
 - The interconnecting tunnels will be located in order to avoid loss of significant historic fabric in the listed 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 a separate application to ABC for Listed Building Consent;
 - Careful design and 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.
- 3.3.7 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 proposal. 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; and
- 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.

- 3.3.8 At time of preparing the Design Basis Report and subsequent June 2021 EIA Scoping Report, there were outstanding design amendments and decisions to be made. These design changes have now been made and have been included into the final design as hereby submitted and assessed (design freeze Feb. 2022). These can loosely be broken down by project elements (Upper Works, Lower Works, and Access Road) and are summarised below.

Upper Works

- 3.3.9 Scoping Position (June 2021) - Upper intake structure proposed within Cruachan Reservoir. This would have required extensive structures within the reservoir and meant a full drawdown of water within the reservoir, meaning that Cruachan 1 would have had an outage period of over 6 months.
- 3.3.10 Revised Design (Feb 2022) as submitted - The intake structure has been relocated to the east, with a significant proportion to be constructed on the eastern bank of the reservoir, on dry land. Although this will result in a need to remove rock from the hillside and the upper intake structure will potentially be more visible (with a larger above ground structure), the need for an underground gate shaft and extensive construction inside the reservoir will be avoided. This significantly de-risks this element of the Proposed Development by enabling construction to take place on the landward side of the reservoir within a dry works area meaning a less complex construction process. It will also reduce the overall drawdown period for the reservoir to around 4-5 weeks. This will allow the existing Cruachan 1 plant to have a significantly reduced outage period.
- 3.3.11 Several iterations of the revised upper intake structure have been developed and the final solution, represents a balance between engineering constructability and limiting visual impact as far as reasonably practicable. Further refinement of this part of the project is anticipated, which will further reduce the excavation of rock from the hillside. The current design details therefore represent a worst-case scenario.

Access Road From A85 to Dam

- 3.3.12 Scoping Position (June 2021) - Unsure of nature or extent of road widening and included the potential to use the access road for the removal of spoil.
- 3.3.13 Revised Design (Feb 2022) as submitted - The extent of road widening has now been clearly defined. Where possible (in the upper part of the access road close to the dam and the lower part of the access road close to St Conan's Road) the access road will be widened to 4.7m to allow 2 way traffic and HGV movements. However, the middle part of the access road is significantly constrained. Therefore, there will be a need for traffic management in this middle part of the access road. This

will consist of traffic lights and a one-way system with HGV queuing. Given the need for this traffic management, as well as feedback from the initial consultation events regarding concerns over vehicle movements on St. Conan's Road, The Applicant has committed to not removing any spoil or rock from the upper works via the Dam access road. Instead, all spoil generated by the upper works will be dropped down the main tunnel shaft and penstocks and removed via the main access tunnel at Loch Awe.

Lower Works (A85 Diversion)

- 3.3.14 Scoping Position (June 2021) – to construct the main access tunnel, the A85 would need to be diverted temporarily onto the quayside structure built in Loch Awe.
- 3.3.15 Revised Design (Feb 2022) as submitted - The A85 is now proposed to be temporarily diverted via an existing carparking layby (also on the A85) to the east of the Cruachan 1 plant at the Falls of Cruachan railway station. This will allow a simpler and safer diversion, a more straightforward construction process and reduce the likely duration of the diversion to a period of 3-4 months, reducing disruption to traffic on the A85. Alternative car parking facilities will also be provided at the Cruachan Visitor Centre whilst these temporary works are underway.

Lower Works (Location of Tunnels)

- 3.3.16 The Scoping Report presented an indicative layout with the Main Access Tunnel to the west and Tailrace tunnel to the east.
- 3.3.17 Revised Design (Feb 2022) as submitted - The position of the Main Access Tunnel and Tail Race Tunnel have been switched. This has the advantages of easier connection between Cruachan 1 and the Proposed Development; easier to construct the Main Access Tunnel at a lower level, thereby given more clearance under the railway line and A85; and also less potential for hydrological interference between the tailrace tunnels of Cruachan 1 and the Proposed Development. Operationally it would mean that any plant, machinery, and personnel accessing the Proposed Development would not have to travel across the tailrace structure, thereby minimising risk of damage.

Options for Spoil Removal

- 3.3.18 A number of options for spoil removal were explored in the Scoping Report.
- 3.3.19 Revised Design (Feb 2022) as submitted - It is intended that spoil will be dealt with primarily in three ways: Reused on site including for quay reclamation; where appropriate, provided to local quarry operator(s) for subsequent re-use in the local market, and/or taken off site for use in the wider construction market. However, for assessment purposes the EIA will assume a worst case that 100% of spoil is transported by road both to the east and west on A85.

Construction Compounds

- 3.3.20 A number of options were explored in the Scoping Report.
- 3.3.21 Approximately 9ha of compound areas will be required close to the Site. This will most likely be within an area of land to the east of the project, to the north of the B8077, close to Castles Farm.
- 3.3.22 The design of the scheme has evolved in nature from initial assessment and through the scoping assessment and as a result of ongoing technical review. These maximum development parameters represent a ceiling that the level of development would not exceed and are used as a baseline to identify the range of reasonable worst case likely environmental effects that have the potential to be considered significant in the context of the EIA Regulations.
- 3.3.23 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 final detailed design of the Proposed Development.

- 3.3.24 In the event that likely significant negative effects are identified, on the basis of the parameters assessed, the proposal can be further amended to avoid or minimise these as far as practicable within the parameters of the consent at the detailed design stage. This is referred to as 'embedded mitigation' i.e., mitigation which has been embedded within the project design and is outlined within each section of this assessment.
- 3.3.25 For each relevant element of the proposal, the detailed design phase will offer the opportunity to refine and finalise the design and to incorporate the associated mitigation, where necessary.

3.4 Alternatives

- 3.4.1 At the feasibility stage, the existing infrastructure at Cruachan 1 was identified as ideally suited for expansion and development of a new and complimentary pumped storage hydropower scheme. The initial design work (Design Basis Report, Stantec 2020) identified the potential to develop a project which would operate alongside the existing scheme and deliver an additional 600MW of electrical output in generation mode.
- 3.4.2 Expansion of Cruachan presents the opportunity to utilise much of the current infrastructure. There is no requirement for a new dam, new reservoir, or modifications to the existing reservoirs. This as a whole presents huge carbon savings in terms of materials requirements and energy used for construction. It also means that the existing dam, which is Category B listed, does not require any modifications to its structure. Additionally, there will also be minimal hydrological changes to Loch Awe with the operation of the new facility.
- 3.4.3 The development of the new facility will not be detrimental to the operation of the existing facility or its current efficiency rates.
- 3.4.4 As such, in this case there has been no consideration of alternative sites. The alternative is a no development scenario, and continued reliance upon the existing facility.

Summary

- 3.4.5 The evolution of the design of the proposal demonstrates several improvements that bring a range of benefits and further reduce the overall impact of the development.
- 3.4.6 Expansion of the existing facility presents an opportunity to utilise much of the current infrastructure including the existing dam and reservoir. The development of the new facility will not impede operation of the existing facility or impact upon its current efficiency and availability rate. The two projects together can help facilitate increased low carbon generation, whilst also providing grid balancing services.
- 3.4.7 This as a whole presents huge carbon savings in terms of materials requirements and energy used for construction. It also means that the existing dam, which is Category B listed, does not require any modifications to its structure. Additionally, there will also be minimal hydrological changes to Loch Awe with the operation of the new facility.

3.5 Maximum Design Parameters

- 3.5.1 The maximum development parameters within the Site have been assumed in preparing the EIA:
- Underground powerhouse (anticipated to consist of either 2, 3 or 4 generating units with an expected capacity of approximately 600MW;
 - The upper intake structure will be located on the south eastern reservoir rim, approximately 200 m upstream of the main dam axis, as shown on Figure 3.2. The upper intake structure would be 13m above ground level and approximately 5m wide (above ground level);
 - The lower inlet-outlet works will be located to the east of the existing Drax operational area on the Loch Awe foreshore - semi-circular structure with 30 m radius (in plan) and approximately 15m in height; and

- 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 510m x 30m.
- 3.5.2 The maximum development parameters have been used in this EIA 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.
- 3.5.3 An indicative schematic of the layout is shown in **Figures 3.3 and 3.4**.

3.6 Construction Process

- 3.6.1 The construction process will take place over an estimated 65-month programme to achieve commercial operation of the first generating unit. Surface work is expected to take place Monday - Saturday 7am - 7pm 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, and therefore a flexible and mutually beneficial approach would be sought from ABC.
- 3.6.2 Key construction activities will include the following:
- Mobilisation, site set up, camps, crushing, batching, concrete mixing plants, and haul roads;
 - Setup traffic management and temporary diversion of A85;
 - Construct bridge piles and pile cap to allow a bridging structure to be created in the main A85 carriageway;
 - Re-divert A85 back onto permanent alignment;
 - Construction of initial phase of working quayside platform on the foreshore of Loch Awe (requiring the import of approximately 21,700 tonnes of material);
 - Excavation of main access tunnel;
 - Using spoil generated from initial excavation of main access tunnel to create the remainder of the quayside area;
 - Continued construction of the main access and tunnel, tailrace gate chamber, ventilation tunnel, a tailrace surge shaft, and a tailrace tunnel under A85;
 - Construction of the intake structure within loch Awe to connect to the tailrace tunnel, including gates, screens and stoplogs;
 - 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 and adjacent to 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); and
 - Dry & Wet commissioning of generating units.
- 3.6.3 Mobilisation will be required at the upper reservoir area and as close as possible to the lower foreshore area. Access to the upper reservoir will be taken via the existing dam access road. This will require to be widened in places and additional passing places formed to accommodate construction traffic.
- 3.6.4 The first phase would be to establish site offices and laydown areas. It is likely that the main site offices would be located within the lower site compound (as described in 3.2.2 above), with smaller construction working areas at the lower works and upper works sites. After the establishment of the site office and laydown areas, access to the main construction areas would be established, with access roads completed prior to commencing the main construction and excavation phases to prevent excessive vehicle movements over unsuitable ground.
- 3.6.5 The main construction laydown area would be decommissioned on completion of the works and the land restored to a suitable standard before being returned to the owners at the end of the construction phase.
- 3.6.6 All underground works would use drill and blast methodology. It is assumed that suitable concrete aggregates and infill for the quayside can be produced from tunnel spoil on the site and therefore a proportion (approximately 0.45 million tonnes) can be re-used on site without the need for additional concrete import.

3.7 Operation

- 3.7.1 The Proposed Development will be designed to be operated 24/7, with periodic shutdowns for maintenance. It will have a design life of circa 100 years, after which the need for re-powering or decommissioning will be considered at that time. The Proposed Development is therefore treated as permanent in this EIA Report, and repowering and decommissioning are not considered in this EIA Report.

3.8 Spoil Management

- 3.8.1 A major component of the Proposed Development is the generation of spoil from excavation of new tunnels and the powerhouse cavern during construction.
- 3.8.2 The construction of the Proposed Development is anticipated to generate up to 2.30 million tonnes of excavated rock arisings over the 5.5 -year construction period (2024-mid of 2029). An average of 1,600 tonnes per day with peak generation of c. 3,000 tonnes per day. The excavation arisings will be in the form of rock 'chippings' ranging from boulders to fines produced by drill and blast techniques.
- 3.8.3 The spoil (approximate maximum volumes) will be generated through the following primary activities:
- Upper Intake: 332,254 tonnes;
 - Lower Works (surface excavations): 197,080 tonnes;
 - Lower Works (underground excavations including excavation of tunnels and power cavern): 1,602,280 tonnes; and
 - Lower Works (10% overbreak to ensure a worst case assessment): 160,291 tonnes
- 3.8.4 Approximately one fifth of this material (0.45Mt) will be re-used on Site. Therefore, there will be a residual volume of 1.85 Mt of spoil which will be removed off-site for use elsewhere.

- 3.8.5 The primary re-use for spoil on site will be the quayside structure in Loch Awe, which is shown on **Figure 3.1**. It has a depth of about 12 m and a length of 510m. It will require approximately 162,500 tonnes spoil, 21,700 tonnes which will be imported to form the initial tunnel access and 140,800 tonnes will be from excavation arisings.
- 3.8.6 Up to 15,000 tonnes spoil will be stored on the quayside structure at any one time, prior to removal by road. The material would be stored under a canopy structure, enclosed on three sides which would prevent runoff and wind-blown silt from entering Loch Awe. The structure is shown on **Figure 3.1**.
- 3.8.7 For assessment purposes this EIA Report has assumed a worst case that 100% of residual spoil is transported by road both to the east and west on the A85.
- 3.8.8 The potential likely significant effects of spoil movement have been covered in more detail throughout this EIA Report, and specifically in **Chapters 7 – Hydrology, 9 – Traffic, Transport and Access, Chapter 10, Noise and Vibration, and Chapter 14 – Waste Management**.

3.9 Risk Management

- 3.9.1 The EIA Regulations, under Schedule 4, part 8 require an EIA Report to provide:
- 3.9.2 *“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”.*
- 3.9.3 Taking account of the location and characteristics of the Proposed Development, and the likelihood of significant environmental effects outlined in this EIA 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;
 - Impacts that affect 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.
- 3.9.4 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.
- 3.9.5 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.
- 3.9.6 Health and safety are a key consideration in the construction sector and will be managed in accordance with legal requirements and best practice.
- 3.9.7 In terms of the potential effects identified above, these will be mitigated as follows:
- Potential accidents and pollution incidents during the construction phase – This will be mitigated through the application of the Construction Design and Management Regulations 2015 (‘CDM’), construction health and safety practices (e.g., Health and Safety at Work Act 1974) and standard best practice construction working methods which would be common on any large construction projects in the UK;

- In addition, procedures for pollution incidents and spills are outlined in the draft CEMP which is included in Appendix 3.1 of the EIA Report;
- Operational incidents would be covered by an operational Environmental Management Plan, which would accord with the overall principles of ISO14001 and wider environmental management plans used by Drax;
- 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;
- Impacts that affect the integrity of the existing structures at Cruachan 1 – Although the tunnels will be inter-connected, risks with this part of the design would be mitigated as part of the mitigation against structural failure of the Proposed Development. No structural work, enhancements or modifications are proposed to the operation of Cruachan 1, including the dam; and
- Pollution incidents will be mitigated through standard best practice construction methods outlined in a CEMP, as described in Chapter 7 Ground Conditions and Chapter 8 Hydrology of this EIA Report.

4 Assessment Methodology

4.1 Introduction

- 4.1.1 This Chapter describes the process by which the EIA Report was carried out. It includes a discussion of the relevant EIA Regulations, the EIA process, consultations, and the assessment method adopted.

4.2 Overview of EIA

- 4.2.1 EIA is a process which aims to identify a project's likely significant environmental effects, identify mitigation measures to reduce the level of, or avoid those effects, and assess the residual significance of predicted environmental effects taking account of all proposed mitigation and enhancement measures. This process helps to ensure that predicted significant effects, and the scope for reducing them, are properly understood by the public and relevant consenting authorities before determining an application for a development proposal.
- 4.2.2 An important tenet of EIA is that it is a process culminating in the submission, consultation, and examination of an EIA report as part of the consenting process. EIA therefore has a number of key characteristics, it is:
- **Systematic** – Comprising a sequence of tasks defined both by regulation and best practice;
 - **Analytical** – Requiring the application of specialist knowledge and skills from environmental sciences and policy;
 - **Impartial** – It's objectives being to inform decision making and improve the environmental performance of projects rather than being to promote them;
 - **Consultative** – With provision being made for obtaining information and feedback from interested stakeholders and relevant consultees; and
 - **Iterative** – Allowing opportunities for environmental concerns to be addressed during the planning and design of a project.
- 4.2.3 Typically, an iterative design process occurs in response to environmental constraints (identified during the EIA process) and other design objectives, taking account of project viability considerations and feedback from relevant consultees. This often results in a development proposal incorporating mitigation measures or design features to avoid, reduce or compensate for potential adverse effects, referred to as embedded mitigation. Additional mitigation is then identified where necessary to reduce or avoid residual significant environmental effects.

4.3 Statutory Provisions

- 4.3.1 The Section 36 Application for the Proposed Development will be determined under the provisions of the Electricity Act 1989. Corresponding statutory EIA requirements which this EIA Report has been prepared in accordance with are set out within: The Electricity Works (Scotland) (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations').

EIA Screening

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

- 4.3.3 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 the Proposed Development is likely to have significant effects on the environment, and that an environmental impact assessment should therefore be carried out. Pursuant to Regulation 6(2)(b) of the EIA Regulations, by virtue of the submission of this EIA Report, the Proposed Development is categorised as an EIA development.
- 4.3.4 This EIA Report therefore formally accompanies a Section 36 Application submitted under the provisions of the Electricity Act 1989 to the Scottish Ministers through the Energy Consents Unit (ECU).

EIA Scoping

- 4.3.5 In accordance with the EIA Regulations, this EIA Report is based on the EIA Scoping Opinion and includes the information which the Applicant considers to be reasonably required for reaching a conclusion on the significant effects of the Proposed Development on the environment, taking into account current knowledge and methods of assessment.

4.4 Consultation

- 4.4.1 A programme of engagement with relevant stakeholders has been undertaken to inform the design of the Proposed Development and the impact assessments reported in this EIA Report. This included a formal EIA scoping exercise, and consultation with the following consultees to discuss and agree the details of the Proposed Development and the scope of assessment:

- Argyll and Bute Council;
- Argyll Fisheries Trust;
- Argyll District Salmon Fishery Board;
- Avich and Kilchrenan Community Council;
- Connel Community Council;
- Crown Estate Scotland;
- Fisheries Management Scotland;
- Glenorchy and Innishail Community Council;
- Historic Environment Scotland;
- Inverary Community Council;
- John Muir Trust;
- Marine Scotland;
- Mountaineering Scotland;
- National Grid;
- NatureScot;
- Network Rail;
- Oban Community Council;

- RSPB Scotland;
 - Scottish Forestry;
 - Scottish Water;
 - ScotWays;
 - Scottish Wildlife Trust;
 - Scottish Wild Land Group;
 - SEPA;
 - SSE;
 - Taynuilt Community Council;
 - Transport Scotland; and
 - Visit Scotland.
- 4.4.2 Details of how stakeholder consultation activities have informed individual technical assessments are provided where relevant in **Subsection X.4 – Methodology** of **Chapters 6 – 15**
- 4.4.3 The following public consultation events have taken place:
- July 2021: Online public consultation with virtual exhibition room and electronic feedback form;
 - November and December 2021: In person events in Dalmally and Taynuilt, with approximately 110 in person attendees, and online public consultation with virtual exhibition room and electronic feedback form; and
 - March 2022: In person and online events in Dalmally and Taynuilt. Over the course of the two days, a total of 86 people attended.

4.5 Information Requirements and Guidance

Information Requirements

- 4.5.1 Regulation 5 of the EIA Regulations prescribe the information which must be included within an EIA Report, including:
- a) *“a description of the development comprising information on the site, design, size and other relevant features of the development.*
 - b) *a description of the likely significant effects of the development on the environment;*
 - c) *a description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
 - d) *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;*

- e) *a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and*
- f) *any other information specified in schedule 4 relevant to the specific characteristics of the development and to the environmental features likely to be affected”.*

4.5.2 A description of the Proposed Development is presented in **Chapter 3 – The Proposed Development**;

- The assessment methodologies deployed in undertaking this EIA (refer to the technical assessment methodologies provided in **Subsection X.4** within **Chapters 6-15**);
- Likely significant effects from the Proposed Development (refer to the assessments presented in **Subsection X.9 – Assessment of Likely Effects**, **Subsection X.11 – Residual Effects** and **Subsection X.13 – Cumulative Assessment** within the technical assessments presented in **Chapters 6-15**);
- Mitigation measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment (refer to **Section 3.8 – Proposed Mitigation and Enhancement**, **Subsection X.7 – Embedded Mitigation** and **Subsection X.10 – Further Mitigation and Enhancement** within the technical assessments presented in **Chapters 6-15**, and **Appendix 4.1 Schedule of Mitigation and Monitoring**);
- Any proposed monitoring arrangements in relation to any predicted significant adverse effects (refer to **Appendix 4.1 Schedule of Mitigation and Monitoring**);
- A non-technical summary of all of the above elements (refer to the standalone **EIA Report Non-Technical Summary**); and
- A reference list detailing the sources used in the assessments (refer to the reference lists provided at the end of each technical assessment presented in **Chapters 6-15**).

EIA Guidance

4.5.3 A range of reference material and guidance has been drawn upon in developing the EIA methodology adopted for the Proposed Development. Over and above the EIA Regulations, this guidance includes:

- IEMA (2015) IEMA Environmental Impact Assessment Guide to Shaping Quality Development;
- IEMA (2016) IEMA Environmental Impact Assessment Guide to Delivering Quality Development;
- Morris, P and Therivel, R. (2009) Methods of Environmental Impact Assessment; and
- Institute of Environmental Management and Assessment (2004). Guidelines for Environmental Impact Assessment (IEMA).

4.5.4 Topic specific guidance used in the preparation of the individual technical assessments presented in this EIA Report is noted where relevant in **Chapters 6-15**.

4.6 The EIA Process

4.6.1 The EIA Regulations emphasise that EIA is a process rather than output and involves the following stages:

- Assessment work, culminating in the preparation of an EIA Report in accordance with information requirements prescribed by the EIA Regulations;

- Public consultation on the application for consent, the EIA Report and any other relevant information;
 - Examination by the Scottish Ministers of the information presented in the EIA Report and other relevant environmental information including that received through the consultation;
 - The Scottish Ministers coming to a reasoned conclusion on the residual significant effects of the Proposed Development on the environment; and
 - The integration of the Scottish Ministers' reasoned conclusion into their decision notice for the application.
- 4.6.2 The EIA process therefore encompasses all stages of considering environmental issues associated with projects, from initial identification of relevant issues through to assessing the residual significant of predicted environmental effects and securing required mitigation. This ensures that all required mitigation is subsequently carried out in the implementation of projects. EIA therefore directly influences the design, construction, operation and, where relevant, decommissioning, of proposed projects, as well as providing information to decision makers.

4.7 EIA Methodology

Overview

- 4.7.1 Following the identification of the scope of the EIA Report in accordance with the EIA Scoping Opinion, each environmental topic has been subject to investigation and assessment to identify and evaluate likely significant environment effects. The survey and assessment methodologies deployed were based on recognised best practice and guidance relevant to each topic area, details of which are provided within relevant technical assessment chapters (**Chapters 6-15**). In general terms, the technical assessments undertaken for each topic area and EIA Report chapter include:
- Collation of existing baseline information regarding relevant aspects of the environment, together with surveys and fieldwork, as required, to fill any knowledge gaps or update historical information;
 - Use of the collated baseline to identify relevant trends, describe the baseline scenario and predict the evolution of this baseline scenario in the absence of the Proposed Development;
 - Consultation with relevant consultees in relation to the EIA scope and emerging findings;
 - Consideration of the potential effects of the Proposed Development on the baseline scenario (and its predicted evolution), followed by the identification of design changes, mitigation measures to avoid or reduce predicted significant adverse effects, and possible enhancement measures to improve environmental outcomes;
 - Assessment of the significance of predicted residual effects from the Proposed Development and consideration of any monitoring required in relation to predicted residual significant adverse effects;
 - Production of EIA Report chapter; and
 - Input into a consolidated schedule of required mitigation measures and proposed monitoring arrangements for the Proposed Development.
- 4.7.2 The detailed methodology adopted to undertake each individual technical assessment is presented in **Subsection X.4 – Methodology** within **Chapters 6-15**.

Key Methodological Assumptions

- 4.7.3 The following key assumptions have been used to ensure that the EIA presented in this EIA Report has undertaken a proportionate assessment of the level and significance of likely effects from the Proposed Development:
- The EIA including the preparation of this EIA Report has been undertaken in full accordance with the applicable EIA Regulations;
 - The Proposed Development has been assessed in relation to a realistic worst case (as described in each technical chapter) the description of the Proposed Development (**Chapter 3**) and Figures included in **Appendix 1.1**;
 - Relevant approved developments which have the potential to interact with the construction and/or operation of the Proposed Development are identified in **Section 4.9** Only these approved developments have been considered within the assessment of cumulative effects presented in **Section X.11 – Cumulative Effects** in **Chapters 6-15**. The assessment assumed that the identified relevant approved developments documents will be built out as set out in the planning applications, or other development consent applications, planning permissions and associated documents available in the public domain for these developments;
 - In accordance with the EIA Regulations, an assessment of likely effects (including cumulative effects) from the Proposed Development has been carried out to identify, describe and assess any significant effects. As such, the assessment only considers possible effects which have some potential to be significant within the context of the EIA Regulations. Other possible effects which have no potential to be significant in EIA terms have been scoped out of this EIA; and
 - Suitable conditions will be attached to any deemed planning permission granted for the Proposed Development to secure relevant mitigation measures proposed in this EIA Report (refer to **Appendix 4.1 – Schedule of Mitigation and Monitoring**).

Establishing Baseline Conditions

Current Baseline

- 4.7.4 A range of site surveys and data collection exercises have been used to identify current environmental conditions at the Site and the surrounding area. The surveys undertaken are reported in each of the topic chapters. Data has also been collated regarding relevant approved cumulative developments which need to be considered in this EIA Report.
- 4.7.5 The EIA Report has been based on technical surveys and assessments, the reporting of which is frequently too detailed and lengthy for incorporation into Volume 1 of this EIA Report (e.g. ecology surveys). In such instances the technical survey and assessment reports are provided in full in Volume 2 – Technical Appendices, with a relevant summary and the reference for the full survey or assessment provided in Volume 1. The geographical scope of these appended surveys and assessments has been based on the likelihood for significant effects in accordance with the EIA Scoping Opinion.

Types of Effect

- 4.7.6 Schedule 4 of the EIA Regulations contains more detail on the information to be included in an EIA Report. It requires consideration of a variety of types of effect, namely direct / indirect, secondary, cumulative, positive / negative, short / medium / long-term, and permanent / temporary. All identified effects need to be considered in terms of how they are predicted to arise, whether they are positive (beneficial) or negative (adverse), their temporal occurrence (i.e. when they are

predicted to occur) and their duration once the effect does occur. This includes consideration of effects during both the construction and operational phases of the Proposed Development.

- 4.7.7 The EIA Report must also consider the potential for effects identified through one topic specific technical assessment to generate secondary or otherwise related effects of relevance to other environmental topics. This is included in **Chapter 16 – Impact Interactions**
- 4.7.8 The spatial scope for the identification of likely significant environmental effect varies between environmental topic areas and a relevant Study Area(s) is therefore defined within each technical assessment EIA Report chapter (**Chapters 6-15**). In general terms, this spatial scope depends on the location of relevant receptors and the existence of known pathways for effects from the Proposed Development to the identified receptors.

Uncertainty

- 4.7.9 The prediction of future effects inevitably involves a degree of uncertainty, in particular due to the reliance upon a future baseline scenario in this EIA Report. Where necessary, the technical assessments presented in **Chapters 6-15** describe the principal factors giving rise to uncertainty in the prediction of effects and the degree of the uncertainty.
- 4.7.10 Confidence in the assessments presented in the EIA Report can be derived from the application of robust topic specific assessment methodologies, which have been developed and implemented in accordance with relevant technical guidance and standards (e.g., the Guidelines for Ecological Impact Assessment in the UK and British Standard Institute publications). Where the success of mitigation is uncertain, the extent of this uncertainty is identified alongside this measure.

Mitigation and Enhancement Measures

- 4.7.11 The technical assessments presented in **Chapters 6-15** of this EIA Report firstly identify predicted effects from the Proposed Development taking into account embedded mitigation measures, before identifying any further mitigation and then reporting predicted residual effects.
- 4.7.12 The EIA Regulations require an EIA Report to include a description of “measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment”. **Subsection X.10** within each technical assessment presented in **Chapters 6-15** therefore considers the need for further mitigation measures (beyond embedded mitigation features) to avoid significant adverse effects otherwise predicted to occur. Consideration is also given to further mitigation measures in order to reduce predicted ‘not significant’ adverse effects and to recommend enhancement measures to improve the environmental performance of the Proposed Development, including in respect of predicted beneficial environmental effects.
- 4.7.13 A schedule of all proposed mitigation measures is provided in **Appendix 4.1 Schedule of Mitigation and Monitoring**. This schedule is provided to assist ABC as the relevant authority in securing all required mitigation measures and any proposed monitoring / discharging of conditions within the decision notice of any consent granted for the Proposed Development.

The Significance of Likely Residual Effects

- 4.7.14 Residual effects are the environmental effects that will remain after the incorporation of both embedded and additional mitigation measures. It is these residual effects which should be considered when assessing the significance of effects of the Proposed Development, rather than the unmitigated effects as unmitigated effects will not occur. For example, whilst the Proposed Development may affect protected species, appropriate mitigation has been identified to ensure that significant effects on such species do not occur.
- 4.7.15 To provide an objective assessment of residual effects, their significance has been determined and is identified in the EIA Report, as detailed below. This allows for comparison of effects between topics, strengthens the assessment of impact interactions and allows decision makers to more easily examine and make a reasoned conclusion of the significant environment effects of a project.

- 4.7.16 The two principal criteria for determining significance of an environmental effect are the magnitude of change and the sensitivity of an identified receptor to this change. The likelihood of the change occurring is also considered, as a constituent factor affecting the predicted magnitude of change.
- 4.7.17 The approach to assigning significance to predicted environmental effects is not in itself detailed within the EIA Regulations, meaning that it is necessary to develop effect significance thresholds to underpin the assessments reported in this EIA Report. These thresholds are defined on a topic specific basis within **Chapters 6-15**, taking account of relevant regulations, guidance, standards, the advice and views of consultees, and expert judgement. **Subsection X.4 – Methodology** within each technical assessment chapter explains the topic specific methodology adopted to identify the level and associated significance of predicted effects with reference to relevant thresholds. Where relevant, this is based on the factors identified above and the generic criteria set out in **Table 4.1** below.

Table 4.1: Generic Significance Criteria

	Level of Effect	Criteria
Significant	Substantial	These 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 district scale site or feature may also enter this category.
	Major	These effects are likely to be important considerations at a local or district scale and may become key factors in the decision-making process.
	Moderate	These effects, while important at a local scale, are not anticipated to be key decision-making issues.
Not Significant	Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process.
	Negligible	Either no effect or an effect which is beneath the level of perception, with normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision-maker.

- 4.7.18 Effects that are described as Substantial, Major, or Moderate are determined to be significant, whereas effects that are described as Minor or Negligible are determined to be not significant, for the purposes of the EIA Regulations.

4.8 Impact Interactions

- 4.8.1 **Chapter 16 – Impact Interactions** provides the assessment of 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 reported within the technical assessment EIA Report chapters (i.e., **Chapters 6-15**). Details of the approach to identifying and assessing impact interactions is provided within **Chapter 16**.

4.9 Cumulative Development

- 4.9.1 The EIA Regulations require likely significant cumulative effects from a development proposal in combination with other existing or approved documents to be described within an EIA Report. An

overview of relevant existing, approved, and proposed documents which have been considered in this EIA is provided below.

Existing Development

- 4.9.2 Existing development is considered as an existing receptor and/or impact source in the baseline in relation to the Proposed Development where relevant within each technical assessment presented in **Chapters 6 -15**.

Approved Development

- 4.9.3 No approved schemes under the Town and Country Planning (Scotland) Act 1997 or S.36 of the Electricity Act 1989 have been identified which are of significant size or scale that would likely to lead to potential cumulative effects in combination with the Proposed Development. This was discussed and agreed with ABC as part of pre-application discussions.

Other Development Considered

- 4.9.4 Although not yet existing or approved, the Applicant has been made aware of a proposed 1.5GW pumped storage hydro scheme at Ballimeanoch, approximately 12km south of the Proposed Development. At the time of preparing this EIA Report, the Scoping Report for the Ballimeanoch scheme has been lodged with the ECU.
- 4.9.5 Given the status of the Ballimeanoch scheme (at Scoping stage) and the fact that Proposed Development is more advanced in planning terms, there is no statutory requirement for the Applicant to consider the Ballimeanoch scheme as part of the cumulative impact assessment for the Proposed Development. Despite this, it is considered good practice to consider all publicly available information, given the nature of the project.
- 4.9.6 Based on a review of information in the Ballimeanoch Scoping Report, as well as the distance from the Proposed Development, there is likely to be very limited potential for cumulative effects between the two projects, this is based on the following key factors:
- Different construction timescales, so that whilst there is potential for overlap of the construction periods, it is very unlikely that both projects would be undertaking the same construction activities at the same time;
 - Different transport routes proposed for construction vehicle movements for both projects, meaning limited potential interaction for traffic and transport;
 - Projects located over 12km away on opposite sides of Loch Awe, meaning limited potential for cumulative impacts on habitats or species, particularly given both projects would be subject to their own specific mitigation measures; and
 - Different noise and heritage receptors.
- 4.9.7 Despite the above, it is recognised that there may be potential cumulative impacts on water levels within Loch Awe, wider landscape and visual receptors, and socioeconomics. Further assessment of these potential impacts is therefore described in Chapters 7, 11 and 13, respectively.

5 Planning Policy

5.1 Introduction

- 5.1.1 This chapter provides a summary of the key planning legislation, policy, and other material considerations as they are relevant to the determination of this application and ensuring that the likely environmental effects of the Proposed Development are properly assessed and understood. The chapter does not provide detailed policy analysis or an assessment of the Proposed Development against the development plan or other material considerations. This analysis is provided in a separate supporting Planning Statement accompanying the S36 application.

5.2 Renewable Energy and Climate Change Framework

Introduction

- 5.2.1 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 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 on intermittent renewable technologies (such as wind and solar) and can avoid the costly reinforcement of the transmission network. With the ability to provide long duration energy storage and utilise renewable water sources, pumped storage hydro schemes effectively act as large water batteries and provide extremely quick back-up during periods of excess demand.

International and European Policy Context

- 5.2.2 Statutory and policy requirements at UK and Scottish level to mitigate climate change and increase renewable energy production are informed by higher level international agreements as outlined below.
- 5.2.3 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 the objectives.
- 5.2.4 The 26th UN Climate Change Conference of the Parties (COP26) was hosted in Glasgow on 31st October – 13th November 2021. The COP26 summit brought nations together to outline how they will achieve the targets of the Paris Agreement and the UN Framework Convention on Climate Change. The COP26 agreement allocates over \$20 billion to facilitate the transition from coal to clean renewable energy.
- 5.2.5 The COP26 agreement represents the strongest ever commitment to the development and use of renewable, green energies, with approximately 90% of world GDP and around 90% of global emissions now covered by net zero commitments.

UK Legislative and Policy Context

- 5.2.6 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 UK's net CO₂ account – covering all six Kyoto Protocol Green House Gases (GHGs) 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.
- 5.2.7 A range of policy documents set out the UK Government's binding commitments to cut carbon emissions through the deployment of renewable energy, including the Net Zero Strategy: Build Back Greener (2021), 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).
- 5.2.8 In April 2022, the UK Government published the British Energy Security Strategy. The policy paper is a strategy to secure, clean and affordable British energy for the long term. The Strategy recognises that the British energy system requires power that can be relied on "when the sun is not shining, or the wind is not blowing". Critical to this is flexible and efficient energy system and the Strategy encourages all forms of flexibility with sufficient large-scale, long-duration energy storage.

Scottish Legislative and Policy Context

- 5.2.9 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.
- 5.2.10 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.
- 5.2.11 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 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.
- 5.2.12 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.

5.3 National Planning Policy

National Planning Framework 3 (NPF3) (2014)

- 5.3.1 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.
- 5.3.2 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 Cruachan 1 is noted.
- 5.3.3 Section 6, 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.

Draft National Planning Framework 4 (NPF 4) (2021)

- 5.3.4 In November 2021, the Scottish Government published the draft NPF4 which sets out an updated long term national spatial strategy. Draft NPF4 contains five *Action Areas for Scotland 2045* with the *Northern revitalisation* area of relevance to Cruachan. Action 6 of the *Northern revitalisation* section is to *Stimulate green prosperity* which sets out that 'this area makes an important contribution to our climate change targets by supporting renewable energy generation'. Cruachan is identified as a national development, within draft NPF4 noting that 'pumped hydroelectric storage at Cruachan can support the energy network'.
- 5.3.5 Part 2 of draft NPF4 sets out national developments which are explained as 'significant developments of national importance that will help to deliver our spatial strategy'. There are eighteen national developments proposed with Pumped Hydro Storage included as national development number 9, which 'supports additional capacity at existing sites as well as new sites. Cruachan is described as a 'nationally important example of a pumped storage facility with significant potential for enhanced capacity that could create significant jobs in a rural location'.
- 5.3.6 Draft NPF4 supports pumped storage hydro across all of Scotland but emphasises an initial focus on Cruachan. It recognises that pumped storage hydro will support the transition to a net zero economy through its ability to optimise electricity generated from renewables by storing and releasing energy when required.
- 5.3.7 Whilst only available as a consultation draft at the time of writing, draft NPF4 provides a greater focus on responding to the climate emergency than previous iterations. Draft Policy 2 notes that significant weight should be given to the Global Climate Emergency when considering development proposals.

Scottish Planning Policy 2014

- 5.3.8 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.
- 5.3.9 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."
- 5.3.10 The SPP's Principal Policy on Sustainability (paragraphs 24 -35) includes a presumption in favour of development that contributes to sustainable development, which relates to the identification of the need for and acceptability of the development. To implement this policy presumption, the SPP (paragraph 29) identifies 13 sustainable development principles which should guide planning policies and decisions. The principles relevant to the Proposed Development are:
- a) "giving due weight to net economic benefit;
 - b) Making efficient use of existing capacities of land, buildings and infrastructure;
 - c) Supporting climate change mitigation and adaptation including taking account of flood risk;
 - d) Having regard to the principles for sustainable land use set out in the Land Use Strategy;
 - e) Protecting, enhancing and promoting access to cultural heritage, including the historic environment;
 - f) Protecting, enhancing and promoting access to natural heritage, including green infrastructure, landscape and the wider environment;
 - g) Reducing waste, facilitating its management, and promoting resource recovery; and
 - h) Avoiding over development, protecting the amenity of new and existing development and considering the implications of development for water, air and soil quality".
- 5.3.11 Paragraph 154 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."
- 5.3.12 Subject specific provisions within the SPP of relevance to the Proposed Development are outlined in **Table 5.1** below.

Table 5.1: Relevant Subject Policies within SPP (2014)

Subject Policy	Relevance
Promoting Rural Development (Paragraphs 74 – 91)	This section identifies planning principles related to sustainable rural development including “encourage rural development that supports prosperous and sustainable communities and business whilst protecting and enhancing environmental quality”
Supporting Business and Employment (Paragraphs 92 – 108)	This section highlights the need to “ <i>give due weight to net economic benefit of Proposed Development</i> ” (paragraph 93). SPP identifies energy as key sector for Scotland.
Valuing the Historic Environment (Paragraphs 135 – 151)	This section states that planning should support promote the care and protection of the designated and non-designated historic environment and should take account of all aspects of the historic environment. Detailed policy provisions are set out in order to protect and enhance different types of historical assets.
Listed Buildings (Paragraph 141)	This paragraph states that “where planning permission and listed building consent are sought for development to, or affecting, a listed building, special regard must be given to the importance of preserving and enhancing the building, its setting and any features of special architectural or historic interest”.
Valuing the Natural Environment (Paragraphs 193 - 233)	<p>This section identifies a number of planning principles related to natural heritage protection and ecological resilience.</p> <p>Principles (paragraph 194) of relevance to the Proposed Development include that planning should: “<i>Facilitate positive change while maintaining and enhancing distinctive landscape character; conserve and enhance protected sites and species... promote protection and improvement of the water environment...in a sustainable and co-ordinated way</i>”.</p>
Protecting Designated Sites (Paragraph 196)	This paragraph requires designated areas and sites to be identified and appropriately protected through development plans, without the use of buffer zones. It also states that “ <i>the level of protect given to local designations should not be as high as that given to national designations</i> ”.
Development Management Decisions (Paragraphs 202 - 203)	This section states that planning decisions “ <i>should take account of potential effects on landscapes and the natural and water environment, including cumulative effects</i> ” (paragraph 202). It further states that “ <i>planning permission should be refused where the nature or scale of Proposed Development would have an unacceptable impact on the natural</i>

Subject Policy	Relevance
	<i>environment</i> ” (paragraph 203). The same paragraph notes that whilst effects on statutorily protected sites will be an important consideration, this “does not impose an automatic prohibition on development”.
National Designations and Protected Species (Paragraphs 212 - 214)	Reflecting legislative requirements, these paragraphs identify criteria to safeguard nationally designated sites and protected species from adverse effects.
Maximising the Benefits of Green Infrastructure (Paragraphs 219 - 233)	This section identifies a number of planning principles related to the protection, enhancement and promotion of green infrastructure including core paths and other important routes.
Promoting Sustainable Transport and Active Travel (Paragraphs 269-291)	This section includes a requirement for development proposals to consider traffic impacts including cumulative effects (paragraph 286).

- 5.3.13 Where relevant, the scope of this EIA Report will allow for these considerations to be identified and assessed.

5.4 National Planning Policy Advice and Guidance

Historic Environment Policy for Scotland

- 5.4.1 The Historic Environment Policy for Scotland (HEPS) is a policy statement which directs decision-making that affects the historic environment. HEPS is a material consideration for proposals that might affect the historic environment and in relation to listed building consent and scheduled monument consent. HEPS sits alongside SPP and supports national policies for land use matters and decisions. HEPS sets out that the historic environment needs to be managed in a sustainable way and therefore good decision-making should take into account current circumstances with long term aspirations.

Scotland’s National Strategy for Economic Transformation 2022

- 5.4.2 The priorities for Scotland’s economy and the actions needed to deliver them are set out in Scotland’s National Strategy for Economic Transformation. The Strategy drives a green economic recovery to meet the current climate and nature targets and respecting environmental limits. The Strategy Vision for the future economy is for Scotland to be recognised as an “*international benchmark for how an economy can transform itself, de-carbonise and rebuild natural capital whilst creating more well-paid and secure jobs and developing new markets based on renewable sources of energy and low carbon technology.*”
- 5.4.3 National planning policy is supported by numerous Scottish Government Planning Circulars, Planning Advice Notes (PANs), Advice Sheets, Ministerial/Chief Planner Letters to Planning Authorities, as well as guidance documents prepared by guidance documents prepared by key agencies of the Scottish Government.
- 5.4.4 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); and
- Energy Storage: Planning Advice (2013).

5.4.5 The following guidance and advice documents developed by the Scottish Government's key agencies are considered to be of relevance to the Proposed Development and where appropriate have been taken into account in the undertaking of this EIA:

- 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); and
- Hydroelectric Schemes and the Natural Heritage (SNH now NatureScot, 2015).

5.5 Development Plan

Overview

5.5.1 The Argyll and Bute Local Development Plan (LDP) was adopted in March 2015 and sets out the overarching vision, spatial strategy, and general planning policies to guide development.

5.5.2 The EIA Report sets out to identify and assess any likely effects on the environment. Policy relevant to assessing potential impacts are as follows:

Table 5.2: Relevant LDP Policies

LDP Policy	Summary
STRAT 1 – Sustainable Development	The policy seeks to examine both the short-term consequences and long term impacts and benefits of development proposals. It is concerned with economic, social and environmental opportunities and contains a set of development principles which will influence the Council's decision-making on development proposals. Those principles are:

LDP Policy	Summary
	<ul style="list-style-type: none"> Maximise the opportunity for local community benefit; Make efficient use of vacant and/or derelict land including appropriate buildings; Support existing communities and maximise the use of existing infrastructure and services; Maximise the opportunities for sustainable forms of design including minimising waste, reducing our carbon footprint and increasing energy efficiency; Avoid the use of locally important and good agricultural land; Utilise public transport corridors and active travel networks; Avoid the loss of important recreational and amenity open space; Conserve and enhance the natural and built environment and avoid significant adverse impacts on biodiversity, natural and built environment and avoid significant adverse impacts; Respect the landscape character of an area and the setting and character of settlements; Avoid places with significant risk of flooding, tidal inundation, coastal erosion, or ground instability; and Avoid having significant adverse impacts on land, air and water environment.
LDP 3 – Supporting the Protection, Conservation and Enhancement of our Environment	<p>This policy seeks to maintain and enhance the quality of the environment through protection, conservation, and enhancement. The aim of the policy is to allow sustainable forms of development to take place and protect against inappropriate development.</p> <p>A development proposal will not be supported when it:</p> <ul style="list-style-type: none"> Does not protect, conserve or where possible enhance biodiversity, geodiversity, soils and peat, woodland, green networks, wild land, water environment and the marine environment; Does not protect, conserve or where possible enhance; The established character and local distinctiveness of the landscape and seascape in terms of its location scale, form and design; Does not protect, conserve or where possible enhance the established character of the built environment in terms of location, scale, form and design; Has not been ascertained that it will avoid adverse effects, including cumulative effects, on the special qualities or integrity of international or nationally designated natural and built environment sites; and Has significant adverse effects, including cumulative effects, on the special qualities or integrity of locally designated natural and built environment sites.
LDP 6 – Supporting the Sustainable Growth of Renewables	<p>The Council will support renewable energy developments when they are consistent with the principles of sustainable development and where it is demonstrated that there would be no unacceptable significant adverse effect, whether cumulative or individual, including on local communities, natural and historic environments, landscape character and visual amenity, and that the proposals would be compatible with surrounding land uses.</p>
LDP 9 – Development Setting, Layout and Design	<p>This policy aims to achieve high quality developments that respect the local environment and create a sense of place. The policy acknowledges that good design has many benefits, including, releasing development capacity in sensitive areas and positive community impacts such as increased safety and fewer environmental impacts.</p> <p>The policy requires that developments are executed with a high standard of appropriate design in accordance with the following criteria:</p>

LDP Policy	Summary
	<p>Development Setting</p> <ul style="list-style-type: none"> Development shall be sited and positioned so as to pay regard to the context within which it is located. <p>Development Layout and Density</p> <ul style="list-style-type: none"> Development layout and density shall effectively integrate with the urban, suburban or countryside setting of the development. Layouts shall be adapted, as appropriate, to take into account the location or sensitivity of the area. Developments with poor quality layouts or densities including over development and overshadowing of sites shall be resisted. <p>Development Design</p> <ul style="list-style-type: none"> The design of developments and structures shall be compatible with the surroundings. Particular attention shall be given to massing, form and design details within sensitive locations such as National Scenic Areas, Areas of Panoramic Quality, Greenbelt, Very Sensitive Countryside, Conservation Areas, Special Built Environment Areas, Historic Landscapes and Archaeologically Sensitive Areas, Historic Gardens and Designed Landscapes and the settings of listed buildings and Scheduled Ancient Monuments. Within such locations, the quality of design will require to be higher than in other less sensitive locations; and Along with the above criteria, the policy strongly encourages energy efficient design and the use of sustainable building practices.
LDP 10 – Maximising our Resources and Reducing our Consumption	<p>The Council recognise that one of the central challenges to planning is to tackle climate change. It sets out that to achieve the target set in the Climate Change (Scotland) Act 2009 to reduce carbon emissions by 80% by 2050 coordinated action is need including a framework for the development and deployment of renewable electricity generating technologies.</p> <p>The policy advises that the Council will support all development proposals that seek to maximise our resources and reduce consumption. Development proposals should accord with the following:</p> <ul style="list-style-type: none"> The settlement strategy; Sustainable design principles; Minimising waste and/or contributing to recycling; Minimising the impact on the water environment both in terms of pollution and abstraction; Avoiding areas subject to flood risk or erosion; Minimising the impact on biodiversity and the natural environment; Safeguarding our mineral resources and minimising the need for extraction; Avoiding the loss of trees and woodland; Contributing to renewable energy generation; Avoiding the disturbance of carbon rich soils; and Safeguarding our best agricultural land.
LDP 11 – Improving our Connectivity and Infrastructure	<p>The Council seeks to ensure development proposals maintain and improve Argyll and Bute’s internal and external connectivity and make the best use of the existing infrastructure by ensuring:</p>

LDP Policy	Summary
	<ul style="list-style-type: none"> ▪ Rights of way and public access are safeguarded; ▪ Public access within the development is delivered, as appropriate, ensuring that any special mobility and safety requirements are addressed; ▪ Consideration is given to the promotion of access to adjoining areas, in particular to the foreshore, core path network and green network; ▪ Integration of the development with existing and potential public transport is taken fully into account; ▪ The Proposed Development is accessible by a range of modes of transport including walking, cycling, public transport and car; ▪ An appropriate standard of access is delivered to serve new developments, including off-site highway improvements where appropriate; ▪ Maximum and minimum car parking standards are applied; ▪ The location and design of new infrastructure is appropriate; and ▪ Standards for drainage, sewage, waste water and water are applied.

LDP Supplementary Guidance

5.5.3 The Argyll and Bute LDP is supported by two sets of Supplementary Guidance, adopted in 2016.

Table 5.3: Relevant Supplementary Guidance

Supplementary Guidance (SG) Policy	Summary
Natural Environment	
SG LDP ENV 1 – Development Impacts on Habitats, Species and Our Biodiversity	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i> and lists the legislation, policies, and conservation objects which the Council will take into account when considering development proposals.</p> <p>The SG policy also advises that the Council will have regard to the delivery of the objectives and targets set by the Local Biodiversity Action Plan (LBAP) and the Scottish Biodiversity Strategy.</p> <p>The aim of this SG policy is to give stronger protection, and where appropriate seek enhancement, of species and habitats, even when they are outside of specifically designated nature conservation sites.</p>
SG LDP ENV2 – Development Impact on European Sites	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p>
SG LDP ENV 4 – Development Impact on Sites of Special Scientific Interest	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>. It advises that in all Development Management Zones development which would affect Sites of Special Scientific Interest and National Nature Reserves will only be permitted where it can be demonstrated that either:</p> <ul style="list-style-type: none"> ▪ The objectives of designations and the overall integrity of the area will not be compromised; or ▪ Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance and the need for the development cannot be met in other less ecologically damaging locations or by reasonable alternative means.
SG LDP ENV 5 – Development Impact on Local Nature	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>. It recognises the valuable role LNCS have in the environment, including by</p>

Supplementary Guidance (SG) Policy	Summary
Conservation Sites (LNCS)	<p>providing links between different sites of nature conservation value and their contribution to the development of habitat networks. For those reasons the Council seek to protect LNCS from damaging development.</p> <p>Development that would have an adverse effect on the integrity of LNCS will not be supported unless it is satisfactorily demonstrated that:</p> <ul style="list-style-type: none"> Such adverse effects are clearly outweighed by social, environmental or economic benefits of community wide importance arising from the development proposal; and The Council is satisfied that all possible mitigation measures have been incorporated to minimise the adverse effects of interests of the site.
SG LDP ENV 6 – Development Impact on Trees/ Woodland	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>The SG policy sets out that the Council will resist development likely to have an adverse impact on trees by using the development process to ensure that adequate provision is made for the preservation of, and where appropriate, the planting of new woodland/trees, including compensatory planting and management agreements.</p> <p>Where there are opportunities for new planting it should be in accordance with the local pattern of woodlands, thereby avoiding erosion of distinctive landscape patterns and enhancing landscape character.</p>
SG LDP ENV7 – Water Quality and the Environment	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>The SG policy advises that in all development management zones, proposals for development that could affect the water environment will be assessed with regard to their potential impact on:</p> <ul style="list-style-type: none"> 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; and The resources protected by Policy LDP3 – Supporting the Protection, Conservation and Enhancement of our Environment and other relevant Local Development Plan policies and SG. <p>The SG policy states that developments that may have a significant detrimental impact on the water environment will not be permitted unless it can be demonstrated that the impacts can be fully mitigated to ensure non-deterioration of waterbody status as required by the EU Water Framework Directive and the River Basin Management Plans covering Argyll and Bute.</p>
SG LDP ENV 9 – Development Impact on Areas of Wild Land	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>This SG policy is concerned with development proposals diminishing the wild character of Wild Land areas as identified on the 2014 NatureScot map of wild land areas. The Council will result such proposals unless it is clearly demonstrated that the adverse effects can be overcome by siting, design or other mitigation.</p>

Supplementary Guidance (SG) Policy	Summary
SG LDP ENV 10 – Geodiversity	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>This SG policy notes that the Council will consider impact on geodiversity when assessing development proposals.</p>
SG LDP ENV 11 – Protection of Soil and Peat Resources	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>The SG policy advises that the Council will only support development where appropriate measures are taken to maintain soil resources and functions to an extent that is considered relevant and proportionate to the scale of development.</p> <p>Developments that would potentially have a significant adverse effect on soil resources and functions or peat structure and function in terms of disturbance, degradation or erosion will not be supported unless it is demonstrated that:</p> <ul style="list-style-type: none"> Such adverse effects are clearly outweighed by social, environmental, or economic benefits of community wide importance arising from the development proposal; and A soil or peatland management plan is submitted which clearly demonstrates how unnecessary disturbance, degradation or erosion of peat and soils will be avoided and how any impacts mitigated as much as possible. Evidence of the adoption of best practice in the movement of, storage, management, reuse, and reinstatement of soils must be submitted along with any planning application.
Landscape and Design	
SG LDP ENV 12 – Development Impact on National Scenic Areas (NSAs)	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>This SG policy is concerned with protecting National Scenic Areas (NSAs) and sets out that the Council will resist any development in or affecting NSAs that would have an adverse effect on the integrity of the area or would undermine the Special Qualities² of the area unless demonstrated that any significant adverse effects on the landscape quality the area has been designated for are clearly outweighed by social, environmental, or economic benefits of national importance.</p>
SG LDP ENV 13 – Development Impact on Areas of Panoramic Quality (APQs)	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>The aim of this SG policy is to protect locally important landscapes from damaging development which could detract from their scenic value. The APQs are seen as important not only for their physical landforms and scenic value, but also for the environmental assets they represent.</p> <p>The Council will resist development in, or affecting, an APQ, where its scale, location or design will have a significant adverse impact on the character of the landscape unless it is adequately demonstrated that:</p>

² As detailed in – The Special Qualities of National Scenic Areas; NatureScot (2010)

Supplementary Guidance (SG) Policy	Summary
	<ul style="list-style-type: none"> Any significant adverse effects on the landscape quality for which the area has been designated are clearly outweighed by social, economic, or environmental benefits of community wide importance.
SG LDP ENV 14 – Landscape	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>The SG policy aims to avoid development which would undermine areas of distinctive landscape character in Argyll and Bute. The landscapes are considered important not only for their physical landforms, but also for the environmental assets that they represent and economic, identity and spiritual benefit that they provide.</p> <p>This SG policy will be used to assess impact on landscape from development proposals in areas outwith National Scenic Areas and Areas of Panoramic Quality. The Council will resist development when its scale, location or design will have a significant adverse impact on the character of the landscape unless it is demonstrated that:</p> <ul style="list-style-type: none"> Any such effects on the landscape quality are clearly outweighed by social, economic, or environmental benefits of community wide importance; and The Council is satisfied that all possible mitigation measures have been incorporated into the development proposals to minimise adverse effects.
Historic Environment and Archaeology	
SG LDP ENV 16 – Development Impact on Listed Buildings	<p>This SG policy provides additional detail to <i>Policy LDP 3 Supporting the Protection, Conservation and Enhancement of our Environment</i>.</p> <p>This SG policy aims to ensure listed buildings, their settings, and any features of special architectural or historic interest are preserved. Developments that affect listed buildings or their settings must:</p> <ul style="list-style-type: none"> Be of the highest quality, and respect the original structure in terms of setting, scale, design and materials; The Proposed Developments is essential to securing the best viable use of the listed building without undermining its architectural or historic character, or its setting; and The Proposed Development conforms to Historic Environment Policy for Scotland and the accompanying Managing Change Guidance Notes. <p>If a development will affect a heritage asset or it's setting the developer will be expected to satisfactorily demonstrate that the impact has been assessed and measures will be taken to preserve and enhance the special interests of the asset.</p>
Transport (Including Core Paths)	
SG LDP TRAN 1 – Access to the Outdoors	<p>This SG provides additional detail to <i>Policy LDP 11 – Improving our Connectivity and Infrastructure</i>.</p> <p>The SG policy explains that the Council require development proposals to safeguard and enhance public rights of access to the outdoors in a manner that is appropriate and proportionate to the specific site characteristics and the scale and impact of the Proposed Development on access issues. As a result of this requirement, the Core Paths Plan, claimed Public Rights of Way and public rights of access to land and water</p>

Supplementary Guidance (SG) Policy	Summary
	<p>under the Land Reform (Scotland) Act 2003 are material considerations in assessing planning applications.</p> <p>If development would have a significant adverse effect upon public access, alternative access provision will be sought, and this will be at the expense of the developer. Routes should be diverted or incorporated into the proposed development.</p> <p>Where development is close to the foreshore or a loch side, a strip of land four metres wide should be provided between the shore and any area from which the developer intends to exclude the public. Where there is a pier or other structure that will obstruct access along a foreshore or loch side a reasonable means of passing by the obstruction should be provided to allow the public to exercise their right of access along the shore.</p>
SG LDP TRAN 5 – Off-site Highway Improvements	<p>This SG policy provides additional detail to <i>Policy LDP 11 – Improving our Connectivity and Infrastructure</i>.</p> <p>The SG applies where development proposals will significantly increase vehicular or pedestrian traffic on substandard private or public approach roads and requires that proportionate contributions are made for improvements to agreed section of the public or private road network.</p>
Supplementary Guidance 2 (December 2016)	
Section 8.1 – Renewable Energy Including Hydro	<p>This SG sets out the Council will generally seek to be supportive of Hydro projects provided they are in the right location and where any impacts on the natural and cultural heritage, water environment, fisheries, aquatic habitats and amenity, and relevant environmental and transport issues can be addressed by the developer to the satisfaction of the planning authority.</p>

5.6 Local Development Plan 2

- 5.6.1 The Argyll and Bute LDP2 Proposed Plan (2019) is currently at examination stage, having been submitted to Scottish Ministers in January 2022. It identifies the Tobermory to Dalmally Growth Corridor, wherein the Proposed Development is located, 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’.*
- 5.6.2 The Plan is anticipated to be adopted in January 2023 and represents the most up to date policy position of the Council. Although this remains to be tested at examination, the Proposed Plan is a material consideration to the determination of this application.

Table 5.4: Relevant Policies

LDP2 Policy	Summary
Policy 04 Sustainable Development	<p>All development proposals will be assessed against the sustainable development policy and the LDP2 seeks to enable delivery of long-term support to the retention and growth of the population, the transition to a low carbon economy, retain and improve essential services, maintain, and improve quality of life and protect and enhance the natural and built environment. Both the short-term consequences and long-term potential impacts and benefits of development proposals will be taken into account.</p>

LDP2 Policy	Summary
	<p>Developers should seek to demonstrate the following sustainable development principles to the planning authority:</p> <ul style="list-style-type: none"> 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; and Impacts on land, air and water environment.
Policy 05 Design and Placemaking	<p>Development proposals should give full consideration to the surrounding environment in terms of infrastructure, land uses, community facilities, connectivity, neighbourhood character, scale and density and views. The aim is to locate the right development in the right place.</p> <p>The following placemaking criteria which developments should aim to meet is as follows:</p> <ul style="list-style-type: none"> 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; and Climate change mitigation.
Policy 06 – Green Infrastructure	<p>Green infrastructure provides valuable functions and benefits for places and people including active travel links and places to enjoy the outdoors. It also provides benefits to biodiversity through creation of habitats and green networks.</p> <p>Where appropriate new non householder developments should adequately demonstrate how green infrastructure has been integrated into the design of the proposals with regards to the following:</p> <ul style="list-style-type: none"> Existing green networks; Biodiversity; Water management; Climate change; Loss of integrity of existing green networks; and Future management and maintenance.
Policy 08 – Suitable Siting	<p>This policy seeks to protect the landscape from inappropriate development. Developments should be sited to integrate sensitively within the landscape and should take into consideration proximity to existing infrastructure and other environmental factors such as flooding and wildlife habitats.</p> <p>Each of the following will apply when any proposal for development is being assessed:</p> <ul style="list-style-type: none"> Developments integration with the landscape or existing built form; Development on sites with sloping topography should be sensitively designed to prevent excessive excavation or under-building; The siting of development should take account of the character of the area in terms of settlement pattern, layout and density; Access to existing infrastructure and services; and Siting of ancillary services e.g parking and services areas.

LDP2 Policy	Summary
Policy 09 Sustainable Design	<p>The LDP2 is committed to supporting the national objectives and targets for transitioning to a low carbon economy and developments must consider the use of renewable sources to reduce emissions and energy use and to be carbon neutral. The LDP2 also highlights the embodied carbon generated through construction and suggests that careful consideration should be given to the materials and constructions methods used.</p> <p>The policy requires that proposals demonstrate consideration and where possible, utilisation of:</p> <ul style="list-style-type: none"> ▪ Renewable sources of energy; and ▪ Sustainable design and construction methods in terms of embodied energy, conversion and re-use and adaptability.
Policy 10 Design: All Development	<p>Proposals should respect the existing character and quality of place and take opportunities to reinforce and enhance this where possible.</p> <p>The policy states that the design of any development must:</p> <ul style="list-style-type: none"> ▪ Demonstrate an understanding of and appropriate response to the Proposed Development site and wider context including consideration of character; ▪ Incorporate existing and enhancing features where applicable; ▪ Use appropriate proportions for built elements and details including massing and fenestration; ▪ Use of harmonious materials; and ▪ Consider the embodied energy and durability of proposed materials.
Policy 14 – Bad Neighbour Development	<p>The Council will operate a precautionary principle when it comes to bad neighbour development. It is for the applicant to provide evidence to demonstrate that there would not be any unacceptable impacts on neighbouring amenity.</p> <p>The Council will resist any proposal which would have an unacceptable adverse impact on the amenity of neighbouring land uses resulting from, but not limited to the following:</p> <ul style="list-style-type: none"> ▪ Noise or vibration; ▪ Odour or fumes; ▪ Emissions including dust, smoke, soot, ash, dirt or grit or any other environmental pollution to water, air or soil; and ▪ Light pollution or flicker.
Policy 15 – Supporting the Protection, Conservation and Enhancement of Our Historic Built Environment	<p>The Council aim to support and encourage sustainable forms of development that seeks to protect, conserve and where possible enhance the historic built environment.</p> <p>Development proposals will not be acceptable where they fail to:</p> <ul style="list-style-type: none"> ▪ Protect, preserve, conserve, or enhance the established character of the historic built environment in terms of location, scale, form, design or proposed use; and ▪ Avoid any cumulative effect upon the integrity or special qualities of designated built environment sites. <p>When the Council consider there to be significant uncertainty concerning the potential impact of a Proposed Development on a designated site, consideration will be given to the appropriate application of the precautionary principle.</p>
Policy 16 – Listed Buildings	<p>The Council consider that listed buildings, their curtilage structures, and their settings make a significant contribution to the character and amenity of Argyll and Bute and regard them as a valuable resource that can stimulate enjoyment</p>

LDP2 Policy	Summary
	<p>of the wider environment and are important for education, economic development, recreation, and tourism.</p> <p>Development proposals which affect listed buildings, their curtilage or wider setting will only be supported when they meet all the following criteria:</p> <ul style="list-style-type: none"> ▪ Respect for the original structure in terms of setting, scale, design, materials and proposed use; ▪ The proposals are essential to securing an appropriate use of the Listed Building without undermining architectural or historic character or setting; and ▪ They conform to national policy and guidance. <p>The developer is expected to demonstrate to the planning authority's satisfaction, that the effect of a Proposed Development on a Listed Building, its curtilage and wider setting has been assessed and that measures will be taken to protect, conserve and where appropriate enhance the special interest of the asset. The use of appropriate access statements, design statements and conservation plans are expected to facilitate this assessment.</p>
Policy 22 – Economic Development	<p>One of the aims of LDP2 is to grow a low carbon economy by promoting economic development in the identified growth areas, regeneration areas and settlements.</p> <p>Cruachan sits within a Growth Corridor where the following will be taken into account when determining applications:</p> <ul style="list-style-type: none"> ▪ Net economic benefit of the development; and ▪ A clear operational need for a specific location is demonstrated.
Policy 30 – The Sustainable Growth of Renewables	<p>Argyll and Bute can continue to make a significant contribution towards meeting the Scottish Government's targets for renewable energy generation. The main aim of this policy is to ensure that renewable energy generation projects are delivered in an all-round sustainable manner.</p> <ul style="list-style-type: none"> ▪ Principles of sustainable development; ▪ Environmental effects on local communities, natural and historic environments, landscape character and visual amenity; ▪ Compatibility with adjacent land uses; and ▪ Opportunities for energy storage, local energy networks and long-term environmental management of the site.
Policy 32 – Active Travel	<p>The Council requires that active travel and recreation are integrated into developments from the start of the wider design process.</p> <p>Development proposals should ensure:</p> <ul style="list-style-type: none"> ▪ Existing active travel networks and rights of way are safeguarded and integrated with the development; ▪ Delivery of active travel routes within development sites; and ▪ Integration of active travel routes to surrounding areas. <p>Where development would have a significant effect on public access whether on a path or under wider right of access, an access plan will be required to be submitted.</p> <p>Any new development proposal must allow a strip of land four metres wide between the shore and any new domestic curtilage or other development with no requirement to be shore based. Where there is a pier or other structure that will obstruct access along a foreshore or loch side a reasonable means of passing by the obstruction should be provided.</p>
Policy 33 – Public Transport	<p>Developments should follow a sequential approach and support patterns of development which utilise existing or potential public transport corridors. Where development proposals are likely to generate significant levels of journeys</p>

LDP2 Policy	Summary
	regard must be had to siting development in locations which facilitate travel by public transport.
Policy 34 – Electric Vehicle Charging	This policy requires the provision of electric vehicle charging points or the infrastructure to accommodate future points as part of all new development which results in a new parking requirement.
Policy 35 – Design of New and Existing, Public Roads and Private Access Regimes	Acceptance of development which utilises new and existing public roads and private access regimes is subject to road safety and street design issues being addressed to the satisfaction of the Roads Authority and the Planning Authority.
Policy 37 – Development Utilising Existing Private Access or Existing Private Road	<p>The criteria for the acceptance of further development that utilises an existing private access or existing private road are as follows:</p> <ul style="list-style-type: none"> ▪ The access is capable of commensurate improvements considered by the Roads Authority to be appropriate to the scale and nature of proposed new development and that takes into account current access issues; ▪ The applicant can secure ownership of the private access road to allow for commensurate improvements to be made; or ▪ Demonstrate that an appropriate agreement has been concluded with the existing owner to allow for commensurate improvements to be made.
Policy 39 – Construction Standards for Private Access	<p>The construction standards to be applied for private accesses are as follows:</p> <ul style="list-style-type: none"> ▪ They shall be constructed to incorporate minimum standards to function safely and effectively as set out in the Council’s Road Development Guide, in particular in relation to adequate visibility splays, access gradients, geometry, passing places, boundary definition, turning capacities, integrated provision for waste management and recycling; ▪ It must be demonstrated to the Planning Authority that consideration has been given by the applicant in the design process to the potential need to make future improvements to the access up to and including an adoptable standard; and ▪ Accesses which connect to or impact significantly on a Trunk Road will require consultation with Transport Scotland.
Policy 59 – Water Quality and the Environment	<p>The Council recognise that the varied water environment in Argyll and Bute is a resource of great value, providing leisure and recreation opportunities and employment in sectors including fishing, aquaculture, tourism, and energy production. The water environment can be affected by engineering works, water extraction for industrial processing and can be at risk from pollution from surface water runoff and other industrial processes. For these reasons the Council will assess the impact of new development on the water environment having regard to potential impact on:</p> <ul style="list-style-type: none"> ▪ 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; and ▪ Mitigation measures.
Policy 70 – Development Impact on	The aim of this policy is to provide adequate protection against damaging development that would diminish the outstanding scenic value of landscapes of national importance.

LDP2 Policy	Summary
National Scenic Areas (NSA's)	<p>The Council will resist any development in or affecting NSAs that would have an adverse effect on the integrity of the area either individually or cumulatively, or that would undermine the Special Qualities of the area unless it is adequately demonstrated that:</p> <ul style="list-style-type: none"> Any significant adverse effects on the landscape quality for which the area has been designated are clearly outweighed by social, environmental, or economic benefits of national importance; and The proposal is supported by an LVIA and consistent with the relevant Argyll and Bute Landscape Capacity Assessment.
Policy 71 – Development Impact on Local Landscape Areas (LLA)	<p>This policy aims to provide LLAs with adequate protection against damaging development that would diminish their high scenic value.</p> <p>The Council will resist development in, or affecting, a Local Landscape Area where its scale, location or design will have a significant adverse impact on the character of the landscape unless it is adequately demonstrated that:</p> <ul style="list-style-type: none"> Any significant adverse effects on the landscape quality for which the area has been designated are clearly outweighed by social, economic, or environmental benefits of community wide importance; and The proposal is supported by an LVIA and consistent with the relevant Argyll and Bute Landscape Capacity Assessment.
Policy 72 – Development Impact on Areas of Wild Land	<p>Through this policy the Council seeks to protect Wild Areas of Land to ensure their retention both for locals and visitors at the present time and for future generations. Proposals that impact on Areas of Wild Land are expected to be submitted with a detailed assessment of the expected impact, including the area affected, the degree of impact and any mitigation proposed. The Council will only support such proposals when the resultant impact of a development on wild character is considered acceptable in terms of no significant reduction of the resource. Where it is determined that proposals would significantly diminish wild character, they will only be supported if adverse effects are clearly outweighed by social, economic, or environmental benefits of national importance.</p>
Policy 73 – Development Impact on Habitats, Species and Biodiversity	<p>The aim of this policy is to give strong protection, and where appropriate seek enhancement, to habitats and species even when they are not associated with specifically designated nature conservation sites.</p> <p>When considering development proposals the Council will give full consideration to the legislation, policies and conservation objectives contained with the following:</p> <ul style="list-style-type: none"> 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; and Protection of Badgers Act 1992. <p>When assessing proposals, the Council will also look for how the proposals contribute to the delivery and objectives of Local Biodiversity Action Plan and Scottish Biodiversity Strategy.</p> <p>If there is evidence to suggest that a habitat or species of international, national and/or local importance exists on a Proposed Development site or would be affected by the proposed development, the Council will require a specialist survey of the site's natural environment and if necessary, a mitigation plan be submitted with the planning application.</p> <p>The Policy also sets out that development proposals which are likely to have an adverse effect on protected species and habitats will only be permitted where it can be justified in accordance with the relevant protected species legislation.</p>

LDP2 Policy	Summary
Policy 74 – Development Impact on Sites of International Importance	<p>Development not directly connected with or necessary to the conservation management of a site covered by the Conservation (Natural Habitats, etc) Regulations 1994 (as amended) and which is likely to have a significant effect on the site (either individually or in combination with other plans or projects) will be subject to an Appropriate Assessment. Where it cannot be ascertained that the development would not adversely affect the integrity of the site it will not be supported unless:</p> <ul style="list-style-type: none"> ▪ There is no alternative solution; and ▪ There are imperative reasons of over-riding public interest that may, for sites not hosting a priority habitat type and/or priority species, be of a social or economic nature. <p>Where the site hosts a priority habitat type and/or a priority species, the reasons referred to at ii) must relate to human health, public safety or beneficial consequences of primary importance to the environment, or other reasons which in the opinion of Scottish Ministers are imperative reasons of overriding public interest.</p>
Policy 75 – Development Impact on Sites of Special Scientific Interest and National Nature Reserves	<p>Development which would affect Sites of Special Scientific Interest and National Nature Reserves will only be permitted where it can be adequately demonstrated that either:</p> <ul style="list-style-type: none"> ▪ The Proposed Development will not compromise the natural feature or conservation objectives, or adversely affect the integrity of the site; or ▪ There is a proven public interest and benefit where social, economic, environmental or safety considerations of national importance outweigh the ecological interest of the site and the need for the development cannot be met in other less ecologically damaging locations or by reasonable alternative means.
Policy 76 – Development Impact on Local Nature Conservation Sites (LCNS)	<p>Development that would have a significant adverse effect on the integrity of the Local Nature Conservation Sites will not be supported unless the developer satisfactorily demonstrates that:</p> <ul style="list-style-type: none"> ▪ Such adverse effects are clearly outweighed by social, environmental, or economic benefits of community wide importance arising from the development proposal; and ▪ The Council is satisfied that mitigation measures have been incorporated to minimise the adverse effects on the interests of the site. <p>Where development is allowed which could affect an LNCS, including beyond their boundaries, the developer must demonstrate that adequate measures will be taken to conserve and enhance the sites' ecological, geological, and geomorphological interests where applicable.</p>
Policy 77 – Forestry, Woodland and Trees	<p>The LDP2 seeks to ensure that the important attributes of woodlands and trees are safeguarded, conserved and where appropriate enhanced when development is being taken forward in both the urban and countryside environment.</p> <p>The policy sets out two categories for assessing impact on woodland and trees:</p>

LDP2 Policy	Summary
	<ul style="list-style-type: none"> ▪ Development likely to have an impact on ancient semi-natural woodland, native or long-established woods, hedgerows and individual trees with high nature conservation or landscape value either on or adjoining a development site will only be permitted where it can be adequately demonstrated that either: ▪ The Proposed Development will not compromise the conservation objectives nor adversely impact on the integrity of the woodland, trees or hedgerows; ▪ There is a proven public interest and benefit where social, economic, environmental or safety considerations of regional importance outweigh the ecological interest of the site and the need for the development cannot be met in other less ecologically damaging locations or by reasonable alternative means, or ▪ Development likely to have an unacceptable adverse impact on other trees (not identified in clause a) on or adjoining a development site will normally only be acceptable where it is demonstrated to the satisfaction of the planning authority that an acceptable mitigation strategy can be put in place. <p>In both cases the developer will be required to demonstrate that adequate provision is made for the preservation and where appropriate the planting of new woodland/trees, including compensatory planting and management arrangements.</p>
Policy 79 – Protection of Soil and Peat Resources	<p>This policy sets out that the management and protection of carbon-rich soils is seen as a key element of Scotland’s climate change mitigation strategy due to the potential of soil to store carbon and exchange greenhouse gases with the atmosphere.</p> <p>The Council will only support development where appropriate measures are taken to maintain soil resources and functions to an extent that is considered relevant and proportionate to the scale of the development.</p> <p>Development that would potentially have a significant adverse effect on soil resources and functions or peat structure and function in terms of disturbance, degradation or erosion will not be supported unless it is satisfactorily demonstrated that:</p> <ul style="list-style-type: none"> ▪ Such adverse effects are clearly outweighed by social, environmental, or economic benefits of community wide importance arising from the development proposal; and ▪ A soil or peatland management plan is submitted which clearly demonstrates how unnecessary disturbance, degradation or erosion of peat and soils will be avoided and how any impacts are to be mitigated as much as possible. Evidence of the adoption of best practice in the movement of, storage, management, reuse, and reinstatement of soils must be submitted along with any planning application.
Policy 80 – Geodiversity	<p>This policy requires new development to assess the potential impacts on geodiversity by taking steps to mitigate any damage that cannot be prevented and identify opportunities that might affect geodiversity.</p> <p>The Council will consider geodiversity impact when assessing development proposals. Development that would have a significant adverse effect on non-designated Geological Conservation Review Sites or Local Geodiversity Sites will not be supported unless it is satisfactorily demonstrated that:</p>

LDP2 Policy	Summary
	<ul style="list-style-type: none"> Such adverse effects are clearly outweighed by social, environmental, or economic benefits of community wide importance arising from the development proposal; and The Council is satisfied that all possible mitigation measures have been incorporated to minimise adverse effects on the interests of the site. Where possible, any resultant rock exposures or other evidence of geodiversity interest should be considered for their potential as an educational or interpretative resource and a record made prior to any loss.

5.7 Summary

- 5.7.1 This chapter has set out the relevant national and local planning policy context against which the Proposed Development will be assessed. Policy assessments relevant to each EIA discipline are presented in **Chapters 6 – 15**.
- 5.7.2 The EIA Report has considered all relevant policy in full and demonstrates that where adverse impacts are identified these can be appropriately mitigated. In relation to other policy considerations, and set out in the wider submission, the Proposed Development has policy support at all levels, meeting national objectives and targets. The Applicant has also considered and sought to integrate the principles set out within other relevant planning guidance into the development design.
- 5.7.3 A separate Planning Statement, which does not form part of the EIA Report, provides an assessment against the Development Plan and other material considerations.

5.8 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).
- Argyll and Bute Council, 2016, Argyll and Bute Local Development Plan Supplementary Guidance 2 (Adopted December 2016).
- COP26 The Glasgow Climate Pact (2021).
- Great Britain Parliament, 1997, The Planning (Listed Buildings and Conservation Areas) (Scotland) Act (1997) as amended.
- Great Britain Parliament, 1997, The Town and Country Planning (Scotland) Act (1997) as amended.
- Great Britain Parliament, 2008, Climate Change Act.
- Historic Environment Scotland, 2019, Historic Environment Policy for Scotland.
- HM Government, 2022, Policy Paper: British Energy Security Strategy.
- HM Government, 2020, Energy White Paper: Powering our Net Zero Future.
- HM Government, 2020, The Ten Point Plan for a Green Industrial Revolution: Building back better, supporting green jobs, and accelerating our path to net zero.

- NatureScot, 2015, Hydroelectric Schemes and the Natural Heritage (SNH now NatureScot).
- Scottish Executive, Revised 2006, Planning Advice Note 51, Planning, Environmental Protection and Regulation.
- Scottish Executive, 2000, Planning Advice Note 60, Planning for Natural Heritage.
- Scottish Executive, 2001, Planning Advice Note 61, Planning and Sustainable Urban Drainage Systems.
- Scottish Executive, 2005, Planning Advice Note 75, Planning for Transport.
- Scottish Executive, 2006, Planning Advice Note 79, Water and Drainage.
- The Scottish Government 2010, Planning Advice Note 3/2010, Community Engagement.
- The Scottish Government, 2011, Planning Advice Note 1/2011, Planning and Noise.
- The Scottish Government Planning, 2011, Advice Note 2/2011, Planning and Archaeology.
- The Scottish Government, 2017, Planning Advice Note 1/2017, Environmental Impact Assessment Regulations.
- The Scottish Government, 2015, Flood Risk: Planning Advice.
- The Scottish Government, 2013, Hydro Schemes: Planning Advice.
- The Scottish Government, Energy Storage: Planning Advice.
- The Scottish Government, 2022, Scotland's National Strategy for Economic Transformation, Delivering Economic Prosperity.
- The Scottish Parliament, 2009, The Climate Change (Scotland) Act 2009.
- The Scottish Parliament, 2011, The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations (2011) as amended.
- The Scottish Parliament, 2013, The Town and Country Planning (Development Management Procedure) (Scotland) Regulations (2013) as amended.
- SEPA, 2013, Land Use Planning System Guidance Note 18: Planning Guidance on Hydropower Developments (Version 3) Scottish Environmental Protection Agency.
- SEPA, 2018, Land Use Planning System Guidance Note 2a: Development Management Guidance on Flood Risk (Version 2).
- SEPA, 2005, Guidance for Applicants on Supporting Information Requirements for Hydropower Applications: The Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR).

6 Ground Conditions

6.1 Introduction

- 6.1.1 This chapter of the EIAR provides an assessment of the likely significant effects from the Proposed Development on ground conditions. It also assesses the effects from the existing ground conditions such as potential contamination on the Proposed Development taking into account relevant national, regional and local policy, guidance and regulations.
- 6.1.2 The Chapter describes the methods used to establish the baseline ground conditions at the site and study area, the potential direct and indirect effects of the Proposed Development, the mitigation measures required to prevent, reduce, or offset these effects, and the remaining residual effects associated with the Proposed Development.
- 6.1.3 The Proposed Development has the potential for effects on and from ground conditions primarily through construction of the main infrastructure (e.g., tunnels, quayside and construction compound).
- 6.1.4 This Chapter has links with other topic chapters including **Chapter 7 – Hydrology and Chapter 14 – Waste Management**.
- 6.1.5 This chapter is supported by the following figures and technical reports:
- **Figure 6.1** – Geological Map. This has been reproduced from the British Geological Survey, 1:50,000 Series sheet 45E (Scotland) Dalmally Solid Geology (1992);
 - **Figure 6.2** – Laydown Area Detailed Peat Probing; and
 - **Appendix 6.1** – Cruachan Expansion Project Preliminary Phase 1 Ground Condition Assessment (Desk Study, Stantec 2022).

6.2 Policy Context, Legislation, Guidance and Standards

Legislation

- 6.2.1 The overarching legislative framework applicable to this EIA for the proposed development is outlined in **Chapter 5**. Subject specific legislation of relevance to this chapter are as follows:
- Environmental Protection Act 1990 (Part IIA) (as amended);
 - Environment Act 1995 (Section 57);
 - The Contaminated Land (Scotland) Regulations 2000 (as amended);
 - 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).

Policy

- 6.2.2 The planning policy framework applicable to this EIA for the proposed development is outlined in **Chapter 5**. Planning policy considerations of specific relevance to this chapter are:
- Argyll and Bute Local Development Plan 2015, in particular:

- Policy LDP4: Supporting the Protection, Conservation and Enhancement of our Environment;
- Policy LDP6: Supporting the Sustainable Growth of Renewables.
- Argyle and Bute Proposed Local Development Plan 2 2019, in particular:
- Policy 59: Water Quality and the Environment;
- Policy 79: Protection of Soil and Peat Resources;
- Policy 80: Geodiversity; and
- Policy 82: Contaminated Land.
- Scottish Planning Policy (2014), in particular the following relevant provisions:
- Principal Policy on Sustainability (paragraphs 24-35);
- Principal Policy on Placemaking (paragraphs 36-57);
- Subject Policy on A Low Carbon Place (paragraphs 167-168);
- National Planning Framework 3 (NPF3) (2014);
- Scottish Government Planning Advice Note (PAN) 33 Development of Contaminated land; and
- Scottish Government Planning Advice: Energy Storage (2013).

Guidance and Technical Standards

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

- The Environment Agency's land contamination risk management (LCRM) guidance on how to assess and manage the risks from land contamination which has superseded the former guidance The Model Procedures for the Management of Contaminated Land, Contaminated Land Report 11 (CLR11);
- BS 5930:2015+A1:2020 Code of practice for ground investigations;
- BS 10175:2011+A2:2017 Investigation of potentially contaminated sites – Code of practice;
- Guidance for Pollution Prevention (GPPs) 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;
- Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters v7;
- Department of the Environment (DOE) Industry Profiles;
- 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance'. Second Edition;

- Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, SEPA, 2012;
- Developments on Peat and Off-Site Uses of Waste Peat, WST-G-052, SEPA;
- Guidance on Developments on Peatland: Peatland Survey (online version only), Scottish Government, SNH, SEPA, 2017; and
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide, Scottish Government, 2017.

6.3 Consultation

6.3.1 **Table 6.1** summarises details of consultation, comments and responses received in relation to the Proposed Development.

Table 6.1: Summary of Consultation

Reference	Comment	Response
Scoping Opinion		
SEPA Scoping Opinion Response	Table 7-1 reports that no groundwater abstractions are known within 1km of the proposed infrastructure. Should this be confirmed to be the case then the EIAR can simply state this fact. If not, the EIA should demonstrate all existing groundwater abstractions are out with a 100m radius of all excavations shallower than 1m and out with 250m of all excavations deeper than 1m. Please refer to our Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions for further advice on the minimum information we require to be submitted.	The EIA will seek to confirm the case that groundwater abstractions are greater than 1km from the proposed infrastructure or where required demonstrate the information required by the SEPA Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions.
SEPA Scoping Opinion Response	"We understand it is anticipated that the project will avoid impacts on peat and that a 'peat probing exercise will be carried out to confirm the absence of peat'. Should this be confirmed then we expect the EIAR to report this. If peat is identified on site, we request the submission include:	Where relevant, the EIA will report the presence of peat in line with Scottish Government's Guidance on developments on Peatland - Peatland Survey (2017). Where relevant re-use proposals will be detailed in line with Scottish Government's Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste, and Developments on Peat and Off- Site uses of Waste Peat.

Reference	Comment	Response
	<ul style="list-style-type: none"> A detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements (including peat storage areas) overlain to demonstrate how the development avoids areas of deep peat"; A table which details the quantities of acrotelmic, catotelmic and amorphous peat which will be excavated for each element and where it will be re-used during reinstatement. Details of the proposed widths and depths of peat to be re-used and how it will be kept wet permanently must be included; and Proposals must accord with Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste and our Developments on Peat and Off- Site uses of Waste Peat. Dependent on the volumes of peat encountered applicants must consider whether a full Peat Management Plan is required. 	
ECU Scoping Opinion Response	<p>Scottish Ministers consider that where there is a demonstrable requirement for peat landslide hazard risk assessment, one should be carried out. The assessment should provide a clear understanding of whether any risks identified in the assessment are acceptable and capable of being controlled by mitigation measures. The Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition).</p>	<p>Where relevant the EIA shall outline the peat landslide hazard risk assessment requirements in line with the Scottish Government's Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition).</p>
Meeting with SEPA		
Request for meeting	<p>SEPA have been contacted for a meeting for environmental information about the Site.</p>	<p>A response from SEPA is pending at the time of writing.</p>
Argyll and Bute Council		

Reference	Comment	Response
Information Request Desk Study	An environmental information request was submitted to Argyll and Bute Council	Argyll and Bute Council responded with information on contaminated land designations and related information. This is contained in the Desk Study as Appendix 6.1 .

6.4 Methodology

Study Area

- 6.4.1 The study area for the ground conditions assessment includes a 250m buffer from the Site boundary to provide a robust assessment of any contaminated land effects and interactions with the Proposed Development from off-site sources.

Baseline Data Collection

- 6.4.2 The following sources of information have been reviewed and used to inform the geology and ground conditions assessment:
- Cruachan Expansion Project, Preliminary Ground Conditions Assessment Report, Stantec 2022;
 - Phase 1 Desk Study Report has been prepared to present the findings of the desk study research carried out in respect of the site, together with the observations from a Stantec site walkover. It includes preliminary information on ground stability and a Tier 1 (preliminary/qualitative) contamination risk and ground condition assessment. Key baseline characteristics identified are summarised in **Section 6.6** – Baseline Conditions, below:
 - Peat Probing Survey;
 - A peat probing survey (**Figure 6.2**) was undertaken in 2022 to determine the presence, lateral extent, and depth of peat deposits where above ground development is proposed at the site. The survey comprised peat depth probing undertaken on a 100m x 100m grid and 10m x 10m grid across the lower compound area. This informed the layout of the Proposed Development and the peat management strategy detailed in **Appendix 6.2 – PMP**.

Assessment

- 6.4.3 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 have been prepared for baseline, the construction phase and operational phase of the Proposed 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.
- 6.4.4 The CM considers:
- 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.
- 6.4.5 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 and sensitivity of potential receptors. A pollutant linkage is identified where all three elements (source-pathway-receptor) are present.

- 6.4.6 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.

Significance Criteria

- 6.4.7 The level and significance of likely effects will be judged with reference to the receptor sensitivity, likelihood and the consequence of the effect occurring. (See [Tables 6.2-6.4](#) below).

Table 6.2: Criteria Used in Ground Conditions for Classifying Receptor Value or Sensitivity

Classification	Definition / Example Scenario
High Receptor of national or international importance	Human health: Residential and uses where children are present Surface water: SEPA ecological status of High or Good Groundwater: Aquifer productivity class is High or Very High Ecology: Special Areas of Conservation (SAC and candidates), Special Protection Areas (SPA and potentials) or wetlands of international importance (RAMSAR) Buildings: World Heritage Site or Conservation Area
Moderate Receptor of county or regional importance	Human health: Employment Surface water: SEPA ecological status of Moderate Groundwater: Aquifer productivity class is Moderate Ecology: SSSI, National or Marine Nature Reserve (NNR or MNR) County Wildlife Sites (CWS) Buildings: Area of Historic Character
Low Receptor of local importance	Human health: Transient or Limited Access. Unoccupied/Industrial land use and construction workers* Surface water: SEPA ecological status of Poor or Bad Groundwater: Aquifer productivity class is Low and Very Low Ecology: Local habitat resources or no designation Buildings: Replaceable/local value

*Assuming that construction workers will adopt appropriate health and safety and personal protective equipment (PPE) procedures.

Table 6.3: 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.

Likelihood / Probability	Definition
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 6.5 below.

Table 6.4: Classification for Consequence

Magnitude / 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.
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.

Table 6.5: Matrix for Establishing Significance of Effect

		Magnitude / Severity			
		Severe	Medium	Mild	Minor
Sensitivity	High	Substantial	Major	Moderate/minor	Minor
	Moderate	Major	Moderate	Minor	Negligible
	Low	Major/moderate	Moderate/minor	Minor	Negligible

6.4.8 **Table 6.6** 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 6.6 below. This demonstrates the additive impact of the proposed development upon the likely future baseline scenario.

Table 6.6: 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

Limitations

- 6.4.9 Whilst the information used in this assessment is considered robust and suitable for purpose, with the exception of the peat probing survey, no recent or development specific ground investigation data is currently available. However, given that there are a number of visual inspection reports for tunnels within Cruachan 1 (which are exposed bare rockface), there is a reasonable level of confidence that the information presented in this report provides a good understanding of the likely ground conditions and enables identification of potential risks. However, further work is recommended to refine the Conceptual Model for the Site and reduce uncertainty.
- 6.4.10 SEPA have been contacted for environmental information about the Site. It is understood that freedom of information requests to SEPA are currently on hold due to the December 2020 cyber-attack on SEPA. Data on land contamination (including ground investigated or designated under Part IIA), landfill sites, abstractions, discharge consents, explosive sites, PPC activities/permits, radioactive substances, enforcement and prohibition notices and plans showing potentially contaminative land uses (current and past) at the Site were all included on the Stantec information request to SEPA. In the absence of a response from SEPA, publicly available information, and information provided in a Groundsure report and a site visit have been used to inform the preliminary ground conditions assessment (Stantec 2022, [Appendix 6.1](#)).

6.5 Current Baseline Conditions

Baseline Summary: Current Land Use

- 6.5.1 For the purposes of this ground conditions assessment, the Site has been divided into three sections:
- 'The West Area' comprising Cruachan 1 and the Proposed Development, including the upper compound area, below ground works (headrace and tailrace tunnels, access tunnels, pressure shaft, power station), inlet and outlet structures and the new quayside along the northern shoreline of Loch Awe;
 - 'The Access Track' comprising the existing access road routing from the A85 to the upper reservoir which will be upgraded; and
 - 'The East Area' comprising a lower construction laydown area off the A85.

Topography

- 6.5.2 In the west area of the Site, the Cruachan Reservoir and the base of Cruachan Dam are located within Coire Cruachan which is approximately 400m above Ordnance Datum (AOD) according to OS mapping. The ground levels fall steeply in a southerly direction from the base of the dam wall (390m AOD) to the A85 at approximately 40m AOD. The profile of the valley below normal loch level falls steeply (at about 45°), consistent with the topography above the A85.
- 6.5.3 Ground levels to the north and south of the access track are generally steep (45% in areas) until the access road meets the village of Lochawe.
- 6.5.4 The upper compound area is located on a slope falling northeast to southwest. Broadly, the northern half of the upper compound area is on an approximate slope of 23% whereas the southern half is more gently sloping approximately 16%.
- 6.5.5 The area being considered for the lower compound area (north of Lochawe and the A85) has undulating topography with an overall gentle slope falling in a south easterly direction.

Baseline Summary: Historical Land Use

- 6.5.6 The historical land use of the Site and surrounding area from available mapping between 1870 and 2022 is described more fully in the Preliminary Report on Ground Conditions (Stantec 2022).
- 6.5.7 However, a summary is provided in **Table 6.7** below.
- 6.5.8 It should be noted that 1:2,500 scale maps for a large portion of the Site are not available. This is likely due to the site being in a rural part of Scotland for which coverage is somewhat more limited.

Table 6.7: Summary of Historical Land Uses

Dates/ Sources	Onsite	Offsite
1:10,560 – 1870	<p><u>East Area:</u></p> <ul style="list-style-type: none"> ▪ Rough pasture/heathland onsite; ▪ Several watercourses flowing though the Site; ▪ Road/track shown along southeast boundary; and ▪ Telegraph line along the southeast boundary. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> ▪ A track is shown broadly following the present-day access track; ▪ Waterfall (later labelled the Falls of Cruachan) shown in present-day location; and ▪ Sheepfold onsite on present-day access track. 	<p><u>East Area:</u></p> <ul style="list-style-type: none"> ▪ Rough pasture/heathland surrounding the Site; ▪ Allt Mhoille located immediately east; ▪ Castle (ruins) ~400m northeast; ▪ Sheepfold ~250m north, adjacent to the Allt Mhoille; ▪ Sheepfold ~50m southeast ▪ Four buildings labelled 'Corries' ~250m north; and ▪ 'Drishraig' building and gardens ~100m southeast. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> ▪ Rough pasture/heathland surrounding the Site.
1:10,560 – 1900	<u>East Area:</u>	<u>East Area:</u>

Dates/ Sources	Onsite	Offsite
	<ul style="list-style-type: none"> Mineral railway enters northern corner passing along west boundary and exiting in the south; and Possible buildings/hard standing shown on southeast boundary. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> Track (Old Military Road) constructed; and Callander & Oban Railway constructed. 	<ul style="list-style-type: none"> Ben Cruachan Quarry ~4600m northwest; and Callander & Oban Railway constructed ~70m south. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> Callander & Oban Railway constructed.
No significant recorded land use changes were recorded on the available mapping following the 1900 map until the 1973 – 1976 map		
1:10,000 – 1973-1976	<p><u>East Area:</u></p> <ul style="list-style-type: none"> Mineral railway now labelled as a track; Electrical transmission line (ETL) cuts through Site on NE to SW axis; and Cruachan Buildings are labelled on the southwest Site boundary. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> Cruachan Power Station has been constructed and the north of the Site has been dammed to form Cruachan Reservoir; Pit (disused) is labelled adjacent to the access track; and Access track has been constructed. 	<p><u>East Area:</u></p> <ul style="list-style-type: none"> Four disused quarries in the area of Ben Cruachan Quarry ~480m northwest at the closest point; A reservoir is noted in the location of one of the former quarries; and Hotel constructed ~ 30m southwest. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> No significant change.
1:2,500 – 1984	<p><u>East Area:</u></p> <ul style="list-style-type: none"> No significant change. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> Electricity substation adjacent to the dwellings at St Conran's Road. 	<p><u>East Area:</u></p> <ul style="list-style-type: none"> Pit disused ~ 70m east. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> Filling station ~80m south of access track; Quarry disused ~100m south of access track; and Sewage works ~110m south of access track.
1:2,500 – 1995	<p><u>East Area:</u></p> <ul style="list-style-type: none"> No significant change. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> No significant change. 	<p><u>East Area:</u></p> <ul style="list-style-type: none"> No significant change. <p><u>West Area and Access Track:</u></p> <ul style="list-style-type: none"> No significant change.
1:10,000 – 2001	<p><u>East Area:</u></p>	<p><u>East Area:</u></p>

Dates/ Sources	Onsite	Offsite
	<ul style="list-style-type: none"> No significant change. <u>West Area and Access Track:</u> <ul style="list-style-type: none"> Sheepfold no longer labelled but building still shown. 	<ul style="list-style-type: none"> No significant change. <u>West Area and Access Track:</u> <ul style="list-style-type: none"> No significant change.
1:10,000 – 2010	<u>East Area:</u> <ul style="list-style-type: none"> No significant change. <u>West Area and Access Track:</u> <ul style="list-style-type: none"> No significant change. 	<u>East Area:</u> <ul style="list-style-type: none"> No significant change. <u>West Area and Access Track:</u> <ul style="list-style-type: none"> No significant change.
1:10,000 – 2022	<u>East Area:</u> <ul style="list-style-type: none"> No significant change. <u>West Area and Access Track:</u> <ul style="list-style-type: none"> No significant change. 	<u>East Area:</u> <ul style="list-style-type: none"> No significant change. <u>West Area and Access Track:</u> <ul style="list-style-type: none"> No significant change.

- 6.5.9 Although not shown on the historical mapping or aerial photography, it is understood from personal communication with the landowner that a compound area associated with the construction of Cruachan Power Station is known to have been situated in the East area in the 1960's.

Geology

- 6.5.10 According to the available BGS information shown in **Figure 6.1 – Geological Map**, superficial deposits are absent across the majority of the site area apart from the following specific areas:
- The area of Coire Cruachan to the north of Cruachan Reservoir - the superficial deposits underlying this area largely comprise Hummocky Glacial Deposits of Diamicton, Sand and Gravel; and
 - The area to the northeast of the A85/site access junction including the lower 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).
- 6.5.11 The depth of the superficial deposits is unknown. Where development (including Cruachan 1, road and railway land etc.) has taken place, localised areas of Made Ground are likely to be present.
- 6.5.12 The BGS information indicates that peat deposits are not shown to be present at the site.
- 6.5.13 The bedrock geology below the proposed development is of the Argyle 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 lower 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

- 6.5.14 The baseline hydrogeology at the site is summarised in Table 6.8 below.

Table 6.8: Hydrogeology

Item and Source	Details
Aquifer Classification	<p>According to SEPA's water classification hub for groundwater, there is no superficial aquifer beneath the Site.</p> <p>The Site is underlain by bedrock aquifers. Broadly to the south of Cruachan Reservoir is the Oban and Kintyre (ID 150698) and Cruachan Reservoir and land to the north is the Upper Glen Coe bedrock aquifer (ID 150693). According to SEPA, both were in good condition in 2020 (the latest available data).</p> <p>The aquifers are recorded to be low productivity aquifers where small amounts of groundwater are in/near the surface weathered zone and fractures. Flow is virtually all through fractures and other discontinuities.</p>
Depth to Groundwater	Unknown.
Groundwater Flow Direction	Generally anticipated to follow local topography descending southwards to Loch Awe.
Groundwater Abstraction	<p>An information request was issued to the LPA and SEPA. A response from SEPA is pending at the time of writing.</p> <p>The LPA noted four known onsite private water supplies (PWS) listed below (site reference, source name, eastings northings, class):</p> <ul style="list-style-type: none"> ▪ AABOL0001, Cruachan Power Station, 207900 726800, A1; ▪ AABOL0010, Cruachan Construction Site, 20790 726800, A1; ▪ AABOL0011, Lochawe Village Supply, 211411 727022, B; and ▪ AABOL0699, Railway Cottages, 207900 726900, B <p>Information on private water supplies is included in Chapter 7 Hydrology.</p>
Groundwater Vulnerability	<p>The underlying bedrock Oban and Kintyre aquifer and Upper Glen Coe aquifers have a low permeability.</p> <p>The superficial soils in the East Area are noted to be between very low and high permeability.</p> <p>SEPA Water Classification Hub 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.</p> <p>Due to the Good water status and the predominantly low permeability of the underlying bedrock geology, the groundwater is considered to be moderately sensitive.</p>
Groundwater Flood Risk - The scope of this chapter does not include a flood risk assessment. The flood risk assessment is covered in Appendix 7.2	The Information contained in the Desk Study suggests that the highest risk of groundwater flooding at the Site is low (on a scale of negligible to high). The highest risk within 50m is also low.
Nitrate Vulnerable Zones (NVZ)	The Site is not within a NVZ.

Item and Source	Details
Drinking Water Protected Area (Groundwater)	The vast majority of Scotland falls within a groundwater Drinking Water Protected Area, including the Site.

Hydrology

- 6.5.15 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.
- 6.5.16 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.

Table 6.9: Summary of Surface Water Related Information

Item and Source	Details
<p>Features</p> <p>Groundsure Report and SEPA (https://www.sepa.org.uk/data-visualisation/water-environment-hub/)</p>	<p>Loch Awe is located immediately south of the Site and flows in a westerly direction. The water quality of Loch Awe has been classified by SEPA as Moderate ecological overall condition in 2020 (the latest available data). The reason for the Moderate ecological condition is not known.</p> <p>The Allt Mhoille to the east of the Site is part of the River Awe catchment and has been classified by SEPA as Good ecological overall condition in 2020 (the latest available data).</p> <p>Allt Cruachan enters the Site from the north, flows southwards into Cruachan Reservoir, then Cruachan Reservoir south to Loch Awe.</p> <p>Several small watercourses also pass through the Site broadly flowing southwards.</p>
<p>Abstractions</p> <p>Groundsure Report, SEPA, Local Authority</p>	<p>An information request was issued to the LPA and SEPA. A response from SEPA is pending at the time of writing. The LPA noted four known PWS listed below (site reference, source name, eastings northings, class).</p> <ul style="list-style-type: none"> ▪ AABOL0001, Cruachan Power Station, 207900 726800, A1; ▪ AABOL0010, Cruachan Construction Site, 20790 726800, A1; ▪ AABOL0011, Lochawe Village Supply, 211411 727022, B; and ▪ AABOL0699, Railway Cottages, 207900 726900 B <p>Fourteen additional PWS were mentioned, primarily cottages located in and near to Lochawe (see Appendix E).</p> <p>It is not known which of these abstractions are from surface water or groundwater.</p>
<p>Discharge Consents</p> <p>Groundsure Report</p>	<p>The Groundsure Report reviewed as part of the desk study does not provide information on surface water abstractions.</p>

Item and Source	Details
	An information request was issued to SEPA. A response from SEPA is pending at the time of writing.
Drinking Water Protected Area (Surface Water) https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/	The East Area is shown to fall within a Surface Water Drinking Water Protected Area. DWPA mapping appears to surround the Allt Mhoille (east of the Site) and Loch Awe to the south.
River Flood Risk - The scope of this chapter does not include a flood risk assessment. The flood risk assessment is included in Appendix 7.2 . Groundsure Report, SEPA	SEPA indicates very localised flooding may occur at Allt Cruachan in the west and along the eastern Site boundary at the Allt Mhoille. The highest flood risk onsite and within 50m of the Site is estimated to be 1 in 30 year (3.33%) greater than 1m.

- 6.5.17 Given the relatively close proximity of the Loch Awe and the Allt Mhoille to the Site, and the drinking water protected area (surface water), surface water has been identified as a sensitive receptor and is taken forward for further consideration in this assessment.

Ecological Setting

- 6.5.18 A full description of the ecological baseline is provided in **Chapter 8**. Based on the presence of several ecological designations within the Site boundary (including Coille Leitire SSSI, Loch Etive Woods SAC and Glen Etive and Glen Fyne SPA), ecology has been identified as a sensitive receptor and is taken forward for further consideration in this ground conditions assessment.

Land Stability

Potential for Compressible Ground Stability

- 6.5.19 The BGS data indicates that peat is not present at the site however the SNH Carbon and Peatland Map 2016 indicates that two areas of the site may contain identified peatland soil. For each of the areas of the site where surface development is proposed then this was investigated visually and by initial peat probing during the site walkover.
- 6.5.20 For the western area lower inlet/outlet area it was confirmed that no peat is present due to the presence of existing Cruachan 1 infrastructure, road and railway, very steep slopes and bedrock at surface.
- 6.5.21 For the western area it was confirmed that insitu peat is not present. During the walkover it was observed that the ground conditions at the Site presently comprise a thickness of soft mixed material comprising organic soil with gravel and cobbles. At the proposed locations it is understood that insitu soil was removed to form a temporary compound area for a recent filming project at the location.
- 6.5.22 For the eastern area it was confirmed that a layer of peat or thin organic soil is present across the Site. This is illustrated on **Figure 6.2 – Peat Survey**. The peat was recorded to be variable in thickness across the site, ranging up to a maximum thickness of 2.20m at a single location, a general peat depth of <1.00m has been encountered.

- 6.5.23 A detailed peat probing survey on a 10m grid peat was undertaken in the east area in April 2022 and is summarised in Table 6.10 showing the number of locations and corresponding percentage of the total results, for each depth category.

Table 6.10: Summary of Organic Soil and Peat Depth Probing Results

Surveyed Depth, m	Number of Probe Points	Percentage of Total Probe Points
<0.5	705	77.73%
0.5 – 1.0	140	15.44%
1.0 – 1.5	52	5.73%
1.5 – 2.0	9	0.99%
2.0 – 2.2	1	0.11%

- 6.5.24 Peat is highly compressible and is not considered to be suitable from a geotechnical perspective for foundation support. Peat soil has high permeability, porosity, compressibility and consolidation settlement, low pH, low bulk density, low bearing capacity and low shear strength. In particular peat is problematic in that if it is subjected to compressive stress, for example due to additional foundation load, then it is prone to excessive settlement.
- 6.5.25 Consideration of this hazard will be used to inform earthworks, the development layout (areas of deep peat will be excluded from development) and the foundation design of the lower compound area.
- 6.5.26 The disturbance of the peat deposits will be avoided where possible in general accordance with Policy 79: Protection of Soil and Peat Resources. A Peat Management Plan (PMP) (**Appendix 6.2**) has been prepared which sets out the measures to protect the peat deposits and if disturbance is necessary, the measures to limit the disturbance of the peat. More details of the PMP are in **Section 6.7 – Embedded Mitigation**.

Potential for Landslide Ground Stability

- 6.5.27 A peat slide occurs when a portion of the peat mass becomes detached and flows downhill, usually as blocks of solid peat rafted upon a slurry of semi-liquid peat. Peat failures may have a significant effect on river water quality and ecology.
- 6.5.28 This hazard will be considered in line with current guidance. This will be used to inform earthworks, the development layout, road, and foundation design.
- 6.5.29 The geotechnical properties of the soil and bedrock materials will require assessment prior to the development.
- 6.5.30 Geotechnical issues with respect to the proposed development will be managed through appropriate foundation, structural and drainage design and are not considered to be inherent to this environmental assessment, and as such, ground stability is not considered any further for the purposes of this EIA.

Summary of Identified Sensitive Receptors

- 6.5.31 In terms of this ground conditions assessment, sensitive receptors include development and maintenance workers, future users, surface and groundwater and proposed buildings and structures, as shown in **Table 6.11** below.

Table 6.11: Summary of Sensitivity of Potential Receptors

Receptor	Sensitivity	Comment
Human Health - Site Workers	High	Ground workers and construction workers are likely to come into direct contact with soils, albeit for a short period of time.
Human Health - Future Site Users	High	Future users include employees and visitors who will have variable exposure scenarios to the ground conditions.
Human Health - Neighbours	High	Off-site workers, visitors and residents including potential groundwater users.
Water Environment - Groundwater Resources	High	The superficial and bedrock aquifers beneath the Site have been classified by SEPA as being in good condition, with a target of continuous improvement.
Water Environment - Surface Water Resources	High	The site is immediately adjacent to Loch Awe, Allt Mhoille and Allt Cruachan. Allt Mhoille is within a drinking water protected area and is in good condition according to SEPA. Loch Awe is in Moderate condition according to SEPA.
Property – Built Environment	Moderate	The site contains listed buildings and Cruachan Power Station buildings structures which are nationally important.
Property - Built Environment	Moderate	Proposed buildings are potentially at risk from aggressive ground conditions caused by low pH or high sulphate and from the build-up of gases in confined spaces.
Ecological Systems and Geodiversity	High	Several designations onsite including SSSI, SAC, SPA, GCR site and ancient woodland
Soil Resources	Moderate	Identified Peatland Soil

6.6 Baseline Evolution and Expected Future Baseline

- 6.6.1 In the absence of the proposed development, the future baseline conditions would likely remain consistent with the existing ground conditions on Site.

6.7 Embedded Mitigation

- 6.7.1 As detailed in **Chapter 3**, a number of design features and embedded mitigation measures have been incorporated into the design and construction of the proposed development to avoid, prevent, or minimise significant adverse environmental effects and to enhance the beneficial effects.
- 6.7.2 The embedded mitigation measures of relevance to this assessment are set out below.
- Development and implementation of a Construction Environmental Management Plan (CEMP) including constituent Site Waste Management Plan (SWMP). Of relevance to this assessment, the CEMP will include measures relating to the following as standard: contractor management, materials storage, working methods and physical controls to avoid disturbance to areas of the site outside of the proposed development footprint, and standard measures and procedures to manage sources of potential pollution (e.g. fuel and other chemical spillages, concrete contamination, sediments, silts, grits and other pollutants) such that no pollution would be capable of reaching the water environment. This will be through suitable site management practises using bunds and containment systems, and or suitable treatment or settlement facilities. As part of the CEMP, the SWMP will be prepared as a live document to minimise and manage construction waste effectively;

- Where ground improvement or piling techniques are required, contamination aspects of the site as identified in this assessment and associated technical appendices must be carefully considered such that pathways are not created for contaminants to travel from the upper strata downwards. Cognisance of the site conditions, following any necessary remediation, will be required and method statements produced and adhered to accordingly;
- Ground and construction workers will be required to develop appropriate standard Risk Assessments and Method Statements (RAMS) and undertake works in accordance with these RAMS;
- Deep Peat Avoidance and Peat Management - where possible, the design and layout of the proposed development avoids known areas of deep peat. The following has been applied in the design of the proposed development and will be implemented during construction: (1) Prevent creation of waste peat, (2) Use peat on site or offsite in peatland restoration, (3) Recycle / Recover, and (4) Disposal;
- Micrositing during the detailed design phase to further avoid areas identified as of high risk of instability;
- Excavated materials taken to temporary storage areas positioned at safe slope gradients and certified by a geotechnical engineer;
- Earthworks and any excavation will be designed and undertaken in such a way as to avoid any excavation of slope toe support material. The excavation of any temporary slopes would be fully designed; and
- A Geotechnical Risk Register will be completed as part of the design phase and geotechnical supervision will be provided throughout construction.

6.8 Assessment of Likely Effects

Construction

- 6.8.1 This section is an assessment of the potentially significant effects from the proposed development on the sensitive receptors identified in [Section 6.5](#) (summarised in [Table 6.11](#) above). It also considers the effects of potentially contaminated ground or groundwater conditions on the Proposed Development.
- 6.8.2 The assessment of effects takes the embedded mitigation (identified in [Section 6.7](#) above) into account.

Soil Resources – Peat

- 6.8.3 The BGS mapping indicates that no peat is expected to be present on the site however the SNH Carbon and Peatland Map 2016 indicates that two areas of the site may contain identified peatland soil. The area around the upper works and upper section of the access track is underlain by Class 3 to Class 5 land which is further described as *‘predominantly peaty soil with some peat soil to no peatland habitat recorded, may include areas of bare soil and soils are carbon-rich and deep peat’*. Class 3 to 5 land is not considered to be land which contains nationally important carbon-rich soils.
- 6.8.4 The lower site compound area in the east of the site is underlain by Class 1 land, further described as peat soil. Peat soil is described in the map data as *‘poorly drained soils with an organic surface layer more than 0.5m thick’*. Detailed peat probing in this area has indicated that the majority (78%) of the area is underlain by a soil surface layer of less than 0.5m thick.
- 6.8.5 Ground gases such as CO₂ and CH₄, both greenhouse gases (GHGs), are stored in peat soils, and if disturbed, can be released into the atmosphere, effectively altering the exchange of CO₂ and CH₄. The disturbance and degradation of peat can be considered a medium to long term adverse environmental effect. The Proposed Development will inevitably entail some disturbance of peat

deposits, however the embedded mitigation measures as outlined in **Section 6.7** above, such as the design of the proposed development to avoid construction on areas of peat will be utilised. Therefore, there is anticipated to be a **moderate** adverse effect on a receptor of **medium** sensitivity, resulting in a **moderate** significance of effect without further mitigation.

Human Health – Ground and Construction Workers

- 6.8.6 The Preliminary Risk Assessment presented in the Desk Study (Stantec 2022, **Appendix 6.1**) suggests that the potential for contamination to be present as a result of past and present activities on the site is typically Low. The risk to site workers during the construction works relates to the risk of skin contact, inhalation and ingestion of dust and contaminated material on the site (if present). In accordance with current health and safety legislation, the contractor will be required to adopt measures to mitigate the risk to site workers.
- 6.8.7 Potential for localised contaminants were identified during the preliminary ground condition assessment, at the upper compound and lower compound areas, as well as naturally occurring Peat which can produce ground gasses. However, the likelihood of severe / mobile contaminations is considered low.
- 6.8.8 Humans are generally considered highly sensitive receptors. Without prior knowledge of the Site or appropriate planning and mitigation measures, construction workers' health could potentially be adversely affected by contamination. However, assuming that appropriate mitigation measures are put in place through the development of method statements, the sensitivity of construction workers drops to **Low**.
- 6.8.9 Most of the groundwork will involve tunnelling through the bedrock and contact with shallow superficial deposits and groundwater (where contamination is most likely to be present) will be very limited. Exposure to soils will likely be short term.
- 6.8.10 Once the embedded mitigation has been implemented, the construction phase of the proposed development is likely to have a direct Minor magnitude of impact and therefore a **Negligible** effect on construction workers.

Human Health – Neighbours

- 6.8.11 The Preliminary Risk Assessment presented in the Desk Study (Stantec 2022, **Appendix 6.1**) suggests that the potential for contamination to be present as a result of past and present activities on the site is typically Low. However, measures will be adopted to mitigate the risk to offsite users associated with air borne or settled dust arising from areas of potentially contaminated land. Such measures will include the selection of appropriate methods to reduce disturbance to the existing near-surface soils present on the Site, such as the spraying of stockpiles and other large, unsealed surfaces to limit the risk of generating air borne dust and covering of excavated materials.
- 6.8.12 Dust mitigation measures may be required in the event of prolonged warm dry weather.
- 6.8.13 Once the embedded mitigation has been implemented, the construction phase of the proposed development is likely to have an indirect **Minor Adverse** magnitude of impact on neighbours (high sensitivity) and therefore a **Minor Adverse effect** overall.

Water Environment (Groundwater and Surface Resources)

- 6.8.14 There is potential for contamination of the groundwater during the construction phase of the project due to fuels/oils stored on site or in construction plant, where excavations are undertaken, and where material is stockpiled on site. Run off from excavations or stockpiles has the potential to create a pathway between contamination (silt, acid generating rock spoil) and the surface water. Piled foundations may be necessary for the proposed development. Piling has the potential to create a pathway between contamination (such as leaks or spills of fuels/oils) to the groundwater, causing a short-term adverse effect.
- 6.8.15 During the construction phase, as vegetation is stripped or disturbed and during earthworks, there is an increased likelihood of run-off causing a short-term adverse effect to the onsite watercourse through an increase in suspended solids. Furthermore, surface waters can be subject to pollution

through accidental spillages or leaks of fuels/oils from construction plant. This can be minimised through the effectively implementation of a CEMP in accordance with the conditions of the CAR regulations and a CAR licence from SEPA (details in **Chapter 7 Hydrology and Flood Risk**), as outlined in **Section 6.7** above. Once the embedded mitigation has been taken into account, there is anticipated to be a **Minor Adverse** magnitude of impact (high sensitivity receptor) and therefore a **Minor Adverse** effect overall.

Operation

Human Health (Current and Future Users)

- 6.8.16 Once the development has been constructed, the risk to onsite current and future users is considered to be **Negligible**.

Built Environment

- 6.8.17 The built environment, including foundations and services, can be affected by aggressive ground conditions, particularly sulphates and acids. Ground conditions will be assessed through intrusive investigation and analysis and the findings will inform the design of the future development – such as the use of sulphate resistant concrete (if required). Once the embedded mitigation has been implemented, the operational phase of the proposed development is likely to have a **Minor magnitude of impact** on the built environment (**moderate** sensitivity) and therefore a **Negligible** significance of effect.
- 6.8.18 In relation to ground instability, subject to appropriate ground investigation, geotechnical assessment and design, it is not anticipated that there will be any effects during operation of the Proposed Development.

6.9 Further Mitigation and Enhancement

- 6.9.1 Given the potential for peat deposits to be present on site, a Peat Management Plan (PMP) has been prepared and is included as **Appendix 6.2**. This has been prepared to set out measures proposed to manage the peat habitat at the site, firstly to avoid the peat habitats during construction where possible, and secondly, where this is not possible, that peat is handled effectively with minimal loss of carbon to the atmosphere. The PMP is based on site specific information available at the time of writing, with the final PMP to be subject to discussion and approval by SEPA prior to implementation.
- 6.9.2 A Site Investigation will be undertaken to better understand geotechnical and geo-environmental conditions within the site and to assess risks associated with identified land stability and contamination (of ground and groundwater). This will be completed within the detailed design phase prior to the commencement of the construction phase of the proposed development.

6.10 Residual Effects

- 6.10.1 Taking account of all proposed mitigation and enhancement measures, the likely residual effects from the construction and operation of the proposed development are identified in **Table 6.12** below.

Table 6.12: Summary of Likely Residual Effects

Development Phase	Receptor	Embedded Mitigation	Further Mitigation	Assessment of Residual Effect Level and Significance
Construction	Soil resources (peat)	Implementation of the SWMP Proposed Development design to avoid and minimise the disturbance of peat	Implementation of the PMP	Negligible <i>Not significant</i>
	Human Health (ground and construction workers)	Implementation of the CEMP Prepare RAMS and undertake work accordingly		Negligible <i>Not significant</i>
	Human Health (neighbours)	Implementation of the CEMP Prepare RAMS and undertake work accordingly		Minor <i>Not significant</i>
	Groundwater and Surface Water	Implementation of the CEMP Appropriate pile design and methods should be informed by the Environment Agency recommended risk assessment framework (EA, 2001). Where stockpiles of material then suitable surface water control and treatment should be in place. Working within good practice guidelines, in accordance with the CEMP and CAR regulations to prevent soil runoff from entering the surface water.		Minor <i>Not significant</i>
Operation	Human Health (future users)			Negligible <i>Not significant</i>
	Built Environment			Negligible <i>Not significant</i>

6.11 Monitoring

- 6.11.1 No monitoring is considered to be proportionate or required in relation to the predicted residual (not significant) effects of the proposed development.

6.12 Cumulative Effects

- 6.12.1 It considered that there is no potential for significant cumulative effects to occur on ground conditions, including geology, soil resources, groundwater, surface water and land contamination due to the physical separation of the site from any relevant cumulative developments.

6.13 Referencing

- Stantec (2022) Cruachan Expansion Project Preliminary Report on Ground Conditions.
- ABC (2015) Argyle and Bute Local Development Plan 2015.
- ABC (2019) Argyle and Bute Proposed Local Development Plan 2 2019.
- 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.
- 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.
- EA (2020) Land contamination risk management (LCRM), available: <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm> , accessed on 10/05/2021.
- EA (2004) The Model Procedures for the Management of Land Contamination, Contaminated Land Report (CLR) 11. Environment Agency, Bristol.
- BSI (2015) BS 5930:2015+A1:2020 Code of practice for ground investigations. British Standards Institute, London.
- BSI (2011) BS 10175:2011+A2:2017 Investigation of potentially contaminated sites – Code of practice. British Standards Institute, London.
- 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.
- SEPA (2014) Position Statement (WAT-PS-10-01) Assigning Groundwater Assessment Criteria for Pollutant Inputs v3.0. Scottish Environmental Protection Agency.
- SEPA (2020) Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters versions v7.1. Scottish Environmental Protection Agency.
- 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%20contaminatio.>
- NetRegs (2022) 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/>.

7 Hydrology

7.1 Introduction

7.1.1 This chapter provides an assessment of the likely significant effects of the Proposed Development 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.

7.1.2 The project has the potential for effects to the water environment during the construction phase such as mobilisation by wind and rainfall-runoff of stockpiled material into Loch Awe, and during the operational phase as a result of potentially contaminated surface water drainage from the quayside elements entering the loch, and the construction of the quayside structure itself on flood risk.

7.1.3 This chapter has links with other topic chapters including **Chapter 6 – Ground Conditions**.

7.1.4 This chapter is supported by the following figure(s) and appendices:

- Cruachan 2 Environmental Impact Assessment: ‘Understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe’ technical note (**Appendix 7.1**);
- Flood Risk Assessment (**Appendix 7.2**);
- **Figure 7.1** - Hydrology Baseline Conditions; and
- Policy Context, Legislation, Guidance and Standards

7.1.5 There are various pieces of legislation, guidance, policy and standards relevant to the assessment of impacts of development on hydrology, and the key provisions relating to this are outlined below.

Water Framework Directive (2000/60/EC) (**Ref.1**)

7.1.6 The Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the protection, improvement, and sustainable use of all water environments. It is transposed into Scot’s law by The Water Environment and Water Services (Scotland) Act 2003 and subsidiary Regulations for the purpose of ensuring the development of Scotland’s water resources.

The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act (2003) (**Ref.2**)

7.1.7 This Act consolidates previous legislation relating to salmon and freshwater fisheries in Scotland.

The Private Water Supplies (Scotland) Regulations (2006) (**Ref.3**)

7.1.8 These regulations are Scotland’s main regulations governing the quality of water supplied by private water supplies.

7.1.9 The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 also govern the quality of private water supplies for human consumption.

Flood Risk Management (Scotland Act) 2009 (**Ref.4**)

7.1.10 This Act introduced a framework for the assessment and management of flood risks, with a sustainable approach to flood risk management that is suited to current needs and can accommodate the impacts of climate change.

The Water Environment (Controlled Activities) (Scotland) Regulations (2011) (Ref.5)

- 7.1.11 These Regulations (CAR) were introduced to provide controls on a range of activities likely to have effects on the water environment, including impoundments, abstractions, engineering in or near the water environment, discharges and diffuse pollution. The CAR also provides protection of groundwater by controlling the discharge of certain substances to the water environment, including all pesticides.

The Reservoir (Scotland) Act (2011) (Ref.6)

- 7.1.12 This Act makes provision for the regulation of the construction, alteration, and management of certain reservoirs, in particular in relation to the risk of flooding from such reservoirs.

The Water Resources (Scotland) Act 2013 (Ref.7)

- 7.1.13 This Act contains provisions which bring large-scale abstractions from the water environment under Scottish Ministers' control. It also imposes a duty on Scottish Ministers to "take such reasonable steps as they consider appropriate for the purpose of ensuring the development of the value of Scotland's water resources" and "do so in ways designed to promote the sustainable use of the resources."

The Public Water Supplies (Scotland) Regulations 2014 (Ref.8)

- 7.1.14 These Regulations contain provisions aiming to protect the quality of water supplied by Scottish Water.

Policy

Scottish Planning Policy (SPP) (2014) (Ref.9)

- 7.1.15 The SPP recommends that planning in Scotland should encourage the following with regards to flood risk:
- A precautionary approach to flood risk from all sources, including coastal, water course (fluvial), surface water (pluvial), groundwater, reservoirs and drainage systems (sewers and culverts), taking account of the predicted effects of climate change;
 - Flood avoidance: by safeguarding flood storage and conveying capacity, and locating development away from functional flood plains and medium to high-risk areas;
 - Flood reduction: assessing flood risk and, where appropriate, undertaking natural and structural flood management measures, including flood protection, restoring natural features and characteristics, enhancing flood storage capacity, avoiding the construction of new culverts, and opening existing culverts where possible; and
 - Avoidance of increased surface water flooding through requirements for Sustainable Drainage Systems (SuDS) and minimising the area of impermeable surfaces (Paragraph 255).
- 7.1.16 In summary, the policy states that proposed developments should be sited away from areas which have a high probability of flooding where possible and should not cause any increase in flood risk elsewhere.

Scottish Government Planning Advice Notes (PANs)

- 7.1.17 PANs set out detailed advice in relation to relevant planning issues. Those applicable to this chapter include:

- PAN 61: Planning and Sustainable Urban Drainage Systems (2001) ([Ref.10](#));
- PAN 79: Water and Drainage (2006) ([Ref.11](#)); and
- Flood Risk: Planning Advice (2015) ([Ref.12](#)).

Design Manual for Roads and Bridges (DMRB) ([Ref.13](#))

- 7.1.18 The DMRB contains technical standards and advice notes relating to road design, and is overseen by National Highways, Transport Scotland, Welsh Government, and the Department for Infrastructure (Northern Ireland).
- 7.1.19 The sections of the DMRB applicable to the water environment include Volume 11, Section 3, Part 10 (LA 113 Road drainage and the water environment: formerly HD 45/09 – Road Drainage and the Water Environment).
- 7.1.20 In addition to the DMRB, the following documents are still applicable to trunk roads projects 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

- 7.1.21 Guidance developed by SEPA, relevant to this chapter includes:
- Land Use Planning System Guidance Note 2a: Development Management Guidance on Flood Risk (Version 2) (SEPA, 2018) ([Ref.14](#)), supported by the Planning Background Paper: Flood Risk (SEPA, 2018) ([Ref.15](#));
 - Land Use Planning System Guidance Note 2b: Development Management Guidance on the Water Environment (Version 2) (SEPA, 2017) ([Ref.16](#)), supported by the Planning Background Paper: Water Environment (SEPA, 2018) ([Ref.17](#));
 - SEPA Flood Risk Standing Advice for Planning Authorities and Developers (SEPA, 2020) ([Ref.18](#));
 - Land Use Planning System Guidance Note 19: Planning Advice on Waste Water Drainage (SEPA, 2011) ([Ref.19](#));
 - Land Use Planning System Guidance Note 2: Planning Advice on Sustainable Drainage Systems (SUDS) (SEPA, 2010) ([Ref.20](#));
 - Climate Change Allowances for flood risk assessment in land use planning (SEPA, 2019) ([Ref.21](#));
 - Flood Risk and Land Use Vulnerability Guidance (SEPA, 2018) ([Ref.22](#)); and
 - Reservoir Inundation Maps – potential use for Land Use Planning ([Ref.23](#)).

Argyll and Bute Council Local Development Plan (LDP) ([Ref.24](#))

- 7.1.22 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 its administrative area. The policy relevant to this chapter is Policy LDP 3 - Supporting the Protection, Conservation and Enhancement of our Environment.

- 7.1.23 The Argyll and Bute LDP is supported by a suite of statutory Supplementary Guidance (SG). SG LDP Policy ENV 7 Water Quality and the Environment is relevant to this chapter.
- 7.1.24 The LDP2 will replace the current LPD and is currently in preparation. The plan will cover all of the ABC area, apart from the Loch Lomond and Trossachs National Park Area (LLTNP), where a separate Local Development Plan is prepared by the National Park Authority.

Highland and Argyll Local Plan District: Local Flood Risk Management Plan (2016 2022) Ref.25)

- 7.1.25 This document supports the Flood Risk Management (Scotland) Act 2009, by identifying flood risks in the Highland and Argyll Local Plan District and setting out objectives and actions to reduce flood risk in the District.

7.2 Consultation

- 7.2.1 Table 7.1 provides a summary of the consultation activities undertaken in support of the preparation of this chapter.

Table 7.1: Consultation Summary

Reference	Comment	Response
Scoping Opinion		
Argyll Salmon Fisheries Board Scoping Response	The current scheme abstracts water from several different watercourses in the Awe and neighbouring catchments. It is unclear at this time how the expansion will affect these watercourses and if improvements in the compensation flows are to be made to bring them up to current standards for new developments. We also require more information on the effects of increased water discharge created by the expansion of the current scheme. The changes to loch level have potential to influence the flows in the River Awe as regulated by Scottish & Southern Energy. We need to be assured of the working arrangements between the two operators considers the potential for exacerbation the discharge of water into the River Awe, particularly during flood flow releases following storm events.	As has been previously indicated in the technical note 'Cruachan 2 Environmental Impact Assessment: understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe', which was appended to the EIA Scoping Report, the expansion is not anticipated to have an impact on current abstractions and Loch levels are not expected to fundamentally change. This note has been updated and included in this EIA Report in Appendix 7.1 . The results are also summarised in Section 7.10 of this chapter.
Glenorchy and Innishail Community Council Scoping Response	There is concern within G&ICC about the construction and operation of Cruachan II with regards to control of the water level of Loch Awe and destruction of water margins. G&ICC ask that consideration be given to the community around Loch Awe and the impact that the artificially controlled loch level has on the land around the loch. What effect will the operation of another pumped storage scheme have on what to us as a	As has been previously indicated in the technical note 'Cruachan 2 Environmental Impact Assessment: understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe', which was appended to the EIA scoping report, Loch Awe levels are not expected to fundamentally change as a result of the proposed development, therefore there is no anticipated impact upon water

Reference	Comment	Response
	community is Loch Awe, the longest freshwater loch in Scotland, but to DRAX and SSE is the Loch Awe Reservoir.	margins around the Loch. This note has been updated and included in this EIA Report in Appendix 7.1 . The results are also summarised in Section 87.10 of this chapter.
SEPA Scoping Response	<p>Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) 2.3. The proposed scheme will require an authorisation from us under CAR. We therefore welcome the intention to twin track the CAR and Section 36 applications. The quayside infrastructure is also likely to require an engineering licence for construction of “in-loch structures with total area of < or >500m²” although it may be possible to apply to vary the existing Water Resource licence and include this activity in that, assuming some of that infrastructure is permanent.</p> <p>Other elements of the scheme must be designed to avoid impacts upon the water environment. If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided.</p> <p>While we welcome that the water levels will not be any higher in Loch Awe than at present, we recommend this, and the underpinning rationale, is reported in the EIAR.</p>	<p>The applicant intends to consult with SEPA and submit a CAR application in parallel to the S36 submission. The EIA Report contains a map showing all proposed temporary or permanent infrastructure overlain with all lochs and watercourses, including a buffer of at least 10m drawn around each loch or watercourse as Figure 7.1 Where this minimum buffer cannot be achieved, the required information is provided for each breach.</p> <p>There is no change to the current abstraction of the Loch (covered by current CAR license). There are no groundwater abstractions or dewatering proposed.</p> <p>The rationale underpinning the outcomes that water levels will not be any higher in Loch Awe than at present was a key output of the technical note 'Cruachan 2 Environmental Impact Assessment: understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe', which was appended to the EIA scoping report. This note has been updated and included in this EIA Report in Appendix 7.1. The results are also summarised in Section 7.10 of this chapter.</p>
Argyll and Bute Council Scoping Response	<p>It is considered by the Planning Authority to be premature at this time to scope out the following matters from the EIA:</p> <ul style="list-style-type: none"> Changes to the hydrological regime of Cruachan Reservoir and Loch Awe; and The Council and ECU are aware of an imminent proposal for a 1.5GW pumped storage proposal which would also seek to extract water from Loch Awe. Therefore, there will be a need for potential cumulative impacts upon the hydrological regime of Loch Awe to be examined. 	A cumulative effects section has been included in Section 7.11 of this Chapter which includes details of potential cumulative effects on the hydrological regime of Cruachan Reservoir and Loch Awe with the Balliemeanoch pumped storage hydro scheme.

Reference	Comment	Response
Marine Conversation Officer – Argyll and Bute Council Scoping Response	The applicant is requested to submit full details of the Surface Water Drainage Strategy, including mitigation measures within their Flood Risk Assessment. It will be important that the Proposed Development does not attribute to an increase in excess surface and ground water accumulations. It will also be important that the development does not attribute to an increase in pollution and any siltation/spoil entering Loch Awe and Cruachan Reservoir, or groundwater bodies, including private water supplies.	A Flood Risk Assessment has been prepared and included as Appendix 7.2 to the EIA Report which includes details of the Surface Water Drainage Strategy. Response noted. These measures will be included within the CEMP, a draft of which is included in Appendix 3.1 of the EIA Report.
Biodiversity Argyll and Bute Council Scoping Response	Whilst mitigation is embedded in the design principles further scoping assessment work is proposed to cover the following: 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 and potential increases in surface water runoff due to an increase in permanent impermeable surface areas during the operational phase.	Consideration of these potential effects has been considered within the EIA chapter, and mitigation is proposed as appropriate. A Flood Risk Assessment has been prepared and included as Appendix 7.2 to the EIA Report.
Energy Consent Unit Scoping Response	Scottish Ministers request that the company contacts Scottish Water and makes further enquiries to confirm whether there any Scottish Water assets which may be affected by the development and includes details in the EIA report of any relevant mitigation measures to be provided.	Information about private water supplies has been obtained from Argyll and Bute Council. Public water supplies have been requested from SEPA. Asset plans and drinking water protected areas has been requested from Scottish Water. To date no response has been received from either SW or SEPA
Argyll and Bute Council		
Registered PWS	Data request via email; 28 th May 2021, for details of The Argyll and Bute Council's records of Private Water Supplies (PWS) within a 5km distance buffer of the Proposed Development.	14 PWS are located within a 5km distance of the Proposed Development. A further three are located adjacent to the 5km buffer in the northwest the Argyll and Bute Council area and have therefore been included. Any potential impacts on these have been included in section 7.12 of this assessment.
SEPA		
Registered supplies and abstractions	Data request via email; 21 st January 2022, for details of SEPAs registered supplies and abstractions within a 5km distance buffer of the Proposed Development.	No response received.
Scottish Water		

Reference	Comment	Response
Drinking Water Protected Areas	Data request via email; 21 st January 2022, for details of whether or not there are any drinking water protected areas within the 5km buffer of the Proposed Development.	While SW have not replied, we have consulted the available maps in order to make an informed assessment.
Asset plans	Data request via email; 27 th January 2021, for details of Scottish Water Asset Plans within the Proposed Development boundary.	There are no mains water supply pipelines within 3km of Cruachan Reservoir. The closest pipeline is a 90mm mains water supply sewer located along the A85. Information obtained from the Asset Plans has been reported in this chapter.

7.3 Methodology

Study Area

- 7.3.1 The study area for the assessment of likely significant effects on the water environment encompasses a 5km radius around the Site boundary (**Figure 7.1**). This was considered appropriate to take account of 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.
- 7.3.2 Sensitive receptors outside of the Study Area have been 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

- 7.3.3 Baseline conditions within the study area have been established through a desk-based review of:
- OS mapping (**Ref.26**);
 - British Geological Survey ('BGS') data (**Ref.27**);
 - Scotland's Environmental Map (**Ref.28**);
 - SEPA Flood Maps (**Ref.29**);
 - SEPA Water Classification Hub (WFD) (**Ref.30**);
 - Scottish Water Asset Plans (**Appendix C** of the Flood Risk Assessment);
 - Drinking Water Protected Areas – Scotland river basin district: maps (**Ref.31**);
 - Argyll and Bute Local Development Plan Interactive Map, and other local planning policy (**Ref.32**);
 - Review of operational data and reports provided by Scottish and Southern Energy Renewables (SSER) and The Applicant; and
 - Consultation and data review with relevant stakeholders (e.g. Scottish Water, SEPSA and ABC) as appropriate (depending on the information already available through other studies).

Assessment

- 7.3.4 The assessment of likely significant effects resulting from the Proposed Development has considered the construction and operational phases only and assumes that all hydrology-related embedded mitigation measures will be in place ahead of the commissioning.
- 7.3.5 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/sensitivity of the receptor or attribute (i.e., its quality, scale, rarity and substitutability and ability to tolerate and recover from change);
 - Estimation of the magnitude of the impact (i.e., the size/level of the effect), and
 - Assessment of the significance of effects by combining the importance of the attribute and magnitude of the impact.
- 7.3.6 The sensitivity of a receptor is characterised by its ability to tolerate and recover from changes in the environment as well as its importance to society (i.e., protection under a statutory designation or economic value). Table 7.2 shows the criteria used to determine receptor sensitivity, with specific examples relevant to hydrology.

Table 7.2: Determining Value/Sensitivity of Resource

Sensitivity / Value of Receptor	Description	Receptor type	Example
Very High	Attribute has a high quality and rarity on a regional or national scale.	Surface Waters	EC Designated Salmonid/Cyprinid fishery. WFD High Ecological Quality. Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site).
		Groundwater	Principal aquifer providing a regionally important resource or supporting a Site protected under wildlife legislation. Source Protection Zone (SPZ) I.
		Flood Rsk	Flood plain or defence protecting more than 100 residential properties from flooding. SEPA Vulnerability Classification "Essential Infrastructure" or "Most Vulnerable" *
		Hydromorphology	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.

Sensitivity / Value of Receptor	Description	Receptor type	Example
High	Attribute has a high quality and rarity on a local scale.	Surface Waters	WFD Good Ecological Quality. Major Cyprinid Fishery. Species protected under EU or UK wildlife legislation.
		Groundwater	Principal aquifer providing a locally important resource or supporting a river ecosystem. SPZ II.
		Flood risk	Flood plain or defence protecting between 1 and 100 residential properties or industrial premises from flooding. SEPA Vulnerability Classification "Highly Vulnerable" *.
		Hydromorphology	Conforms closely to natural, unaltered state and will often exhibit well developed and diverse geomorphic forms and processes characteristic of river and lake type. Deviates from natural conditions due to direct and/or indirect channel, floodplain, bank modifications and/or catchment development pressures.
Medium	Attribute has a medium quality and rarity on a local scale.	Surface Waters	WFD Moderate Ecological Quality.
		Groundwater	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ III.
		Flood Risk	Flood plain or defence protecting 10 or fewer industrial properties from flooding. SEPA Vulnerability Classification "Least Vulnerable" *.
		Hydromorphology	Shows signs of previous alteration and / or minor flow / water level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.

Sensitivity / Value of Receptor	Description	Receptor type	Example
Low	Attribute has a low quality and rarity on a local scale.	Surface Waters	WFD Poor or Bad Ecological Quality.
		Groundwater	Unproductive strata.
		Flood Risk	Flood plain with limited constraints and low probability of flooding of residential and industrial properties. SEPA Vulnerability Classification "Water Compatible" *.
		Hydromorphology	Substantially modified bypass land use, previous engineering works or flow / water level regulation. Watercourses likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation. Watercourses may also be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches will fall into this category.

*As defined in Table 1: SEPA Land Use Vulnerability Classification in SEPA Flood Risk and Land Use Vulnerability Guidance.

- 7.3.7 Determination of the magnitude of change to the receptors, as a result of the Proposed Development, has been undertaken based on the criteria set out in Table 7.3 below.

Table 7.3: Magnitude of Change Criteria

	Magnitude of Change		Description	Example
Significant	Major	Adverse	Results in loss of attribute and/or quality and integrity of the attribute.	Pollution/remediation of potable source of abstraction resulting in failure/recovery above drinking water

	Magnitude of Change		Description	Example
		Beneficial	Results in major improvement of attribute quality.	standards. Deterioration/improvement of WFD status or deterioration/improvement of one or more of the WFD quality elements.
	Moderate	Adverse	Results in effect on integrity of attribute, or loss of part of attribute.	Loss/gain in productivity of a fishery. Contribution/reduction of a significant proportion of the effluent in a receiving river, but insufficient to change its WFD classification
		Beneficial	Results in moderate improvement of attribute quality.	
<i>Not Significant</i>	Minor	Adverse	Results in some measurable change in attribute's quality or vulnerability.	Measurable changes in attribute, but of limited size and/or proportion.
		Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.	
	Negligible	N/A	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.	Minor physical effect to a water resource, but no significant reduction/increase in quality, productivity, or biodiversity. No significant effect on the economic value of the feature.

7.3.8 The significance of an effect is derived based upon the sensitivity of the receptor and the magnitude of the change. The significance of the effect is then determined using the matrix presented at Table 7.4. The significance of an effect has also been qualified based on the likelihood of an impact occurring (using a scale of certain, likely, or unlikely).

Table 7.4: Effect Significance Matrix

		Sensitivity/Importance of Water Resource Receptor			
		Very High	High	Medium	Low
<i>Magnitude of Effect</i>	Major	Substantial	Major	Moderate	Negligible
	Moderate	Major	Moderate	Minor to Moderate	Negligible
	Minor	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

7.3.9 The significance criteria set out in Table 7.4 are further explained in Table 7.5. In the absence of 'industry standard' significance criteria for the consideration of hydrology, water resources and flood

risk impacts, a qualitative approach, based upon available knowledge, experience and professional judgement is employed.

- 7.3.10 Effects have been classified as either permanent or temporary, where appropriate. Permanent changes are those which are irreversible (e.g., permanent land take), will last for the foreseeable future or are effects considered to last greater than ten years. The duration of temporary environmental effects is defined as follows:
- Short-Term – Less than two years;
 - Medium-Term – Two years to five years; and
 - Long-Term – Five years to ten years.
- 7.3.11 Where environmental effects are episodic the frequency of the events are identified. Consideration is also given to the following terms when describing potential effects in this chapter:
- Beneficial Effects – Effects that have a positive influence on the environment;
 - Adverse Effects – Effects that have an adverse influence on the environment;
 - Direct Effects – Effects that are caused by activities which are an integral part of the scheme;
 - Indirect Effects – Effects that are due to activities that are not part of the scheme, e.g., regeneration benefits attributable to the scheme; and
 - Secondary Effects – Effects that are induced from a different effect, e.g., the possibility of increased sediments in rivers and loss of aquatic life, caused by increased soil erosion due to the loss of vegetation from a proposed scheme.
- 7.3.12 Where significant adverse (either direct or indirect) effects are identified, mitigation measures have been proposed to eliminate or reduce the effects to an acceptable level. The significance of residual effects (i.e., the environmental effects that remain after the incorporation of mitigation measures) is discussed in Section 7.12. Cumulative effects are considered within Section 7.14.

Table 7.5: Significance Criteria

	Level of Effect	Criteria	Examples
Significant	Substantial	These 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 borough scale site or feature may also enter this category.	Fundamental changes to the regional hydrological regime. Fundamental changes to flow conveyance and floodplain storage.
	Major	These effects are likely to be important considerations at a local scale and may become key factors in the decision-making process.	Major changes to the regional hydrological regime. Major changes to flow conveyance and floodplain storage.
	Moderate	These effects, 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.	Moderate changes to the local hydrological regime. Moderate changes to flow conveyance and floodplain storage.
Not significant	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.	Some noticeable changes to the local hydrological regime. Some noticeable changes to flow conveyance and floodplain storage.
	Negligible or No Effect	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.	No noticeable changes to the local hydrological regime. No noticeable changes to flow conveyance and floodplain storage.

7.4 Limitations

- 7.4.1 This assessment of the likely hydrological, water resources and flood risk impacts of the Proposed Development is based on the most up-to-date data currently available. Hydrological monitoring is

ongoing, however the information available to date is sufficient to support a robust assessment at this stage.

7.4.2 Baseline conditions have been established from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions will change during the construction and operation of the Proposed Development.

7.4.3 Some of the conclusions in the assessment are based on third-party data. No guarantee can be given for the accuracy or completeness of any of the third-party data used.

7.5 Current Baseline Conditions

Topography and Land Use

7.5.1 The Study Area encompasses Cruachan 1 and its associated infrastructure, Cruachan Reservoir, the access track to the reservoir, Loch Awe, the A85 and surrounding agricultural/wild land. 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 shore of Loch Awe.

Hydrology

7.5.2 The Proposed Development is located in the River Awe Catchment. 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 km². 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 to make the most efficient use of the reservoir for power generation.

7.5.3 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 thought to be significant by comparison).

7.5.4 Loch Awe has a topographical catchment area of ca. 813 km², which encompasses two natural lochs: Loch Tulla and Loch Avich. The loch covers an area of 38 km² making it the third largest freshwater loch in Scotland. At approximately 41 km in length, it is also the longest freshwater loch in Scotland. Relative to the Cruachan Reservoir, Loch Awe has a very large surface area, topographical catchment, and storage volume. Loch Awe is impounded by the Loch Awe Barrage, operated by SSER. For further details regarding the existing water level regime within these two water bodies, refer to [Appendix 7.1](#).

7.5.5 There are numerous surface water bodies within the 5km buffer including WFD classified waterbodies Cladich River/Allt an Stacain, River Nant, Teatle Water, Kilchrenan Burn, River Noe, River Strae and Allt Mhoille, upstream of the Proposed Development. There are also numerous unnamed overland drains/ordinary watercourses. These are unlikely to be impacted by the Proposed Development as they are not hydrologically connected but have been considered in the assessment where relevant.

7.5.6 The Scottish Government Drinking Water Protected Areas – Scotland River basin district: maps indicate that the Proposed Development crosses a surface water DWPA beneath the A85. This is considered to be of very high sensitivity.

Groundwater Bodies

7.5.7 The SEPA Environment Interactive Map indicates the Study Area overlies a Low productivity aquifer (Class 2c), with only small amounts of groundwater near the surface and within fractures.

- 7.5.8 The SEPA Water Classification Hub indicates the Study Area covers two groundwater bodies, the Oban and Kintyre and the Upper Glen Coe.
- 7.5.9 The Scottish Government Drinking Water Protected Areas (DWPA) – Scotland River basin district: maps indicate that the Proposed Development crosses and is wholly underlain by a groundwater DWPA. Groundwater DWPA are areas that have been identified by Scottish Ministers in The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013 as bodies of water used for large-scale abstraction of water intended for human consumption, to fulfil the Scottish Ministers’ obligation in the WFD to identify such bodies. As the groundwater bodies are part of a DWPA their sensitivities are very high in relation to water quality.

Water Quality

- 7.5.10 Loch Awe is, designated under the WFD 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 2020 was ‘moderate ecological potential’, therefore this waterbody is considered to be of medium sensitivity.
- 7.5.11 River Awe is a WFD water body, 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 2020 was ‘good ecological potential’, therefore this waterbody is considered to be of high sensitivity.
- 7.5.12 River Orchy is a WFD waterbody. The overall status in 2020 was ‘moderate ecological potential’, therefore this waterbody is considered to be of medium sensitivity.
- 7.5.13 Cruachan Reservoir, the unnamed overland drains, and remaining watercourses/overland drains within the study area in the River Awe catchment do not have a WFD classification and are therefore considered to be of low sensitivity.
- 7.5.14 The two groundwater bodies, the Oban and Kintyre and the Upper Glen Coe both have an overall status of ‘Good’ (2018), therefore they are considered to be of very high sensitivity.

Geology

- 7.5.15 The bedrock geology within the Study Area is complex. As detailed in **Chapter 6** of the EIAR, 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.
- 7.5.16 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.
- 7.5.17 Further details on the underlying geology of the Study Area are provided in **Chapter 6** of this EIA Report – Ground Conditions.

Ecological Designations

- 7.5.18 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 are covered by **Chapter 8 – Ecology and Biodiversity**.
- 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. For the basis of this assessment, GWDTEs will be assessed as very high sensitivity receptors (highly dependent) and moderately sensitive (moderately dependent);
- Loch Etive Woods Special Areas of Conservation (SAC), which is considered to be of very high sensitivity;
- Glen Etive and Glen Fyne Special Protection Area (SPA), which is considered to be of very high sensitivity;
- Coille Leitire Site of Special Scientific Interest (SSSI), which is considered to be of very high sensitivity; and
- Loch Etive Mountains Wild Land Area (WLA), which is considered to be of high sensitivity.

7.5.19 These receptors are shown on the Environmental Constraints Plan (**Figure 2.1**).

Water Supplies

7.5.20 Argyll and Bute Council confirm there are 17 private water supplies located within a 5km buffer of the Proposed Development (see Table 7.6). Multiple properties are served by the supplies which are considered to be of very high sensitivity.

Table 7.6: Private Water Supplies within the Study Area.

Name of Supply	Type	Eastings	Northings
Hayfield, Kilchrenan, Taynuilt PA35 1HE	Regulated	207133	724069
Ardanaiseig Hotel	Regulated	208874	724902
Kilchrenan, Taynuilt PA35 1HE	Regulated	212800	724200
Achilan	B	210800	725900
Innis Chonan Dalmally PA33 1AW	B	208873	725242
Ardanaiseig Cottage	Regulated	208309	726002
Kilchrenan, Taynuilt PA35 1HE	B	207595	725970
Dawnfresh – Tervine Fish Farm	B	205449	725916
Kilchrenan, Taynuilt PA35 1HE	Regulated	207900	726800
Tervine House	Regulated	207900	726800
Kilchrenan, Taynuilt PA35 1HE	B	207900	726900

Name of Supply	Type	Eastings	Northings
Ballimore Farm Estate	B	211411	727022
Kilchrenan, Taynuilt PA35 1HD	Regulated	204600	728700
Cruachan Power Station	Regulated	205125	733989
Lochawe, Dalmally PA33 1AN	Regulated	207007	733800
Cruachan Construction Site	B	205700	734300
Lochawe, Dalmally PA33 1AN	B	205500	734300

- 7.5.21 At the time of the assessment no information on licenced water abstractions was available. The location and data on licenced abstractions has not been provided by SEPA.

Scottish Water's Drainage Infrastructure

- 7.5.22 According to Scottish Water Asset Plans, there are no mains water supply pipelines within 3km of Cruachan Reservoir. The closest pipeline is a 90mm mains water supply sewer located along the A85. There are no foul water sewers within the Study Area.

Drainage and Flood Risk

- 7.5.23 The Study Area currently drains mainly via overland flows towards Cruachan Reservoir and Loch Awe, although Cruachan Reservoir also receives gravity input via aqueducts from adjacent catchments (refer to [Appendix 7.1](#) for further information). The existing road and built infrastructure will also contain gravity surface water drainage systems.
- 7.5.24 The SEPA Flood Maps indicate that the Allt Cruachan and Loch Awe have a Low-High likelihood of fluvial flooding. High Likelihood indicates a 10% annual probability of flooding and high sensitivity, whilst Medium Likelihood indicates a 0.5% annual probability and medium sensitivity, and Low Likelihood indicates a 0.1% annual probability and low sensitivity. Allt Cruachan, however, is part of a pumped system as it comprises the outfall from Cruachan Reservoir into Loch Awe. Therefore, this is unlikely to be subject to flood risk as it is artificially controlled. Cruachan Reservoir has a high likelihood of fluvial flooding. Fluvial flood risk is confined to those waterbodies.
- 7.5.25 The SEPA Flood Maps also indicate that the Cruachan Reservoir and Loch Awe have a 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.

Current Operational Regime

- 7.5.26 As outlined in the 'Cruachan 2 Environmental Impact Assessment: Understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe' technical note in [Appendix 7.1](#), it was identified that Cruachan 1 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.

7.6 Baseline Evolution and Expected Future Baseline

- 7.6.1 In the longer term, the hydrologic regime across the Site and within the catchments for Cruachan Reservoir and Loch Awe may change as a result of the predicted impacts of climate change irrespective of any development. Peak river flows and rainfall intensities are predicted to increase as a result of climate change. Such changes would occur irrespective of the Proposed Development, although the Flood Risk Assessment contains the necessary climate change allowances included in the flood levels, as specified by SEPA (**Appendix 7.2**).

Sensitive Receptors

- 7.6.2 With reference to the sensitivity criteria within Table 7.2 and the above key findings, the sensitivity of key water resources and receptors are summarised in Table 7.7 below.

Table 7.7: Sensitive Receptors in the Study Area

Receptor	Sensitivity	Overall WFD Status (2020)
Surface Water Bodies		
Loch Awe	Medium	Moderate ecological potential
River Orchy	Medium	
River Awe	High	Moderate
Cruachan Reservoir	Low	Good Ecological Potential
Unnamed overland drains and remaining watercourses downstream of the Proposed Development	Low	N/A
	Very High	N/A
Surface Water DWPA		N/A
Groundwater Bodies		
Oban and Kintyre Groundwater Body	Very High	Good
Upper Glen Coe Groundwater Body	Very High	Good
Groundwater DWPA	Very High	N/A
Ecological Designations		
Highly groundwater dependent GWDTE	Very High	N/A
Moderately groundwater dependent GWDTE	High	N/A
Loch Etive Woods SAC		
Glen Etive and Glen Fyne SPA	Very High	N/A
Coille Leitire SSSI	Very High	N/A
Loch Etive Mountains WLA	Very High	N/A
	High	N/A

Receptor	Sensitivity	Overall WFD Status (2020)
		N/A
Flood Risk		
Low Likelihood Flood Zone	Low	N/A
Medium Likelihood Flood Zone	Medium	N/A
High Likelihood Flood Zone	High	N/A
Private Water Supplies	Very High	N/A

7.7 Embedded Mitigation

Construction Environmental Management Plan

- 7.7.1 Construction phase embedded mitigation measures will be implemented through 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. An outline CEMP is included as **Appendix 3.1** to the EIA Report.
- 7.7.2 Best practice recommendations for the management of construction-phase surface runoff and prevention of contamination will be outlined in more detail in the CEMP and agreed with relevant statutory consultees prior to commencement of construction works. This will include measures to comply with relevant legislation and guidance, and best practice measures in line with the Considerate Contractors Scheme and the Site handbook for the construction of SuDS (CIRIA C698), and Control of water pollution from construction sites (CIRIA C532). It will include an erosion prevention and sediment control plan to reduce the quantity of sediment entrained in runoff and to prevent hydromorphological changes to surface water features, in addition to a construction-phase surface water runoff management plan.
- 7.7.3 The CEMP will include the following items:
- Details of how fuels and chemicals will be safely stored on site with appropriate bunding and impermeable geomembranes in place in case of leakages;
 - An Erosion Prevention and Sediment Management Plan;
 - A Construction-Phase Surface Water Management Plan; and
 - Details of plant/vehicles used and how they will be kept in good working order to prevent hydrocarbon leakages.
- 7.7.4 The following mitigation measures will be embedded within the CEMP and implemented during the construction phase, to manage flood risk, increased surface water runoff and the disturbance of groundwater flow paths:
- Movement of materials around the Site would be managed under an appropriate Materials Management Plan to ensure the placement of materials does not impact flood risk. Materials would not be stockpiled adjacent to drainage systems or in such a way that would increase flood risk off-site; and
 - Best practice construction measures would be adopted in line with the Considerate Contractors Scheme and 'Site handbook for the construction of SuDS' (CIRIA C698) and the Control of water pollution from construction sites (CIRIA C532) to minimise the risk of flooding during construction.

- 7.7.5 The following mitigation measures will be embedded within the CEMP and implemented during the construction phase, to manage the risk of alterations to groundwater flow and quality, on-site during construction:
- If perched groundwater is encountered within the made ground or superficial deposits at the Site, during the establishment of the foundations, or during excavation activities, dewatering may be required. The most appropriate method of dewatering would be chosen at this stage, which may include the enclosure of the excavation by sheet piling. Piezometers could be used outside of the sheet-pile to monitor any perched groundwater levels;
 - If ground contamination is encountered during construction works, work would stop immediately and measures would be taken to prevent disturbance and mobilisation of contaminants, until the contamination has been treated in-situ or removed for off-site treatment; and
 - Water arising from excavations would require appropriate disposal.
- 7.7.6 The following mitigation measures will be embedded within the CEMP and implemented during the construction phase, to manage the risk of leaks and spillages of contaminants entering surface water or groundwater bodies on-site during construction:
- Preparation of incident response plans, prior to construction, which should be present onsite throughout construction to inform contractors of required actions in the event of a pollution incident;
 - Spillages and leaks would be immediately contained in line with the incident response plan;
 - On-site availability of oil spill clean-up equipment including absorbent material and inflatable booms for use in the event of an oil spill or leak;
 - Wherever possible, plant and machinery would be kept away from the drainage system;
 - Use of drip trays under mobile plant; and
 - Construction materials brought to the Site should be free of any contaminated material, so as to avoid any possible contamination of watercourses.
- 7.7.7 The following mitigation measures should be embedded within the CEMP and implemented during the construction phase, to manage the risk of physical contamination of surface and groundwater bodies, on-site during construction:
- Working areas shall be clearly defined to ensure the disturbance of soils is minimised, where possible;
 - The cleaning of vehicle wheels prior to leaving Site;
 - Controlled and covered waste storage areas;
 - Dust Management Plan (i.e., damping down); and
 - Installation of systems such as silt traps and oil separators designed to trap silty water and hydrocarbons including adequate maintenance and monitoring of these to ensure effectiveness, particularly after adverse weather conditions;

Operational Hydrological Regime of the Proposed Development

- 7.7.8 The normal operational water level range in the Cruachan Reservoir with the Proposed Development in place will not routinely exceed the current maximum and minimum operational water level

boundaries, which have an existing range of ca.20m (**Appendix 7.1**). The Proposed Development also does not involve increasing the volume of water routinely pumped from – and discharged back to – Loch Awe, or in an increase in the volume of water that Cruachan Reservoir receives from gravity transfers from neighbouring catchments.

- 7.7.9 The proposed development drawings in **Appendix F** of the Flood Risk Assessment indicate that the proposed development will reduce the minimum operating level in the Cruachan Reservoir when compared to the historical range shown in **Appendix 7.1**. This, however, is only required to allow the Applicant to draw down water levels to a lower elevation in exceptional circumstances as required by National Grid and to facilitate periodic maintenance and would not represent a change to the routine water level variability in the reservoir shown in **Appendix 7.1**.
- 7.7.10 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 (**Appendix 7.1**). 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 normal retained 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. The proposed development will not alter or amend the inflow from the existing viaduct system or that from natural runoff.
- 7.7.11 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 7.1**.
- 7.7.12 As with Cruachan 1, the Proposed Development will be largely sub-terranean, with all tunnels and the powerhouse cavern located underground. As a result, the Proposed Development would only be at risk of flooding from a failure of the reservoir dam 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 Reservoir (Scotland) Act (2011). Further description of the risk of major accidents and disasters is presented in **Chapter 3** of the EIA Report.

Hydro Morphological Mitigation

- 7.7.13 The new lower inlet – outlet structure has been designed to minimise the depth of the structure in Loch Awe and to be similar to the existing levels of the Cruachan 1 Power station inlet-outlet structure. In terms of water velocity at the Proposed Development 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.

Design of Quayside Structure

- 7.7.14 The quayside structure will be built at a level of 38m AOD (refer to the proposed development drawings contained within **Appendix F** of the Flood Risk Assessment). A 1.5m retaining wall around the perimeter of the quayside will be built at 39.5m AOD to provide a ca. 1 in 1000-year current standard of flood protection to the quayside elements (principally the new Administration Building), although this standard of flood protection will reduce with the impacts of climate change over the lifetime of the proposed development. Further details on the flood risk to the quayside elements (and the acceptability of which on the basis of SEPA guidance) can be found in the Flood Risk Assessment (**Appendix 7.2**).

Quayside Canopy Structure

- 7.7.15 A temporary quayside canopy structure, enclosed on three sides by brick or concrete walls with a corrugated roof, will be designed to protect the spoil storage pile from natural elements including wind and rain from the dominant north westerly direction. The canopy structure will prevent spoil

temporarily stored on the quayside during the construction phase from being mobilised by wind and rainfall-runoff and subsequently entering Loch Awe, which could present a pollution risk. An indicative layout for the canopy structure is shown on [Figure 3.1](#).

Foul Drainage

- 7.7.16 During construction, wastewater generated from temporary sanitary facilities and from washing down machinery and equipment would be discharged into septic tanks and tinkered away in the surrounding area, following pre-treatment and approval as required. During the operational phase, it is anticipated that any new foul water provisions would form part of the existing foul water services already present as part of the Cruachan 1 power station. Given that the proposed development would not lead to a significant increase in operational staff using the new power station (the routine operation of much of which would be automated and/or controlled via remote telemetry), it is not anticipated that the proposed development would lead to a significant increase in foul water loading.

7.8 Realistic Worst-Case Parameters for Assessment

- 7.8.1 The following worst-case parameters have been assumed during the assessment:

- The maximum project parameters identified in [Chapter 3](#) of this EIA Report have been used as the basis for the assessment;
- The A85 road extension area currently comprises impermeable hardstanding; runoff from which already forms part of the adopted road drainage network. The assumption is that this will be retained as hardstanding during operation and that a significant increase in impermeable area will not arise as a result of the A85 extension;
- The quayside and construction lay down areas will consist entirely of hardstanding;
- The quayside will be used for less vulnerable development, such as above ground administration and workshop buildings, for routine operational maintenance tasks only (i.e., no overnight accommodation for staff will be provided);
- The proposed development drawings in [Appendix F](#) of the Flood Risk Assessment indicate that the proposed development will reduce the minimum operating level in the Cruachan Reservoir when compared to the historical range shown in [Appendix 7.1](#). This, however, is only required to allow the Applicant to draw down water levels to a lower elevation in exceptional circumstances as required by National Grid and to facilitate periodic maintenance, and would not represent a change to the routine water level variability in the reservoir shown in [Appendix 7.1](#); and
- The water velocity from the new inlet-outlet structure on Loch Awe will not exceed 0.3m/s.

7.9 Assessment of Likely Effects

Construction

- 7.9.1 Increased road runoff and pollution potential associated with the temporary diversion/extension of the A85 and increase in road traffic haulage and plant movements, including accidental chemical/fuel leaks and spills
- 7.9.2 The sensitivity of Highly dependent GWDTEs, groundwater bodies, groundwater, and surface water DWPA, ecological designations (SAC/SPA/SSSI) and PWS is considered to be **very high**, and the sensitivity of Moderately dependent GWDTEs and WLA is considered to be **high**. However, the potential for increased road runoff and pollution during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, the magnitude of change

following embedded mitigation is **negligible**. There is therefore likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.

- 7.9.3 The sensitivity of the River Awe is considered to be **high**. However, the potential for increased road runoff and pollution during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, the magnitude of change following embedded mitigation is **negligible**. There is therefore likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.4 The sensitivity of Loch Awe and the River Orchy is considered to be **medium**. However, the potential for increased road runoff and pollution during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, the magnitude of change following embedded mitigation is **negligible**. There is therefore likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.5 The sensitivity of Cruachan Reservoir and the unnamed overland drains and remaining watercourses downstream of the Proposed Development is considered to be **low**. The potential for increased road runoff and pollution during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, the magnitude of change following embedded mitigation is **negligible**. There is therefore likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.6 **Mobilisation by wind and rainfall-runoff of stockpiled material into Loch Awe**, associated with the temporary storage of excavated spoil and rock on the new quayside area (stockpiled material would be a potential source of pollution of Loch Awe if not sustainably managed)
- 7.9.7 The potential for mobilisation by wind and rainfall-runoff of stockpiled material associated with the temporary storage of excavated spoil and rock on the new quayside area will be mitigated by the temporary canopy structure, as set out in Section 7.8.15. The sensitivity of Loch Awe is considered to be **medium**. The magnitude of change following embedded mitigation is **negligible**. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.8 Temporary increased potential for pollution of surface water bodies, due to the potential for sediment mobilisation during construction activities, in the absence of appropriate management also has the potential to result in significant effects.
- 7.9.9 The sensitivity of the River Awe is considered to be **high**. The magnitude of change following embedded mitigation is **negligible** as the potential for sediment mobilisation and accidental chemical/fuel leaks and spills from Contractor compounds and working areas during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.10 The sensitivity of Loch Awe and the River Orchy is considered to be **medium**. The magnitude of change following embedded mitigation is **negligible**, as the potential for sediment mobilisation and accidental chemical/fuel leaks and spills from Contractor compounds and working areas during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.11 The sensitivity of Cruachan Reservoir and the unnamed overland drains and remaining watercourses downstream of the Proposed Development is considered to be **low**. The magnitude of change following embedded mitigation is **negligible**. The potential for sediment mobilisation and accidental chemical/fuel leaks and spills from Contractor compounds and working areas during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.12 Temporary increases in flood risk due to increased surface water runoff from Contractor compounds, working areas and the temporary diversion/extension of the A85 in the absence of appropriate management.

- 7.9.13 The sensitivity of Loch Awe and the River Orchy is considered to be **medium**. The magnitude of change following embedded mitigation is **negligible**. The potential for increases in surface water runoff discharges from Contractor compounds and working areas during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.14 The sensitivity of Cruachan Reservoir and the unnamed overland drains and remaining watercourses downstream of the Proposed Development is considered to be **low**. The magnitude of change following embedded mitigation is **negligible**. The potential for increases in surface water runoff discharges from Contractor compounds and working areas during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.15 Potential for medium term impacts on the WFD status of surface and groundwater bodies during the construction phase, in the absence of appropriate mitigation, due to the above potential pressures
- 7.9.16 The sensitivity of groundwater bodies is considered to be **very high**. The magnitude of change following embedded mitigation is **negligible**. The potential for medium term impacts on the WFD status during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.17 The sensitivity of the River Awe is considered to be **high**. The magnitude of change following embedded mitigation is **negligible**. The potential for medium term impacts on the WFD status during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.
- 7.9.18 The sensitivity of Loch Awe and the River Orchy is considered to be **medium**. The magnitude of change following embedded mitigation is **negligible**. The potential for medium term impacts on the WFD status during the construction phase will be mitigated by the proposed CEMP for the Site, as set out in Section 7.8. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.

Operation

Potential for alterations in the hydrological regime and hydromorphology of Cruachan Reservoir

- 7.9.19 The potential impacts of alterations in the hydrological regime and hydromorphology are outlined in 'Cruachan 2 Environmental Impact Assessment: Understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe' technical note, in **Appendix 7.1**.
- 7.9.20 The normal operational water level range in the Cruachan Reservoir with the Proposed Development in place will not routinely exceed the current maximum and minimum operational water level boundaries, which have an existing range of ca.20m (**Appendix 7.1**). The Proposed Development also does not involve increasing the volume of water routinely pumped from – and discharged back to – Loch Awe, or in an increase in the volume of water that Cruachan Reservoir receives from gravity transfers from neighbouring catchments.
- 7.9.21 The proposed development drawings in **Appendix F** of the Flood Risk Assessment indicate that the proposed development will reduce the minimum operating level in the Cruachan Reservoir when compared to the historical range shown in **Appendix 7.1**. This, however, is only required to allow the Applicant to draw down water levels to a lower elevation in exceptional circumstances as required by National Grid and to facilitate periodic maintenance and would not represent a change to the routine water level variability in the reservoir shown in **Appendix 7.1**.
- 7.9.22 It is therefore concluded that the normal operational water level range within the reservoir will not change with the scheme in place (with lower water levels likely to only occur during periods of infrequent routine maintenance). 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.

- 7.9.23 The sensitivity of Cruachan Reservoir is considered to be medium. The magnitude of change is negligible as described above. Based on the above, therefore, there is likely to be a long term, permanent, adverse effect on the hydrological and hydromorphological regimes of Cruachan Reservoir of **negligible significance (not significant)**.

Potential for alterations in the hydrological regime of Loch Awe

- 7.9.24 The potential impacts of alterations in the hydrological regime and hydromorphology are outlined in 'Cruachan 2 Environmental Impact Assessment: Understanding likely scheme impact on water levels within Cruachan Reservoir and on Loch Awe' technical note, in **Appendix 7.1**. 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 normally retained storage volume.
- 7.9.25 The sensitivity of Loch Awe is considered to be **medium**. The magnitude of change is **negligible** as described above. Therefore, there is likely to be a long term, permanent, adverse effect on the hydrological regime of Loch Awe of **negligible significance (not significant)**.

Potential effects of the New Quayside structure on volume displacement, water levels and flood risk within Loch Awe

- 7.9.26 The total volume occupied by the proposed quayside structure is estimated to be 62,500m³. The total volume of Loch Awe is estimated to be 1.2km³ (12,00,000,000m³). The volume of water within Loch Awe that will be displaced by the creation of the new quayside structure is estimated to be 0.005% of its overall storage volume, which is considered negligible. In addition, within the vicinity of the site, Loch Awe is a controlled waterbody, with water levels routinely governed by the operation of SSER's barrage. Therefore, the quayside structure will have a negligible impact on volume displacement and consequentially a negligible impact on water levels and flood risk on Loch Awe.
- 7.9.27 The sensitivity of Loch Awe is considered to be medium. The magnitude of change is negligible as described above. Therefore, there is likely to be a long term, permanent, adverse effect on water levels and flood risk on Loch Awe as a result of the creation of the new quayside structure of **negligible significance (not significant)**.

Potential flood risk to New Quayside structure

- 7.9.28 The quayside structure will be built at a level of 38m AOD (refer to the proposed development drawings contained within **Appendix F** of the Flood Risk Assessment). A 1.5m retaining wall around the perimeter of the quayside will be built at 39.5m AOD to provide a ca. 1 in 1000-year current standard of flood protection to the quayside elements (principally the new Administration Building), although this standard of flood protection will reduce with the impacts of climate change over the lifetime of the proposed development. Further details on the flood risk to the quayside elements (and the acceptability of which on the basis of SEPA guidance) can be found in the Flood Risk Assessment (**Appendix 7.2**).

Potential effects of the New Quayside structure on the morphology of Loch Awe

- 7.9.29 The new quayside structure will occupy a section of the bank of Loch Awe, which is currently natural lochside habitat. This section of natural bank will be lost, however, the 510m length comprises approximately 0.2% of the total shoreline of Loch Awe. Therefore, the quayside structure will have a minor impact on the morphology of Loch Awe.
- 7.9.30 The sensitivity of Loch Awe is considered to be medium. The magnitude of change is minor as described above. Therefore, there is likely to be a long term, permanent, adverse effect of **minor significance (not significant)**.

Potential increases in surface water runoff due to an increase in permanent impermeable surface areas

- 7.9.31 The net increase in new hardstanding area is **negligible**, as described above (much of the proposed development will be subterranean in constructed form). The potential increases would arise from the new quayside structure and the widened area of the A85. The layby area on the A85 to be used

for the temporary diversion is currently hardstanding used for car parking and is proposed to be retained as hardstanding, therefore there will be no significant increase in surface water runoff from new road hardstanding. Similarly, the proposed quayside structure will be constructed by encroaching within Loch Awe itself. All rainfall that currently falls on this area enters Loch Awe directly; this surface water will still enter Loch Awe once the quayside structure is built, therefore, there will be no increases in surface water runoff to Loch Awe.

- 7.9.32 The sensitivity of Loch Awe is considered to be medium. The magnitude of change is negligible as described above. Therefore, there is likely to be a long term, permanent, adverse effect of negligible significance (not significant). No additional mitigation is considered to be required, assuming that industry standard surface water drainage infrastructure is installed within the quayside structure design, to allow surface water to freely discharge into Loch Awe (for further details, refer to the Flood Risk Assessment in [Appendix 7.2](#)).

Potential for increased chemical and physical pollution of surface water bodies, due to the operational use of the quayside structure, in the absence of appropriate management

- 7.9.33 During the operational phase, although the volume of surface water runoff does not increase as a result of the Proposed Development, there is the potential for surface water to become polluted within the quayside, prior to discharging into Loch Awe.
- 7.9.34 The sensitivity of River Awe is considered to be high. The magnitude of change following embedded mitigation is moderate. Therefore, there is likely to be a long term, permanent, adverse effect of moderate significance (significant), in the absence of appropriate mitigation.
- 7.9.35 The quayside structure will, however, be served with appropriate silt traps and oil separators to ensure runoff does not form a potential source of pollution to Loch Awe. The sensitivity of Loch Awe is considered to be medium. The magnitude of change following embedded mitigation is considered to be negligible. Therefore, there is likely to be a long term, permanent, adverse effect on Loch Awe water quality of **negligible significance (not significant)**.

Potential for long term impacts on the WFD status of surface water bodies during the operational phase, in the absence of appropriate mitigation, due to the above potential pressures

- 7.9.36 The key considerations for WFD status include hydrological alterations, morphological changes, and deterioration in water quality. The combination of embedded mitigation and enhancement measures effectively deal with any potential impacts on WFD. Therefore, no additional mitigation measures are required.
- 7.9.37 The sensitivity of the River Awe is considered to be high. The magnitude of change is negligible as described above. The potential for medium term impacts on the WFD status during the operational phase will be mitigated as described above. Therefore, there is likely to be a long term, permanent, adverse effect of **negligible significance (not significant)**.
- 7.9.38 The sensitivity of Loch Awe and the River Orchy is considered to be **medium**. The magnitude of change is **negligible** as described above. The potential for medium term impacts on the WFD status during the operational phase will be mitigated as described above. Therefore, there is likely to be a long term, permanent, adverse effect of **negligible significance (not significant)**.

Potential additional scour or morphological damage to the bed and banks of Loch Awe

- 7.9.39 To prevent any scour or morphological damage to the bed and banks of Loch Awe during the operational phase from the new inlet-outlet structure, the velocity will be limited to a maximum of 0.3m/s by the installation of fish screens.
- 7.9.40 The sensitivity of Loch Awe is considered to be medium. The magnitude of change following embedded mitigation is negligible as described above. The potential for additional scour or morphological damage to the bed and banks of Loch Awe during the operational phase will be mitigated as described above. Therefore, there is likely to be a long term, permanent, adverse effect of **negligible significance (not significant)**.

Potential for increased foul water effluent from operational buildings on the Quayside

- 7.9.41 The quayside Administration and workshop buildings have the potential to increase foul water effluent during the operational phase, which will require appropriate treatment and disposal. Foul water generated from these buildings will be disposed of in the same manner as the existing lochside elements associated with the Cruachan 1 scheme.
- 7.9.42 The sensitivity of Loch Awe is considered to be medium. The magnitude of change following embedded mitigation is considered to be negligible. Therefore, there is likely to be a long term, permanent, adverse effect of **negligible significance (not significant)**.

7.10 Further Mitigation and Enhancement

Construction

- 7.10.1 No further mitigation measures are required during the construction phase over and above those described above.

Operation

- 7.10.2 No further mitigation measures are required during the operational phase over and above those described above.

7.11 Residual Effects

Construction

- 7.11.1 With the embedded mitigation measures in place, the residual effects during the construction phase would be considered to be of **negligible significance (not significant)**.

Operation

- 7.11.2 With the embedded mitigation measures in place, the residual effects during the operational phase would be considered to be of **negligible significance (not significant)**, with the exception of the construction of the new quayside structure, which will have a **minor impact** on the morphology of Loch Awe.

7.12 Monitoring

- 7.12.1 The Applicant has undertaken historical monitoring of water levels within both Cruachan Reservoir and on Loch Awe. This monitoring will continue with the Proposed Development.

7.13 Cumulative Effects

- 7.13.1 At the time of writing, only one other proposed scheme is included within the assessment of cumulative effects, Balliemanoach Pumped Storage Hydro, ILI (Borders PSH) Ltd. This scheme is currently at EIA Scoping stage.
- 7.13.2 Balliemanoach Pumped Storage Hydro (PSH) scheme is proposed close to Lochan Airigh, approximately 4.4km to the south of the village of Portsonachan and 9km northwest of Inveraray in Argyll and Bute. The scheme will discharge water from its tailrace back into Loch Awe which is also utilised by the existing Cruachan scheme.
- 7.13.3 In accordance with national policy, any additional approved development schemes within the vicinity of the Site will be required to incorporate the necessary mitigation (drainage infrastructure and flood mitigation measures) to ensure that flood risk to or from the developments is not increased.

- 7.13.4 Based on this policy requirement and the Balliemeanoch Pumped Storage Hydro scheme description, provided at the time of writing, in combination with the large storage volume available within Loch Awe, the cumulative effects of the scheme are considered to be negligible.

7.14 Referencing

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8 Ecology and Ornithology

8.1 Introduction

- 8.1.1 This chapter of the EIAR provides an assessment of the likely significant effects from the Proposed Development on ecological features. The assessment is based on the characteristics of the Site and surrounding area and the key parameters of the Proposed Development detailed in Chapter 3 – The Proposed Development. Other chapters relevant to this chapter include Chapter 6 - Ground Conditions and Geology, and Chapter 7 - Water, Hydrology and Flood Risk.
- 8.1.2 This chapter is supported by the following figures and technical reports provided in [Appendix 8.1](#) (Non-Avian Terrestrial Ecology Technical Appendix), [Appendix 8.2](#) (Avian Ecology Technical Appendix), [Appendix 8.3](#) (Freshwater Technical Appendix and Confidential Technical [Appendix 8.4](#) (Confidential Ecological and Ornithological Information).

8.2 Policy Context, Legislation, Guidance and Standards

- 8.2.1 Detailed information relating to planning policy can be found within Chapter 5 - Legislative and Policy Context. The chapter presented here has also been informed by relevant biodiversity legislation and policy, including European legislation which has become subsumed into UK and Scottish law post-Brexit, domestic environmental legislation, UK nature conservation policy and local biodiversity guidance. These include:

- The Conservation (Natural Habitats etc.) Regulations 1994 as amended, including amendments made in 2017 with limited relevance to Scotland, and as translated post-Brexit by the UK Withdrawal from the European Union (Continuity) (Scotland) Bill (2020);
- The Wildlife and Countryside Act (as amended) 1981;
- The Wildlife and Natural Environment Act (2011);
- The Nature Conservation (Scotland) Act 2004 (as amended);
- The Protection of Badgers (Scotland) (as amended) Act 1992;
- The Scottish Biodiversity List (SBL);
- The Conservation (Natural Habitats etc.) Regulations 1994 as amended, including amendments made in 2017 with limited relevance to Scotland, and as translated post-Brexit by 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 translated post-Brexit by the UK Withdrawal from the European Union (Continuity) (Scotland) Bill (2020); and
- The Argyll and Bute Local Biodiversity Action Plan (LBAP).

- 8.2.2 Further detail of relevant legislation and policy is provided in the Technical Appendices accompanying this chapter.

8.3 Consultation

- 8.3.1 Throughout the design process, a number of organisations were consulted to inform both the design and this assessment process. Table 8.1 summarises consultation responses received. Responses

listed in the table include those received via the Scoping Opinion and later discussions regarding survey scope and method.

Table 8.1: Scoping Responses for Ecology and Ornithology

Name of Consultee	Comment	Response
Argyll District Fisheries Board	The report indicates that a fish and fisheries survey (2017) of which we are unaware of the scope of the survey or its findings. We would like to be consulted on the report findings and its relevance to the responsibilities of Argyll DSFB.	Reports circulated by Stantec.
	We would also need to know the proposed monitoring that will occur because of the development.	Monitoring is covered at section 8.12 of this EclA.
Marine Science Scotland	NatureScot advise that the Environmental Impact Assessment (EIA) report should include details regarding any potential adverse impact on Arctic charr populations and proposed mitigation measures. MSS agree with this, adding that the potential impacts on all the above fish species are considered throughout the construction and operation of the proposed development.	Impacts on Arctic charr <i>Salvelinus alpinus</i> and other fish are included in section 8.9 of this EclA.
	There are no details provided on the proposed surveys for fisheries and freshwater invertebrates and MSS would welcome further information. These surveys should provide sufficient information to carry out a rigorous assessment of the potential impacts on the fish species, specifically in Allt Cruachan, in the vicinity of the proposed development on Loch Awe and on Cruachan Reservoir.	Further information regarding approach to freshwater survey work was provided in the Gatecheck report. Full details of the surveys undertaken, and their results can be found in Technical Appendix 8.3 .
	The developer proposes to scope out watercourses draining into Loch Awe which MSS are content with (Section 5.14 of the scoping report); however, we advise that the River Awe, which drains out of Loch Awe, should be scoped in.	Based on bathymetric data and boat surveys conducted within the Loch Awe red line boundary, the depth of water and existing substrate around the take-off would be unsuitable for Arctic charr spawning. Results from the surveys and proposed mitigation measures, including any further monitoring are available in the freshwater Technical Appendix (8.3) .
	The developer should consider whether salmon smolt acoustic studies will be required in Loch Awe to provide information on the migration of smolts through Loch Awe from the River Orchy and to assess the potential impact on the smolts as they pass the existing take-off at Cruachan.	Salmon <i>Salmo salar</i> smolt acoustic surveys to be undertaken to assess the migratory behaviour of smolts as they travel to Loch Awe (see Section 8.12).
	Survey work should also be considered to assess any potential impact on any areas used by Arctic charr for spawning in the vicinity of the proposed take off.	The results from surveys undertaken by Gavia Environmental in 2021 indicated that substrate composition for potential salmonid

Name of Consultee	Comment	Response
		spawning habitat within the Study Area was either unsuitable or sub-optimal, due to either the substrate type being too large, not containing enough spawning substrate or having the presence of sand and silt. Full details of the fisheries surveys are provided in Technical Appendix 8.3 .
	Potential cumulative impacts on fish populations as a result of the operation of both Cruachan schemes and the Loch Awe Barrage should also be considered.	See Cumulative Effects section 8.13 of this EclA
	Full details regarding the proposed surveys including methodology, results from the surveys, proposed mitigation measures and any further monitoring should be presented in the EIA report.	Full details of the fisheries surveys are provided in Technical Appendix 8.3 .
	Contact the Argyll District Salmon Fishery Board and Argyll Fisheries Trust for information regarding local fish stocks.	Argyll District Salmon Fishery Board and Argyll Fisheries Trust to be contacted prior to commencement of the Construction Phase for information regarding local fish stocks to provide baseline data prior to development works.
NatureScot	There are historical records of Arctic Charr in Cruachan Reservoir. This species has not been referred to in the scoping report. It may be the case that the project will not have any adverse impact on this species, but such a conclusion and any mitigation required should be considered and discussed in the EIAR.	Full details of the fisheries surveys are provided in Technical Appendix 8.3 . Arctic charr is included in Section 8.9 of this EclA
	The site includes part of Loch Etive Woods SAC. As such the Habitat Regs will have to be considered. The analysis of impacts on this SAC needs to be detailed and sufficiently robust to help inform a Habitat Regulations Assessment under the Habitat Regulations, ideally including all the information required to fully inform an Appropriate Assessment (AA) which may have to be undertaken by the competent authority. We will advise on the need for an AA in our response to the consultation on the associated section 36 application.	A shadow HRA is included in Section 8.14 of this EclA.
	The proposed scope of surveys, methodologies and assessment of the key ornithological receptors identified in the Scoping Report (sections 9.4 to 9.8) will adequately assess the overall ornithological impacts. White tail and golden eagle, other Schedule 1 raptors, and black grouse are likely to be the main species of interest on the	Ornithological impact assessment can be found within Section 8.9 of this EclA.

Name of Consultee	Comment	Response
	site. These should be assessed both for onsite impacts and also cumulatively at the relevant Natural Heritage Zone level in addition to any designated site assessments that might be required.	
	The site abuts and covers parts of the Glen Etive and Glen Fyne Special Protection Area (SPA) for golden eagle. As such the Habitat Regs will have to be considered. The analysis of impacts on this SPA needs to be detailed and sufficiently robust to help inform a Habitat Regulations Assessment under the Habitat Regulations, ideally including all the information required to fully inform an Appropriate Assessment (AA) which may have to be undertaken by the competent authority. NatureScot will advise on the need for an AA in our response to the consultation on the associated section 36 application.	A shadow HRA is included in Section 8.14 of this EclA.
	The main impacts on the SPA will be likely to come from disturbance due to blasting (and similar activities) and transport flights (use of helicopters). The territory concerned is NA6. Breeding activity is known to take place in the norther half of the territory and, as such, Ben Cruachan and other summits in the range will potentially provide a degree of screening/buffer to disturbance. Even so, there remains potential for eagles to be displaced (due to disturbance) from southern parts of their territory. Vantage point data and modelling will help determine the significance of this displacement. Mitigation measures may be required to compensate for this impact. It should be noted that if modelling is required to help interpret vantage point data, then the Golden Eagle Topography model (GET) should be used as opposed to the PAT model.	A GET model has been used to inform this EclA.
	Section 5.1.5 of the Scoping Reports proposes that “Changes to the hydrological regime of Cruachan Reservoir and Loch Awe” be scoped out of the EIA. It should be noted that marginal zones of Loch Awe are important for some bird species when nesting. If construction or operation of the site is likely to significantly change the existing hydrological regime (levels/speed/seasonal changes) of Loch Awe, then this aspect should be scoped into the EIA, impacts of birds assessed and the topic presented in the EIAR.	The margins of Loch Awe which will be affected by the Development are predominantly steep rocky sections, with limited suitability for nesting birds of conservation concern. Whilst some sections of Loch Awe's shore may indeed be important for nesting birds, this is not the case for the stretch within the Development site. This is covered in Technical Appendix 8.2 .

Name of Consultee	Comment	Response
RSPB	The scoping report states that the impact on the water levels within Loch Awe will be negligible due to the expansion project. We would, however, advise that the installation and long-term management of diver rafts be highly considered by the developers in a way to deliver for biodiversity within the local area surrounding Loch Awe.	No effects on divers have been identified as part of the EcIA.
	The Cruachan power station is surrounded by Atlantic Rainforest an important and increasingly rare habitat in Scotland, highlighted in the SNP manifesto as a prime example of a nature-based solution and we would advise that the developer use this opportunity to expand this habitat. Atlantic Rainforest are also rich in biodiversity, they provide habitat for well-known species like red squirrels, red listed bird species such as wood warbler and pied flycatcher and are incredibly important for Scotland's lichens and bryophytes, some species of which are found nowhere else in the world.	Opportunities for mitigation, compensation and/or enhancement are included in section 8.9 of this EcIA.
SEPA	We note updated habitat surveys are planned and that GWDTE are to be assessed in the EIA. Should GWDTE be identified on site the following information must be included in the submission: a) A map demonstrating that all GWDTE are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m; & b) If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTE affected.	Habitat surveys have extended to a 250 m around areas of potential excavation, and to 100 m around areas of shallow excavation. Habitats have been mapped using the Scottish EUNIs system, and those considered likely to include GWDTEs allocated to an NVC community for subsequent assessment. The mapping and description of these features can be found in Technical Appendix 8.1 .
Marine Coastal Development - ABC	It will be important that throughout the construction and operational phases, the applicant is advised to ensure that all naturally available habitat is accessible to fish, including: sufficient water flows; the hydrology (drainage), underlying geology, and geomorphology is not affected, and to provide mitigation against any habitat loss/damage through a habitat restoration programme.	Walkover fish habitat surveys have been conducted on the burns flowing into Cruachan Reservoir. These sought to ascertain the suitability of these freshwater habitats for the spawning of salmonid fish species. In addition, boat surveys have been conducted on both Loch Awe and Cruachan Reservoir within the redline boundary to assess the potential for salmonid spawning habitat. Arcus also undertook fish habitat and fish fauna surveys of tributaries of Loch Awe in 2017.

Name of Consultee	Comment	Response
	A walkover habitat survey should be undertaken on the main channels of Awe catchment with the aim of quantifying and evaluating the condition of freshwater habitats utilised for recruitment by fish, and in particular salmonids.	Walkover fish habitat surveys have been conducted on the burns flowing into Cruachan Reservoir. A pre-commencement walkover Scottish Fisheries Coordination Centre (SFCC) fish habitat assessment will also be undertaken on the River Awe prior to the commencement of the Construction Phase, if no such recent data already exists from the Argyll Fisheries Trust.
	The applicant is advised to consult with Argyll Fisheries Trust (AFT), Argyll District Salmon Fishery Board (ADSFB) and the Awe District River Improvement Association (ADRIA) in the first instance for further advice.	Argyll Fisheries Trust (AFT), Argyll District Salmon Fishery Board (ADSFB) and the Awe District River Improvement Association (ADRIA) were all consulted during the Scoping and Gatecheck process. to take place prior to the Construction Phase for existing data.
	Otters are classed as European Protected Species (EPS) under the Conservation (Natural Habitats, &c.) Regulations 1994. Where there is a high likelihood of otters being present, it is recommended that an otter survey will be required, and an EPS Licence to conduct works may be required from NatureScot.	Full otter survey has been undertaken for the Site and a 200 m buffer of this, as per current NatureScot guidance.
	Under section 9.4.12 non-avian protected species, it is stated that “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 Ecological Impact Assessment,” including the freshwater pearl mussel, I would disagree on this view as much of the survey data is over 6 months old and is therefore out-dated.	NatureScot now gives 2 years as being a reasonable validity period.
	The Freshwater Pearl Mussel is afforded statutory protection under Schedule 5 of the Wildlife and Countryside Act 1981; listed in Annexes II and V of the EC Habitats Directive and Appendix II of the Bern Convention; it is also listed as a Priority Species under the Argyll and Bute Local Biodiversity Action Plan. I therefore recommend that a Protected Species Survey for the Freshwater Pearl Mussel be undertaken in the vicinity of the proposed development (River Awe).	Consultation with NatureScot determined that the watercourses within the Site were not known to support freshwater pearl mussel nor represented suitable habitat for the species. Surveys for this species would therefore not be needed.

Name of Consultee	Comment	Response
Biodiversity - ABC	The [scoping report] habitat surveys are robust, however, there are special 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 EclA, 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.	Habitat surveys have extended to a 250 m around areas of potential excavation, and to 100 m around areas of shallow excavation. Habitats have been mapped using the Scottish EUNIS system, and those considered likely to include GWDTEs allocated to an NVC community for subsequent assessment. The mapping and description of these features can be found in Technical Appendix 8.1 .
	Whilst restoration of habitats has been identified in the report, I ask that a Method Statement is included in relation to the treatment and monitoring of the vegetation and excavated materials during the construction phase and re-instatement of same post –construction. The Method Statements need to be included in the Construction Environment Management Plan. Re. further restoration methods e.g., compensatory planting of trees- I ask that outline details (species and indicate location where most likely) of same should be factored in at this stage.	Outline details regarding habitat restoration and enhancement are included in section 8.10 of this EclA, including a requirement for these to be incorporated in the CEMP and the production of a Habitats Restoration Plan.
	Surveys specifically have been carried out in 2017 and 2018, albeit the applicant is aware that these are absent and can be scoped out of the EclA, namely wildcat, freshwater pearl mussel, beaver, and specially protected amphibians such as great crested newt. 5.4 Comment: I note that the surveys are out of date, but the applicant considers they are robust enough to remain valid except where the works where the compound is to be located. This gap needs to be addressed along with the new site boundary and those that are known to be present and active within the study area, namely fisheries, freshwater invertebrates, otter, pine marten and red squirrel surveys- prior to work commencing (albeit that a full planning application has to be submitted is granted permission) - a pre-start ecological survey on priority construction areas i.e. works compound and the areas following this as the project develops should be carried out prior to opening up these sites by the ECoW along with Tool -box talks (contained within the	Habitat surveys were completed or updated in 2021 for all areas within the Site. Surveys for fisheries, freshwater invertebrates, otter, pine marten, red squirrel, badger and a Preliminary Roost Assessment (for bats) have also been undertaken, as well as 12 months of bird vantage point data.

Name of Consultee	Comment	Response
	Construction Environment Management Plan-detail in 6.0) be given to site staff in advance of same.	
	I noted that no invasive non- native species (INNS) have been included in the EIAS, I ask that the applicant confirms that no Rhododendron ponticum or Japanese Knotweed or any INNS on the Wildlife and Country (1981) Act on the Schedule 9 list are on the development site.	INNS were included in the habitat surveys, and description of these features can be found in Technical Appendix 8.1.
	Construction Environment Management Plan (CEMP) - I note that mitigation measures along with licencing contacts for ecological interest are to be embedded in the plan and over seen by the ECoW. I ask that Toolbox Talks are included too and updated as and when required.	Toolbox talks would be a standard inclusion in the remit of the ECoW and the content of the CEMP.
	As this development is over a number of years, I ask that ecological monitoring reports with images are submitted to the local authority on annual basis.	The ECoW would likely provide monthly reports during the construction phase as part of its remit.

8.4 Methodology

- 8.4.1 This chapter has been informed by a suite of desk and field studies, further details of which are described below. The Ecological Impact Assessment (EclA) has been undertaken in line with good practice guidance, also as described below.
- 8.4.2 The scope of desk and field studies were agreed with consultees during scoping, and as set out in Table 8.2 later in this chapter.

Study Area

- 8.4.3 The study area for this assessment has been defined by determining the zone of influence of the Proposed Development in relation to each of the identified Important Ecological Features (IEFs), including the extent to which direct effects caused by land take and habitat loss may be experienced by those IEFs and the extent of indirect effects, such as an IEF's prey species being affected by the Proposed Development.
- 8.4.4 The zone of influence is different for each of the IEFs assessed and therefore a separate study area has been defined for each.

Desk Study

- 8.4.5 In order to anticipate the potential ecological sensitivities associated with the Site, a desk study was conducted in advance of the field surveys. This included a review of:
- Ecological and ornithological surveys undertaken within the Site boundary or its environs since 2016;
 - Existing data on statutory designated sites available through NatureScot Sitelink website for statutory designated sites up to 10 km from the Site;
 - Records of Ancient Woodlands available from NatureScot (up to 2 km from the Site);
 - The SBL;

- Argyll and Bute Council has designated non-statutory nature conservation sites, and such sites within 2 km from the Site were extracted from the Argyll and Bute Council Local Development Plan; and
- Other pre-existing biological data relevant to the Site were also searched for in online databases to which the authors had access and for which there were no copyright issues associated with their use in a commercial setting.

Field Survey

8.4.6 The EclA presented here has been informed by a series of technical field studies, as described in Technical **Appendix 8.1**. In summary, the surveys included:

- Habitats, including GWDTEs and those listed as Annex 1 Priority Habitats, and notable flora, including Invasive Non-Native Species (INNS);
- Otter;
- Water vole;
- Badger;
- Red squirrel;
- Pine marten;
- Bats;
- Vantage point surveys for target raptor species;
- Breeding birds;
- Black grouse;
- Electrofishing surveys for fish;
- Spawning habitat surveys (for salmonid fish);
- Kick and sweep surveys for macroinvertebrates, and
- Aquatic macrophytes.

Ecological Impact Assessment Methodology

8.4.7 The EclA was undertaken following good practice guidelines current at the time of writing (CIEEM, 2018).

8.4.8 In summary, EclA requires six steps:

- Identifying and characterising Important Ecological Features (IEFs);
- Identifying and characterising impacts and their effects;
- Identifying measures to avoid and mitigate effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and

- Identifying opportunities for ecological enhancement and monitoring.

Identifying Important Ecological Features (IEFs)

8.4.9 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 8.2. 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 8.2: An Approach to Assessing Important Ecological Features in Scotland.

Level of Sensitivity or Value	Examples (Not Exhaustive)
International (including European)	<p>An internationally designated site or candidate site (SPA³, proposed SPA (pSPA)⁴, Special Area of Conservation (SAC)⁵, candidate SAC (cSAC)⁶, pSAC⁷, Ramsar site⁸, Biogenetic Reserve⁹) 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.</p> <p>A viable area of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of that ecological resource.</p> <p>A regularly occurring population representing >1 % of the European resource of a species listed in Schedules 2 or 4 of the Habitat Regulations (As amended post-Brexit).</p>
National	<p>A nationally designated site (Site of Special Scientific Interest (SSSI)¹⁰, National Nature Reserve (NNR)¹¹, 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.</p> <p>A viable area of a priority habitat identified in the Scottish Biodiversity List, or smaller areas of such habitat which are essential to maintain the viability of that ecological resource.</p> <p>A regularly occurring population representing >1 % of the national population of a nationally important species, i.e., a priority species listed in the Scottish Biodiversity List and/or Schedules 1, 5 (S9 (1, 4a, 4b)) or 8 of the Wildlife and Countryside Act, or Schedules 2 or 4 of the Habitat Regulations (as amended post-Brexit).</p> <p>A regularly occurring and viable population of a UK Red Data Book species.</p>

³ Special Protection Area classified under the EU Birds Directive for importance to birds.

⁴ Potential Special Protection Area.

⁵ Special Area of Conservation Area classified under the EU Habitats Directive for important habitat or non-bird species.

⁶ Candidate Special Area of Conservation.

⁷ Potential Special Area of Conservation.

⁸ Wetland of international importance designated under the Ramsar Convention.

⁹ Sites deemed representative examples of particular habitats in Europe.

¹⁰ Site of Special Scientific Interest.

¹¹ National Nature Reserve.

Level of Sensitivity or Value	Examples (Not Exhaustive)
Council	Viable areas of key habitat identified in Council LBAP or Scottish Biodiversity List, 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 Council LBAP or Natural Heritage Zone profile on account of its rarity or localisation. Non-statutory designated wildlife sites including semi-natural ancient woodland greater than 0.25 ha. Networks of species-rich hedgerows.
Local	Locally important habitats or species such as: semi-natural ancient woodland smaller than 0.25 ha; features that are scarce within the local area or which appreciably enrich the local habitat resource e.g. networks of hedgerow/ditches not considered to be species-rich; small populations of notable species (e.g., SBL or LBAP species) regularly resident on or using the site.
Site	Commonplace and widespread habitats or species which contribute to the functioning or value of the wider ecological landscape, such as: scrub, poor semi-improved grassland, coniferous plantation woodland, intensive arable farmland etc.; common and widespread faunal species, or occasional individuals of more notable species such as SBL or LBAP species, either resident on or using the site.

Identifying Impacts and Their Effects

- 8.4.10 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.
- 8.4.11 Impacts have been defined here as being high, medium, low, or neutral, as summarised in Table 8.3. Impacts may be adverse (detrimental) or positive (beneficial).

Table 8.3: 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 (or at least the lifetime of the Proposed 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 (with respect to the lifetime of the Proposed 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.

Impact Type	Description
Neutral	There is no perceptible change in the ecological feature.

- 8.4.12 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 EclA, probabilities are assessed qualitatively and relatively, using the terms defined in Table 8.4 below.

Table 8.4: 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

- 8.4.13 The 2018 CIEEM guidelines use only two categories to classify effects, namely those which are significant, and those which are not. In accordance with those guidelines, a "significant effect" in this assessment 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, in particular where the integrity of an IEF will be affected. 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.
- 8.4.14 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. The mitigation hierarchy (avoid, mitigate, compensate, enhance) may need to be applied, consistent with the scale at which the significant effect has been identified, in order to ameliorate any identified significant effects.

8.5 Current Baseline Conditions

Desk Study and Designated Sites

- 8.5.1 The findings of the desk study are as presented in Table 8.5.

Table 8.5: Summary Desk Study

Source	Relevant Data
NatureScot	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). Details relating to the SPA are included within Technical Appendix 8.2 . 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. 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.

Source	Relevant Data
Argyll and Bute Council	No LNCSSs 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 their closest point.
Ancient Woodland Inventory	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 is included within the Coille Leitire SSSI and the Loch Etive Woods SAC.
National Biodiversity Network (NBN) Atlas	<p>The NBN Atlas contained nearly 16,000 data records for a 5 km buffer around the Site. The vast majority of these were records which cannot be used for commercial purposes, were dated pre-2010, and/or were species of no notable conservation importance. Of those records dated from 2010 or later, 77 were not constrained by a CC-BY-NC licence, and included:</p> <ul style="list-style-type: none"> ▪ 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. <p>These are all species which were considered in one or more of the survey reports reviewed.</p>
ScottishPower Generation Ltd (2016) <i>Cruachan Power Station / Extended Phase 1 Habitat and National Vegetation Classification (NVC) Survey Report / Arcus consultancy Services Ltd.</i> Unpublished contract report, dated 11 November 2016.	<p>Covered the majority of the Cruachan Reservoir part of Site and its 250 m buffer. Narrow strip of Access Track and limited extent of 250 m buffer. Lower Site Compound not covered.</p> <p>A number of ecologically valuable habitats were recorded within the Site. Though generally in a degraded condition, these areas supported SBL habitats and Annex 1 habitats, which are of ecological importance and of conservation value. In addition, the Site also contained habitats with moderate and high potential to support GWDTes; the potential hydrological sensitivity of these habitats should be considered to inform future development of the Site.</p>
ScottishPower Generation Ltd (2017) <i>Cruachan Power Station Bryophyte Survey Report.</i> Unpublished contract report, dated November 2017.	<p>Majority of Cruachan Reservoir part of Site physically sampled. Data search for rest of Site.</p> <p>The Study Area as surveyed had some 113 bryophyte taxa (82 mosses and 31 liverworts) a modest total for what was a relatively large site with a diversity of habitat including significant watercourses. The majority of the Study Area was assessed to be species poor (due to vegetation being over granite) especially in the mire areas and in the smaller watercourses. Much of the species' diversity was concentrated in proximity to the Beinn à Bhùiridhand the Allt Cruachan, where the rock was more base-rich. Almost all these species recorded in this area were locally common, including three nationally scarce species which are quite frequent in this part of Argyll.</p> <p>There were 13 oceanic species recorded in the Study Area, a rather smaller number than might have been expected. Lack of oceanic species may have been partly as a result of the altitude (300m +) and the lack of tree cover.</p> <p>In terms of the protocol for assessing the oceanic bryophyte interest, the Site had one indicator species, <i>Harpalejeunea mollerii</i>, giving the</p>

Source	Relevant Data
	Site a score of 1. The Study Area thus had a very limited bryophyte interest.
Arcus (2021) <i>Cruachan Power Station – Extended Phase One Habitat Survey Report 2020</i> . Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.	Restricted study area along shore of Loch Awe to east of visitor centre. Habitat map provided.
ScottishPower Generation Ltd (2017) <i>Cruachan Power Station Bat Survey Report</i> . Unpublished contract report, dated November 2017.	Range of PRFs identified (trees and buildings).
ScottishPower Generation Ltd (2018) <i>Cruachan Power Station Fisheries Habitat & Fish Fauna Survey Report</i> . Unpublished contract report, dated January 2018.	Lack of suitable habitats due to impediments to fish movement. Reasonable to conclude that freshwater pearl mussel does not occur in the study area.
ScottishPower Generation Ltd (2017) <i>Cruachan Power Station Protected Species Survey Report</i> . Unpublished contract report, dated November 2017.	Badger sett identified. Otter spraints, slides and couches identified. Couches predominantly restricted to the edges of Cruachan Reservoir. Pine marten denning features restricted to north-west of Visitor Centre and the Dalmally Substation. Pine marten scats found north-east of Visitor Centre and at Falls of Cruachan. Red squirrel feeding remains found north-east of Visitor Centre. Some suitable denning habitats for wild cat but large amount of deterrents. No field evidence of water vole and habitat suitability limited to upper reaches of Cruachan catchment.
Drax (2020) <i>Cruachan 2 Hydro Ecology – Camera Trap Monitoring Report</i> . Unpublished contract report, dated March 2020.	Pine marten confirmed as present, but no den locations confirmed.
Arcus (2021) <i>Cruachan Power Station – Protected Species Survey Report 2020</i> . Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.	Woodland habitat suitability for badger, and sett still present. Single otter spraint identified below Cruachan Reservoir. Habitat suitability for pine marten denning and a scat recorded. No positive sightings of red squirrel but ample habitat suitability. No evidence of water vole and considered unlikely to be present. No formal survey undertaken for herpetofauna, but suitability identified for common amphibians, and forage, refuge and hibernaculae for reptiles.
ScottishPower Generation Ltd (2017) <i>Cruachan Power Station Ornithology Annual Report Year 2: October 2016 – September 2017</i> . Unpublished contract report dated March 2018. And ScottishPower Generation Ltd (2018) <i>Cruachan Power</i>	During the breeding bird surveys, a total of 50 species were recorded, including 16 species listed on the BoCC and/or SBL that were considered to be breeding or holding territory within the Study Area. Territories were heavily concentrated in the woodland habitats in the lower elevation areas of the Study Area. Relatively few bird's species listed on the BoCC and/or SBL were recorded breeding or holding territories within the actual Site. Within the vantage point data, a total of 204 flights by 15 target species were recorded in 2016-2017, and 144 flights by 14 target species in 2017-2018. Overall, flight activity was greatest over and

Source	Relevant Data
<p><i>Station Ornithology Annual Report Year 2: October 2017 – September 2018.</i> Unpublished contract report, dated December 2018.</p>	<p>around Loch Awe, reflecting the predominance of waterbirds (wildfowl, heron, razorbill, etc.) among the species observed. Grey heron was the most frequently recorded species during the vantage point surveys with many observations associated with the fish farm opposite the Cruachan Visitor Centre.</p> <p>Within the Site Survey Area itself, relatively few flights were observed, although those that were recorded, tended to be more sensitive species (e.g., Schedule 1 raptor species).</p> <p>In addition to golden eagle and white-tailed eagle, peregrine and osprey were also recorded nesting within the Breeding Raptor Study Area during the 2016-2017 and 2017-2018 survey periods.</p> <p>There were also three observations of hen harrier during the 2017-2018 surveys, however, none of the individuals recorded exhibited any type of breeding or territorial behaviour.</p> <p>One pair of golden eagle was confirmed breeding within the 6 km buffer of the Site in both study years.</p> <p>White-tailed eagle was also recorded frequently throughout the 2017-2018 survey period, likely to be associated with breeding territories c. 6 km from the Site.</p>

Field Survey

Scottish EUNIS, GWDTEs and Notable Flora

- 8.5.2 Full details of the habitat survey results can be found in Technical [Appendix 8.1](#).
- 8.5.3 Within the Upper and Lower Works areas and the Access Track, the main aquatic habitat within the Site was standing water, as applied to Cruachan Reservoir and Loch Awe, collectively comprising just over 17 % of the Site. The shores of both waterbodies were virtually devoid of aquatic macrophytes; at Cruachan Reservoir because of the constant abstraction and discharge (resulting in 2.1 % of the Site being classified as periodically inundated shores) and at Loch Awe because of the artificial nature of the loch edge in front of Cruachan 1, shelving steeply into deep water. Mappable extents of watercourse were classified as running water, such as the Allt Cruachan flowing between the two main waterbodies.
- 8.5.4 Less than 0.5 % of the Site was classifiable as a type of blanket bog. This did however include a small extent of low altitude blanket bog, primarily above the Allt Cruachan, south of Cruachan Reservoir, and referenceable to M17a in the NVC. Although these areas did support carpets of Sphagnum mosses, hare's-tail cottongrass *Eriophorum vaginatum* was conspicuously absent, presumably having been grazed out by sheep. The dominant graminoids were instead deergrass *Trichophorum cespitosum* and purple moor-grass *Molinia caerulea*. Within these blanket bog areas, there were occasional bog pools, predominantly referenceable to the M1 bog pool community in the NVC.
- 8.5.5 A number of types of upland flush were recorded throughout the Upper Works part of the Site, in particular down the slopes leading into Cruachan Reservoir, and down to the existing Access Track. These were often narrow (< 0.5 m wide) and on stony substrates within areas of wet heath (see below), and often too small to be mapped. The majority of these were referenceable to the M10 mire community in the NVC, although small areas of M11 mire were also identified, and on more shallow gradients, the M6 mire.
- 8.5.6 Grasslands, including types of marshy grassland, comprised just over 13 % of the Upper Works part of the Site. The majority of these were semi-improved acid grasslands represented by U4 in the NVC, either on its own or as a mosaic with other bracken *Pteridium aquilinum* and/or mat-grass *Nardus stricta* habitats (see below). At higher elevations, the U4 grasslands tended to give way to U5 *Nardus stricta* - *Galium saxatile* grasslands. The EUNIS grass heath category was used for small

- areas of a mosaic habitat that had affinities with both CG10 and CG11 in the NVC, which occurred as small patches along the existing Access Track.
- 8.5.7 Improved grasslands were generally very limited within the Upper Works part of the Site, restricted to a small, improved pasture adjacent to a steading along the existing Access Track. These were referenceable to MG6 in the NVC.
- 8.5.8 Marshy grassland types comprised just over 2 % of the main works area, either generically classified as humid meadows, or more specifically as *Juncus acutiflorus* rush pastures where sharp-flowered rush was recorded as the dominant species. The humid meadow category was used for areas referenceable to either MG9 or M23b in the NVC.
- 8.5.9 Sub-Atlantic bracken fields were ubiquitous throughout the Upper Works part of the Site, along the route of the existing Access Track, and the steep hillside slopes flanking the Allt Cruachan and leading down to Loch Awe.
- 8.5.10 Four main heathland types were identified within the Upper Works part of the Site and the Access Track. The majority of this, comprising nearly one-third of the whole Site, was northern wet heath, referenceable to M15 in the NVC. These habitats tended to be on shallow peat less than 0.5 m in depth, but depths were variable, reflecting the undulating bedrock. This habitat type was abundant along the slopes around Cruachan Reservoir, and often occurred in a mosaic with other associated plant communities such as bog pools, blanket bog on deeper peat areas, flushes and acid grassland types. Where purple moor-grass achieved dominance on shallow peat areas, the habitat was classified as purple moor-grass wet heath, and in terms of the NVC, these were referenceable to M25a. Both the northern and purple moor-grass wet heaths supported very small flush areas referenceable to M10 (see above) and were considered to be GWDTEs. Very small areas of sub-montane and sub-Atlantic *Calluna* heaths were mapped, predominantly on the southern, downslope side of the existing Access Track.
- 8.5.11 Woodland habitats were generally confined to areas below the 200 m contour and associated with the Loch Etive Woods SAC and SSSI. A strip of ash woodland flanked the A85 at the bottom of the hill, referenceable to W9 in the NVC. Above this initial strip of ash woodland, the habitat graded into a community more definable as oak/birch woodland, and classified as being W11 in the NVC, although occasionally the W17 community was used for areas where the ground layer was much more open and heathier in character, with abundant bryophytes and lichens. Very small areas of plantation woodland occurred around the residential properties along the existing Access Track, including both coniferous plantations, and deciduous or mixed stands.
- 8.5.12 Rockfaces, boulder fields and other bare ground occurred throughout the main works Site. These were not always totally devoid of vegetation. For example, the rock faces created during the construction of the existing Cruachan Reservoir dam supported a species rich and colourful U15 community. Within the boulder fields, small plants of heather and cross-leaved heath were recorded, as well as saplings and small trees of rowan, moss cushions and a number of herbs and ferns.
- 8.5.13 Low density buildings within the Site included the Cruachan Reservoir dam, utilities buildings, residential properties and the offices and visitor centre associated with Cruachan 1. Roads, tracks, and other areas of hard standing included the railway line along the valley floor and maintained areas of grassland and gardens were classified as cultivated/amenity grassland. These areas had no associated NVC community.
- 8.5.14 The habitat composition of the Lower Site Compound was notably different to the main part of the Site, being a complex of valley mire and northern wet heaths, as represented by the M17 and M15 NVC communities, either in isolation or in a mosaic, also with M6, M25, U4 or U5. Just over 6 ha of the Lower Site Compound part of the Site comprised grassland habitats, the majority of which were *Juncus acutiflorus* rush pastures. These were primarily located within the area previously used as a construction compound for Cruachan 1, either side of the Access Track that passed through this part of the Site.
- 8.5.15 Semi-improved acid grasslands within this part of the Site were generally limited to small areas on raised moraine hummocks which had been closely sheep grazed. In addition, a very small area of

mesotrophic pasture was recorded where the Access Track left the public road, representing the NVC community MG1.

- 8.5.16 Sub-Atlantic bracken fields occurred throughout the southern section of this part of the Site, in a mosaic with the northern wet heaths and semi-improved acid grasslands, referenceable to the NVC community U20.
- 8.5.17 No large extents of woodland occurred within the location of the Lower Site Compound, but the Study Area did clip small sections of riparian alder woodland/scrub along the north-eastern boundary, referenceable to W7 in the NVC. The oak/birch woodlands in this part of the Site were generally examples of W11, although adjacent to the public road these were little more than lines of trees.

Otter

- 8.5.18 Full details of the results of the otter survey can be found in Technical **Appendix 8.1**. The majority of the Site had high suitability for otter, and their presence was either confirmed through active signs, or suitability based on known historic presence and the general structure of the watercourses. The exception to this was the location of the Lower Site Compound which mainly contained smaller networks of ditches less suitable for otter. However, the Allt Mhoille along the eastern boundary of this part of the Site was noted as having suitability for commuting and foraging otter, although no signs of the species were found here. Otter was identified as being an IEF of **Local** importance, for inclusion in this EclA.

Water Vole

- 8.5.19 Full details of the results of the water vole survey can be found in Technical **Appendix 8.1**. Water voles were judged to be absent from the Site and Study Area and there was limited habitat suitability to suggest that the Site could become colonised in the future. Small areas of suitable habitat were identified within the location of the Lower Site Compound, where networks of ditches lined by rush offered suitable burrowing and feeding habitat for water vole. Areas of limited suitability around the dam and reservoir were generally isolated within the surrounding landscape and judged unlikely to become colonised. Water vole was not considered to be an IEF needing to be included in the EclA, although a watching brief for the species will be included in the remit of the Proposed Development's Ecological Clerk of Works (ECOW – see Section 8.7).

Badger

- 8.5.20 Full details of the results of the badger surveys can be found in Technical **Appendix 8.1**. In 2019, badger were confirmed to be active within the wider Study Area, and there were confirmed signs of the species found during the 2021 surveys. It was likely that a badger clan territory extended along the steep woodland slopes north of the A85, and that a second badger clan was present in habitat surrounding the river Strae to the east of the Site. The presence of setts within the main Site boundary in woodland north of the A85 could not be ruled out, due to much of this area being inaccessible. No signs of badger were found within the location of the proposed Lower Site Compound, north of the B8077; much of the ground within this part of the Site was wet and unsuitable for sett creation. Given the known presence of badger, and the potential for setts to be located within areas accessible for survey, the species will be considered to be a **Site** level IEF in the EclA.

Red Squirrel

- 8.5.21 Full details of the red squirrel surveys undertaken can be found in Technical **Appendix 8.1**. Red squirrel was likely to be abundant and frequent within the woodland areas north of the A85, and although no specific dreys were found in areas to be directly impacted by proposed works, the foliage at the time of the survey made the presence of dreys impossible to rule out. Images of red squirrel have regularly been obtained by camera traps in the area.

- 8.5.22 Argyll and Bute Council LBAP is currently being re-drafted, but the current version includes red squirrel as a priority species. Therefore, the Site is considered to be of Council level importance for the red squirrel population in the area.

Pine Marten

- 8.5.23 Full details of the pine marten surveys can be found in Technical [Appendix 8.1](#). When combining all of the surveys undertaken, it was considered likely that pine marten were widespread within the woodland areas of the Site, north of the A85. No specific dens were found, but the foliage and access restrictions at the time of the survey made the presence of dens impossible to rule out, and animals were often seen on camera trap footage. The Lower Site Compound did not have suitable habitat for pine marten dens, but suitable woodland habitat for the species did occur to the west within a 250 m buffer of the Site.
- 8.5.24 The Site is considered to be of Local level importance for the pine marten population in the area, and the species should therefore be considered to be a **Local** level IEF in the EclA. The presence of pine marten dens within 250 m of the Lower Control Works should also be assessed within the EclA on a precautionary basis.

Bats

- 8.5.25 Full details of the bat surveys undertaken can be found in Technical [Appendix 8.1](#). With regards to bat roosts in structures, there were two bridges within, or in close proximity to the Site which displayed moderate summer roosting suitability for bats, namely the bridge over the Allt Mhoille at the B8077 and the railway bridge over Allt Cruachan. The Visitor Centre and administration building at the existing power station, both displayed low bat roost suitability. However, as none of these structures will be affected by the Proposed Development, summer roosting bats in structures can be scoped out of this EclA.
- 8.5.26 Suitability for hibernating bats occurs within the tunnels surrounding Cruachan Reservoir, and in late October 2019 a hibernating Daubenton's bat was found in one of these tunnels. Hibernating bats should therefore be included in as an IEF of Local importance within the EclA.
- 8.5.27 Numerous trees were identified as having bat roost suitability, in particular along the main Access Track and mature trees adjacent to the A85. Tree roosting bats were considered to be an IEF of Site level importance and should be included in the EclA.

Birds

Target Raptor Species

- 8.5.28 Golden eagle flights were recorded across the Site in all survey years, predominantly in 2016-2018 when the closest golden eagle territory to the Site was occupied. Although the GET model showed that there will be no significant loss of golden eagle habitat arising from the construction and operation of the Proposed Development, given their association with the SPA, golden eagle is included in this EclA as an IEF of National importance.
- 8.5.29 Regular white-tailed eagle activity was also recorded within the Eagle Study Area in 2016-2018, and it was likely that the pair that was confirmed breeding in the south-west of the original (wider) Eagle Study Area in 2016-2017 bred again in 2017-2018, but this was not investigated as it was over 5 km from the Site. During 2021-2022, white-tailed eagle was recorded overflying Cruachan Reservoir more frequently than in 2016-2018, but again did not nest within the Study Area. Given the regularity of the white-tailed eagle presence within the Site, it is included in this EclA as an IEF of Council importance.
- 8.5.30 Osprey and peregrine were both confirmed to be breeding within the wider Study Area. However, the stated disturbance distance for both species is put at around 750 m, and the recorded nest locations were both well over 1 km from the Site. Given that neither of these species are associated with the SPA, and no impacts are expected, they will not be considered as IEFs in this EclA.

Black Grouse

- 8.5.31 There were no black grouse recorded in the Study Area during any of the dedicated surveys in 2021, or during any other survey work undertaken in that year. Given the good, often perfect weather conditions for surveying, and the good coverage and accessibility of suitable habitat, it is considered unlikely any birds were missed. It is therefore considered likely that in 2021 black grouse were absent from the immediate vicinity of the Proposed Development, following the downward trend seen in other parts of Scotland. As there were only three males recorded in 2018, including at two single-bird leks, it is possible the species has become locally extinct in the years subsequent to that earlier survey.
- 8.5.32 Given that there will be a separation distance of c. 1.3 km between the Proposed Development and the nearest historic black grouse lek, and at that distance it is not expected that any disturbance impacts will occur, black grouse will not be considered as an IEF in this EclA.

Other Breeding Birds

- 8.5.33 During the BBS walkovers, a total of 50 species were recorded, including 17 Birds of Conservation Concern (BoCC) considered to be breeding or holding territory within the Study Area. If the criteria proposed by Fuller (1981) are used, this would place the breeding bird assemblage to be of **Council** level importance (50-69 species). However, since that assemblage reflects typical species of the wide variety of habitats falling within the Site, and that the 2016-2018 breeding bird surveys covered a much wider Study Area than that formed by the final Site boundary, non-scarce raptor breeding birds at the Site will be considered to be an IEF of **Local** importance in this EclA.

Freshwater Features

Fish Fauna

- 8.5.34 Full details of the fish fauna surveys undertaken by Mhor Ecology in 2017 can be found in *Cruachan Power Station Fisheries Habitat & Fish Fauna Survey Report 2018*. Full details of the fish fauna surveys undertaken by Gavia Environmental in 2021 can be found in Technical Appendix 8.3.
- 8.5.35 Timed electrofishing surveys were carried out on Cruachan Reservoir, and no fish species were detected here. This was likely to be due to limited suitable areas to survey, the continual fluctuation of water levels, and lack of control on these fluctuations for survey purposes.
- 8.5.36 Timed electrofishing surveys were also carried out on Loch Awe. In total four species of freshwater fish were identified: European minnow *Phoxinus phoxinus*, European perch *Perca fluviatilis*, European eel *Anguilla anguilla* and brown trout *Salmo trutta*.
- 8.5.37 Arctic charr are considered within this EclA to be an IEF of National importance. Although not detected by the surveys undertaken for this EclA, are assumed to be present in Cruachan Reservoir and Loch Awe and are therefore a regularly occurring species listed on the SBL as a species of Principal Importance.
- 8.5.38 Atlantic salmon and sea trout are both considered within this EclA to be IEFs of Council level importance. The River Awe catchment populations are locally significant populations within the Argyll district, and they are a SBL listed species of Principal Importance.
- 8.5.39 Brook lamprey are considered within this EclA to be IEFs of Site level importance as they were recorded within the desk study as being present in Cruachan Reservoir but are unlikely to be a notable population. They are Listed on Annex III of the Bern Convention and Annex II of the EC Habitats Directive and are a SBL listed species of Principal Importance.
- 8.5.40 Brown trout are considered within this EclA as being an IEF at the Local level as although they are common and widespread in this area, they are listed on the SBL as species of Principal Importance.

Fish Habitat

- 8.5.41 Full details of the fish habitat surveys undertaken by Mhor Ecology in 2017 can be found in *Cruachan Power Station Fisheries Habitat & Fish Fauna Survey Report 2018*. Full details of the fish habitat surveys undertaken by Gavia Environmental in 2021 can be found in Technical Appendix 8.3.
- 8.5.42 In both Loch Awe and Cruachan Reservoir, the substrate type and composition were deemed to be unsuitable or sub-optimal for salmonid spawning. The main reasons for this were that the substrate was too large, there was insufficient substrate suitable for spawning, or the presence of sand and silt. Fish spawning habitat is therefore not included in this EclA as an IEF.

Macroinvertebrates

- 8.5.43 Full details of the macroinvertebrate sweep, and kick surveys undertaken by Gavia Environmental in Autumn 2021 can be found in Technical Appendix 8.3. No species of nature conservation interest were noted from the sampling conducted.
- 8.5.44 Sweep samples collected from the Cruachan Reservoir revealed four family groups and four species of aquatic invertebrates as being present. As with the results from Loch Awe, the Chironomidae family (non-biting midge) was present in large numbers and was the dominant family group for this sampling area.
- 8.5.45 Kick samples collected from the inflowing burns to Cruachan Reservoir revealed six family groups and six species of aquatic invertebrates as being present.
- 8.5.46 Sweep samples collected from Loch Awe produced four family groups and seven individual species. The taxa collected were mainly generalists with the most abundant family group being that of Oligochaeta (aquatic and terrestrial worms).
- 8.5.47 Despite a relatively low abundance of species, and an absence of species of conservation importance recorded during the surveys undertaken in 2021, aquatic macroinvertebrates are considered within this EclA precautionarily as being an IEF of Site level importance. This was primarily due to insufficient data being available to be able to discount the invertebrate assemblage entirely from the assessment.

Aquatic Macrophytes

- 8.5.48 Full details of the aquatic macrophyte surveys undertaken in 2021 can be found in Technical Appendix 8.3.
- 8.5.49 No aquatic macrophytes were found within Cruachan Reservoir.
- 8.5.50 Aquatic macrophyte surveys were limited to one area on Loch Awe due to difficulties associated with safe access. However, within this area a total of 12 species were collected and identified. The main characteristics of the area surveyed was that it was shallow, close to the shoreline, consisted of large substrate, was subject to wave action, and would experience fluctuating water levels in comparison to the rest of the Loch. Aquatic macrophytes are not therefore considered in this EclA as being an IEF.

8.6 Modifying Influences (Future Baseline in Absence of Development)

- 8.6.1 The dynamic nature of the natural environment means that the ecological features associated with the Site will continually change over time. In the absence of the Proposed Development, the primary process by which the Site's ecological status would most likely change would be continual management of the habitat mosaic via sheep grazing (on the hill) and cattle (lower elevations), and potentially continued expansion of bracken. The operation of Cruachan 1 would continue, with the associated changes in water levels in Cruachan Reservoir.

Implications of Climate Change

- 8.6.2 According to the UK Climate Change Projects 2018 (UKCP18) summary for Argyll and Bute, it is anticipated that summer temperatures and winter precipitation are both expected to increase. Additionally, extreme weather events are likely to increase in both frequency and intensity. These longer-term changes are predicted to cause range shifts in some species and may alter habitat composition and health of the plant communities present. The suitability of the Site may therefore change for some of the species which are currently present, and new, different species may colonise. The baseline surveys carried out for this EIAR represent a snapshot of ecological composition and activity present at the time of survey, and cannot be extrapolated to predict future population trends in the event of climate change.

8.7 Assumptions and Limitations

- 8.7.1 While every attempt was made to collect accurate baseline data for this EIAR, as identified above all ecological surveys represent a 'snapshot' of activity. Ecological features are dynamic and often transient, and it is rarely possible to confirm the absence of a species through survey. It may be necessary to update ecological surveys prior to construction, and data presented in this chapter should not be used for long-term analysis of species distribution or occurrence. However, it is considered that sufficient data have been collected for the assessment purposes of this EcIA.
- 8.7.2 Species or habitat specific limitations are discussed further in Technical Appendices 8.1-8.3.

Identification of Important Ecological Features (IEFs)

- 8.7.3 Based on the criteria given in Table 8.1, summaries of the IEFs identified in Appendices 8.1-8.3 are presented in Table 8.6 for designated sites, Table 8.7 for habitats, and Table 8.8 for faunal species. All other ecological features have been scoped out of this assessment (see summaries above and Appendices 8.1-8.3 for more details).

Table 8.6: Summary of Designated Sites IEFs

Site	Value	Rationale
Glen Etive and Glen Fyne SPA	International	Originally designated under European legislation for features notable at a European-scale.
Loch Etive Woods SAC	International	Originally designated under European legislation for features notable at a European-scale.
Coille Leitire SSSI	National	Designated and protected under national legislation.
Ancient Woodland	Council	Large extent of ancient woodland also covered by A&BC Local Development Plan policies.

Table 8.7: Summary of Habitat IEFs

Habitat Type	Value	Rationale
C1: Standing water	Council	Oligotrophic and dystrophic freshwaters are listed on the A&BC LBAP. These waterbodies are important for their size, potential ecological value, and position in the ecological mosaic.
C2: Running water	Council	Rivers and streams are listed on the A&BC LBAP. Within the Site, they are important for their role as a connective feature, their position in the ecological mosaic and their potential value.

Habitat Type	Value	Rationale
D1.21: Low-altitude blanket bog/ D1.22: Bog pools in blanket bog	Council	These habitats include NVC types which would represent Annex 1 habitat types. They are important for their size and rarity at a European level and are listed as a biodiversity asset in the A&BC LBAP.
D2: Valley mire	Council	These habitats include NVC types which would represent Annex 1 habitat types. They are important for their size and rarity at a European level and are listed as a biodiversity asset in the A&BC LBAP.
D4.19: British <i>Carex demissa</i> flushes	Council	These habitats include NVC types which would represent Annex 1 habitat types and GWDTEs. Although only small areas are present within the Site, they are important for their rarity at a European level and are listed as a biodiversity asset in the A&BC LBAP.
E1.71: <i>Nardus stricta</i> acid grasslands	Local	Widespread and commonplace habitats typical of this assemblage of upland habitats, with a diversity that has been impacted by grazing and in some localities, drainage. However, at the Site they form mosaics with narrow species-rich flushes of conservation importance that are also GWDTEs.
E1.72#: Grass-heath	Local	These habitats include NVC types which would represent Annex 1 habitat types and GWDTEs. Although only small areas are present within the Site, they are important for their rarity at a European level and are listed as a biodiversity asset in the A&BC LBAP.
F4.11: Northern wet heaths	Council	These heathlands include NVC types which would represent some overlap with habitats considered to be Annex 1, as well as being GWDTEs. As soligenous types of wet heath, these would be considered to be a biodiversity asset within the A&BC LBAP. Important for its size, species-richness, and position in the ecological mosaic.
F4.13: Purple moor-grass wet heaths	Local	These heathlands include NVC types which would represent some overlap with habitats considered to be GWDTEs. Important for its size, position in the ecological mosaic and potential ecological value.
F4.21: Sub-montane heath/ F4.22: Sub-Atlantic <i>Calluna</i> heaths	Council	These heathlands include NVC types which would represent some overlap with habitats considered to be Annex 1. They would be considered to be a biodiversity asset within the A&BC LBAP. Important for their position in the ecological mosaic.
G1.1: Riparian birch/willow woodland/scrub	Local	Small area of a woodland type considered likely to be a GWDTE and considered to be a biodiversity asset in the A&BC LBAP.
G1.2: Riparian alder woodland/scrub	Local	Very small area of a woodland type considered likely to be a GWDTE and considered to be a biodiversity asset in the A&BC LBAP.
G1.91: Oak/birch woodland	Council	Extensive area of habitat likely to include Annex 1 types. Important for its size, continuity, species diversity and position in the ecological mosaic. Also, a biodiversity asset in the A&BC LBAP.
G1.A: Oak woodland	Local	Extensive area of habitat listed as a biodiversity asset in the A&BC LBAP. Important for its size, continuity, species diversity and position in the ecological mosaic.
G1.A2: Ash woodland on slopes and screes	Council	Extensive area of habitat likely to include Annex 1 types. Important for its size, continuity, species diversity and

Habitat Type	Value	Rationale
		position in the ecological mosaic. Also, a biodiversity asset in the A&BC LBAP.

Table 8.8: Summary of Faunal IEFs

Species/Species Group	Value	Rationale
Otter	Local	No holts occurred within 200 m of the Proposed Development, but the stretch of shore in front of the existing power station is currently an important territory for otter, for commuting and foraging, socialising, and resting. Argyll and Bute Council LBAP is currently being re-drafted, but the current version includes otter as a priority species.
Badger	Site	Badger unlikely to be resident within the Site, but active in close proximity.
Red squirrel	Council	The Argyll and Bute Council LBAP is currently being re-drafted, but the current version includes red squirrel as a priority species. High suitability of habitat within parts of the Site, and recorded sightings and field signs of the species.
Pine marten	Local	Likely to be widespread within the woodland areas north of the A85. Although no specific dens were found in the Site, pine marten confirmed to be present within areas adjacent to the existing Access Track through both field signs and camera monitoring.
Bats - hibernating	Local	Hibernating bats historically confirmed within tunnel system at Cruachan Reservoir.
Bats – summer tree roosting		High suitability tree features present within woodland adjacent to A85 and along main Access Track.
Bats - activity		Loch Awe and Cruachan Reservoir both confirmed as being well-used by bats for foraging and commuting.
Raptors – golden eagle	National	Regularly occurring pair of Schedule 1 birds in vicinity of the Proposed Development and part of a population associated with an SPA.
Raptors – white-tailed eagle	Council	Regularly occurring Schedule 1 birds within the Site, currently associated with a nest > 5 km from the Site.
Nesting birds	Local	An assemblage of 50 species, including 17 BoCC, but covering a number of different ecotopes which would inflate species-richness.
Arctic charr	National	A regularly occurring population of a nationally important species listed in the SBL as a species of Principal Importance. Assumed to be present within Cruachan Reservoir and Loch Awe.
Atlantic salmon and sea trout <i>Salmo trutta</i>	Council	A regularly occurring, locally significant population within the Argyll district, assumed to be present at least in Loch Awe. Atlantic salmon and sea trout are SBL listed species of Principal Importance.
Brook lamprey <i>Lampetra planeri</i>	Site	Records found within desk study for this species in Cruachan Reservoir but considered unlikely to be a notable population. Included here precautionarily due to species being listed on Annex III of the Bern Convention and Annex II of the EC Habitats Directive.

Species/Species Group	Value	Rationale
Brown trout	Local	Common and widespread faunal species and a SBL listed species of Principal Importance, possibly either resident in or using waterbodies within the Site, although spawning habitats found to be suboptimal.
European eel	National	A regularly occurring population of a nationally important species (SBL listed species as Critically Endangered and of Principal Importance). Listed on the IUCN Red List of Threatened Species.
Aquatic macroinvertebrates	Site	Low species richness and relatively low abundance was recorded during surveys undertaken in 2021, and no nature conservation species recorded. Included here precautionarily due to insufficient data available.

8.8 Embedded Mitigation

- 8.8.1 This assessment of impacts and their effects has been undertaken in the context of the application of embedded mitigation which will reduce impacts associated with both 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.

Best Practice During Construction

- 8.8.2 An Ecological Clerk of Works (ECoW) will oversee all stages of construction, to ensure that good practice measures with regards to ecology are implemented. Other good construction practice measures will be incorporated into the Construction Environmental Management Plan (CEMP) for the Proposed Development. These can be summarised as:
- Pre-commencement surveys for all relevant protected species, and the preparation of Species Protection Plans as 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. Temporary fencing will be used to ensure that plant and operatives do not encroach further than is necessary into ecologically sensitive areas;
 - General good practice measures for working in and near to watercourses and waterbodies will be adhered to, for example, during construction, silt interception traps will be provided to minimise unchecked contaminated run-off. Appropriate temporary drainage solutions must be designed and installed. Detailed drainage designs will require review and approval by the scheme Environmental Manager (and ECoW as required), and appropriate drainage measures will be installed in advance of major ground-breaking works. A Pollution Prevention Plan will be included in the CEMP, which will include the approach to be taken to dust management;
 - Preparation of a Biosecurity Management Plan;
 - 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 watercourses and woodland edges. Use of heavy machinery and pile

drivers will be limited to avoid two hours before and after dawn and dusk within 30 m of watercourses, waterbodies or woodland edges; and

- A site speed limit of 15 mph for all construction traffic will be in place to protect otter, badger, red squirrel and pine marten.

8.9 Assessment of Effects

Construction Phase Effects

8.9.1 Potential direct effects of construction include:

- Direct loss of habitat through land take for construction of built features and associated infrastructure; and
- Direct loss or harm of species through felling and other construction activities.

8.9.2 Potential indirect effects of construction include:

- Changes to the existing hydrology that could lead to detrimental changes in quality or availability of surface waters;
- Increased pollution risk associated with accidental spillage of fuels, oils, and increases in silt laden run-off and dust emission; and
- Disturbance effects to faunal species.

8.9.3 Using GIS, the Proposed Development footprint was overlain on the Scottish EUNIS Habitat Map to calculate the extent of habitat lost directly to construction. Construction footprints supplied for this purpose accounted for instances where felling or construction may lead to increased direct impacts.

8.9.4 Indirect impacts on habitats and species are less easy to quantify. The zones of influence of construction activities, or disturbance to species, can be site-, species- or disturbance source-specific, as can be fragmentation effects. Indirect effects are therefore discussed at a qualitative level through consideration of the habitat and species maps and development layout.

Designated Sites

8.9.5 Potential construction phase impacts and effects on designated sites, prior to mitigation, are summarised in Table 8.9 below.

8.9.6 With regards to the Glen Etive and Glen Fyne SPA, effects significant from the Site level up to the Local level have been identified, prior to mitigation. These arise as a result of a loss of a small area of SPA ground to both temporary and permanent features, indirect effects on other SPA water-dependent habitats and disturbance effects for birds from construction activities.

8.9.7 The widening of the Access Track will directly affect habitats within the boundary of the Loch Etive Woods SAC. In practice, these are track-edge, non-wooded habitats and it is likely that their overlap with the small areas proposed for widening may be as a result of the precision of the GIS shapefile available for SAC boundaries. Therefore, no significant effects are predicted for the SAC. By association, given that their boundaries are identical, no significant effects are also predicted for the Coille Leitire SSSI.

8.9.8 As with the GIS data available for SSSI and SAC boundaries, there are numerous digitising discrepancies associated with the Ancient Woodland Inventory dataset. In this instance, Ancient Woodland is shown as, for example, covering the pre-existing Access Track within the Site. This has meant that the direct habitat loss calculations show an impact on c. 0.20 ha of ancient woodland, whereas in practice no such woodland will be affected. Therefore, no significant impacts on ancient woodland are anticipated.

Table 8.9: Summary of Likely Construction Phase Impacts and Effects on Designated Site IEFs Prior to Mitigation

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Glen Etive and Glen Fyne SPA	International	Construction of features within SPA	Direct habitat loss within SPA (0.02 ha for Access Track widening; 0.08 ha for Upper Site Compound 2; 0.32 ha for Upper Site Compound 3; 0.13 ha for Upper Works) (3.7 % of footprint)	Low adverse impact, temporary and permanent, certain.	Adverse significant effect at the Local level.
			Fragmentation of habitats	Low adverse impact, temporary and permanent, likely.	Adverse significant effect at the Site level.
			Loss of breeding/feeding habitat	Low adverse impact, temporary and permanent, unlikely.	No significant effect.
		Changes in quality or quantity of hydrological regime of SPA water-dependent habitats.	Pollution, droughting or flooding of habitats.	Low adverse impact, temporary, likely.	Adverse significant effect at the Local level.
		Noise, vibration or lighting	Disturbance of SPA features – reduced survival/reproduction rates.	Medium adverse impact, temporary, likely.	Adverse significant effect at the National level.
Loch Etive Woods SAC	International	Widening of Access Track	Direct loss of 0.13 ha (0.9 % of total footprint)	Low adverse impact, permanent, unlikely in practice.	No significant effect.
			Fragmentation	Low adverse impact, permanent, unlikely.	No significant effect.

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Coille Leitire SSSI	National	Widening of Access Track	Direct loss of 0.13 ha (0.9 % of total footprint)	Low adverse impact, permanent, unlikely in practice.	No significant effect.
			Fragmentation	Low adverse impact, permanent, unlikely.	No significant effect.
Ancient Woodland	Council	Widening of Access Track	Direct loss of 0.20 ha (1.4 % of total footprint)	Low adverse impact, permanent, unlikely in practice.	No significant effect.
			Fragmentation	Low adverse impact, permanent, unlikely.	No significant effect.

Habitats

- 8.9.9 Potential construction phase impacts and effects on habitats considered to be IEFs are summarised in Tables 8.10 and 8.11 below. Habitats containing GWDTEs are shown in *italics*.
- 8.9.10 None of the Upper Site Compounds nor the A85 widening are associated with loss of habitat IEFs, with the majority of all habitat impacts, both direct and indirect, being as a result of the formation of the Lower Site Compound within an extensive area of northern wet heath. Both the Upper Works and the Quayside/Lower Works will result in the loss of open water habitats, although the Upper Works will technically be temporary as the structure will be submerged during the operational phase. There will be a small area of non-tree-ed oak/birch woodland habitat affected by the widening of the Access Track. Overall, construction phase impacts on habitat IEFs of Council level significance are predicted for standing water and northern wet heaths. All other construction phase habitat impacts will be either not significant, or significant at a Site level at most.
- 8.9.11 With regards to GWDTEs, the majority of impacts will be associated with the formation of the Lower Site Compound within the area of northern wet heath, and small groundwater-fed flushes in the habitats around the Upper Works. However, small-scale groundwater-fed flushes, of a size below that recordable within the minimum mappable unit for the habitat survey, could also be affected during the formation of the Upper Works. These GWDTEs also occurred along the upslope edge of the Access Track, but as widening will only occur along the down-slope edge, it is unlikely that those particular habitats would be affected. Impacts on GWDTEs will therefore be primarily aligned with those associated with the northern wet heaths and will be of **Council** level significance.

Table 8.10: Summary of Construction Phase IEF Habitat Impacts (GWDTEs in *Italics*)

Habitat IEF	A85 diversion	Access Track	Lower Site Compound	Quayside and Lower Works	Upper Site Compounds	Upper Works	Total (ha)	% Footprint	Indirect impacts
C1: Standing water	-	-	-	0.75	-	0.54	1.29	8.7	4.44

Habitat IEF	A85 diversion	Access Track	Lower Site Compound	Quayside and Lower Works	Upper Site Compounds	Upper Works	Total (ha)	% Footprint	Indirect impacts
C2: Running water	-	-	-	-	-	-	-	-	<0.01 ha
D1.21: Low-altitude blanket bog	-	-	-	-	-	-	-	-	0.14
D2: Valley mire	-	-	-	-	-	-	-	-	0.17
D4.19: <i>British Carex demissa</i> flushes	-	-	-	-	-	0.02	0.02	0.1	0.07
E1.71: <i>Nardus stricta</i> acid grasslands	-	< 0.01	-	-	-	-	< 0.01	< 0.1	-
E1.72#: Grass heath	-	-	-	-	-	-	-	-	-
F4.11: Northern wet heaths	-		5.66	-	-	0.07	5.73	38.5	9.11
F4.13: Purple moor-grass wet heaths	-	0.10	-	-	-	-	0.10	0.6	0.55
F4.21: Sub-montane heath/ F4.22: Sub-Atlantic Calluna heaths	-	0.03	-	-	-	-	0.03	0.2	-
G1.1: Riparian birch/ willow woodland / scrub	-	-	-	-	-	-	-	-	-
G1.2: Riparian alder	-	-	-	-	-	-	-	-	-

Habitat IEF	A85 diversion	Access Track	Lower Site Compound	Quayside and Lower Works	Upper Site Compounds	Upper Works	Total (ha)	% Footprint	Indirect impacts
<i>woodland / scrub</i>									
G1.91: Oak/birch woodland	-	0.26	0.07	-	-	-	0.33	2.2	-
G1.A: Oak woodland	-	-	-	0.88	-	-	0.88	5.9	-
G1.A2: Ash woodland on slopes and screes		-	-	-	-	-	-	-	-
Total (ha)	0.00	0.38	5.73	1.63	0.00	0.80	8.54	-	-
% footprint	0.0	2.6	38.5	11.0	0.0	5.4	57.4	-	-

Table 8.11: Likely Construction Phase Impacts and Effects on Habitat IEFs Prior to Mitigation (GWDTEs in Italics)

Habitat IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
C1: Standing water	Council	Construction of new water control features.	Direct loss of open water habitats.	Medium adverse impact, permanent (Quayside) and temporary (Upper Works), certain.	Adverse significant effect at the Local level.
		Changes in quality or quantity of hydrological regime.	Pollution, droughting or flooding of habitats.	Medium adverse impact, temporary, likely.	Adverse significant effect at the Local level.
C2: Running water	Council	Changes in quality or quantity of hydrological regime.	Pollution, droughting or flooding of habitats.	Low adverse impact, temporary, unlikely.	No significant effect.
D1.21: Low-altitude blanket bog/ D1.22: Bog pools in	Council	Changes in quality or quantity of hydrological regime.	Pollution, droughting or flooding of water-dependent habitats.	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.

Habitat IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Nitigation
blanket bog					
D2: Valley mire	Council	Changes in quality or quantity of hydrological regime.	Pollution, droughting or flooding of water-dependent habitats.	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
D4.19: British <i>Carex demissa</i> flushes	Council	Construction of new water control features.	Direct loss of habitats.	Low adverse impact, permanent (Upper Works), certain.	Adverse significant effect at the Site level.
E1.71: <i>Nardus stricta</i> acid grasslands	Local	Widening of Access Track	Direct loss of habitats.	Low adverse impact, permanent, certain.	No significant effect.
E1.72#: Grass heath	Local	No impacts	No effects	n/a	n/a
F4.11: Northern wet heaths	Council	Construction of new water control features and Lower Site Compound.	Direct loss of habitats.	High adverse impact, permanent, certain.	Adverse significant effect at the Council level.
			Fragmentation	Medium adverse impact, permanent, certain.	Adverse significant effect at the Site level.
		Changes in quality or quantity of hydrological regime.	Pollution, droughting or flooding of water-dependent habitats.	High adverse impact, temporary, likely.	Adverse significant effect at the Council level.
F4.13: Purple moor-grass wet heaths	Local	Widening of Access Track	Direct loss of habitats.	Low adverse impact, permanent, certain.	No significant effect.
			Fragmentation	Low adverse impact, permanent, certain.	No significant effect.
		Changes in quality or quantity of hydrological regime.	Pollution, droughting or flooding of water-dependent habitats.	Low adverse impact, temporary, likely.	No significant effect.

Habitat IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
F4.21: Sub-montane heath/ F4.22: Sub-Atlantic <i>Calluna</i> heaths	Council	Widening of Access Track	Direct loss of habitats.	Low adverse impact, permanent, certain.	No significant effect.
			Fragmentation	Low adverse impact, permanent, certain.	No significant effect.
G1.1: Riparian birch/willow woodland/scrub	Local	No impacts	No effects	n/a	n/a
G1.2: Riparian alder woodland/scrub	Local	No impacts	No effects	n/a	n/a
G1.91: Oak/birch woodland	Council	Widening of Access Track and Lower Site Compound	Direct loss of habitats.	Low adverse impact, permanent, certain.	Adverse significant effect at the Site level.
			Fragmentation	Low adverse impact, permanent, unlikely.	No significant effect.
G1.A: Oak woodland	Local	Formation of Quayside and Lower works	Direct loss of habitats.	Low adverse impact, permanent, certain.	Adverse significant effect at the Local level.
			Fragmentation	Low adverse impact, permanent, likely.	Adverse significant effect at the Site level.
G1.A2: Ash woodland on slopes and screes	Council	No impacts	No effects	n/a	n/a

Otter

- 8.9.12 Potential construction phase impacts and effects on otter are summarised in Table 8.12 below. Construction of the Quayside and Jetty will result in the loss of a well-used resting place along the northern shore of Loch Awe. The presence of machinery, construction personnel, lighting and noise sources would all potentially cause disturbance to otter along this stretch of the loch shore, and represent an effect significant at the **Local** level, prior to mitigation. There may also be impacts on otter as a result of collision with plant/vehicles, and this would be significant at **Site** level.

Badger

- 8.9.13 Potential construction phase impacts and effects on badger are summarised in Table 8.12 below. Badger are likely to be present in wooded habitats in close proximity to the Proposed Development, in particular along the Access Track, at the location of the A85 widening, and potentially around the Quayside/Jetty. Although no setts will be directly affected by the proposals, there may be impacts on badger as a result of collision with plant/vehicles. These would be significant at a **Site** level. All other predicted impacts on badger would be small-scale and/or temporary.

Red Squirrel

- 8.9.14 Potential construction phase impacts and effects on red squirrel are summarised in Table 8.12 below. No tree removal is proposed and therefore direct impacts on red squirrel dreys is not a consideration within this EIA. However, widening of the Access Track, the A85 diversion and creation of the Quayside/Jetty will all result in noise, vibration, or lighting disturbance impacts, which may indirectly affect red squirrel. Prior to mitigation, these would represent adverse effects significant at the **Local** level. **Site** level effects are also predicted for the potential risk of collision with construction machinery and/or vehicles.

Pine Marten

- 8.9.15 Potential construction phase impacts and effects on pine marten are summarised in Table 8.12 below. Although it is highly unlikely that pine marten dens will be affected by the Proposed Development, the Lower Works, the diversion of the A85 and potentially also the widening of the Access Track could introduce disturbance sources, and this could affect pine marten within 250 m of these locations should they be present. Disturbance effects on pine marten would be significant at the **Local** level, and collision with plant/vehicles would be significant at the **Site** level prior to mitigation.

Bats

- 8.9.16 Potential construction phase impacts and effects on bats are summarised in Table 8.12 below. No direct impacts on features used by roosting bats are anticipated, with all impacts being associated with the introduction of noise, vibration or lighting disturbance sources within habitats regularly used by bat species, including potential disturbance of hibernation roosts within 100 m of the Upper Works and the disruption of foraging/commuting routes around the Lower Works. For hibernating bats, these effects would be significant at the **Local** level, and for tree-roosting bats and those using the Site for foraging or commuting route this would be significant at the **Site** level.

Raptors

- 8.9.17 Potential construction phase impacts and effects on raptors are summarised in Table 8.12 below. With respect to golden eagle, the GET model has shown that the land-take associated with the Proposed Development within the SPA and up to a 20 km buffer of this represents a very small fraction of preferred golden eagle habitat, and therefore no significant effects are predicted for the loss of foraging habitat. This will also apply to the white-tailed eagle.
- 8.9.18 However, although both the golden eagles and white-tailed eagles that use the ground at Cruachan Reservoir will be habituated to some level of human presence around the dam and reservoir, construction activities will inevitably introduce an elevated level of noise and lighting, vehicle movements, people, and plant. The golden eagles that hold territory closest to the Upper Works appears not to breed reliably in every year, and it is possible that the construction phase of the Proposed Development will overlap with one of those non-breeding years. However, in a worst-case scenario, it is possible that these disturbance impacts, despite being c. 3 km from the closest part of the works, could cause a nesting attempt to be abandoned. This would be a high adverse effect, but would be unlikely to occur at such a distance, and therefore has been assessed as being of **Council** level significance for golden eagle, and of **Local** significance for white-tailed eagle, prior to mitigation.

Other Breeding Birds

- 8.9.19 Potential construction phase impacts and effects on nesting birds other than raptors are summarised in Table 8.12 below. Clearance of vegetation may have direct effects on nesting birds if present at the time the works are carried out, as well as indirect disturbance effects. This would predominantly be associated with the formation of the Site Compounds and the Quayside/Jetty but would be relevant in any location where vegetation is removed. This would represent an adverse effect significant at the **Site** level.

Fish

- 8.9.20 Potential construction phase impacts and effects on fish species are summarised in Table 8.12 below.
- 8.9.21 All fish species have the potential to be impacted during the construction phase by noise, vibration or lighting and changes to water quality. Although unlikely to occur, these impacts would have an adverse effect for Arctic charr, Atlantic salmon and sea trout and European eel significant at Local level, and for brook lamprey significant at a **Site** level.

Macroinvertebrates

- 8.9.22 Potential construction phase impacts and effects on macroinvertebrates as a result of the Proposed Development are summarised in Table 8.12 below.
- 8.9.23 Macroinvertebrates have the potential to be impacted during the Construction Phase by changes to water quality. This would be an adverse effect, significant at the **Site** level.

Table 8.12: Likely Construction Phase Impacts and Effects on Faunal Species IEFs Prior to Mitigation

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Otter	Local	Collision with plant	Injury or death	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
		Excavations	Entrapment	Low adverse impact, temporary, unlikely.	No significant effect.
		Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	High adverse impact, permanent, certain.	Adverse significant effect at the Local level.
		Changes in quality or quantity of hydrological regime	Reduced foraging habitat – reduced survival reproduction rates	Low adverse impact, temporary, unlikely.	No significant effect.
		Loss of resting place.	Disturbance – reduced survival/ reproduction rates.	Medium adverse impact, permanent, certain.	Adverse significant effect at the Local level.

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Badger	Site	Collision with plant	Injury or death	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
		Excavations	Entrapment	Low adverse impact, temporary, unlikely.	No significant effect.
		Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	Low adverse impact, temporary, unlikely.	No significant effect.
Red squirrel	Council	Collision with plant	Injury or death	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
		Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	High adverse impact, permanent, certain.	Adverse significant effect at the Local level.
Pine marten	Local	Collision with plant	Injury or death	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
		Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	Medium adverse impact, permanent, likely.	Adverse significant effect at the Local level.
		Loss of resting place.	Disturbance – reduced survival/ reproduction rates.	Medium adverse impact, permanent, unlikely.	No significant effect.
Bats - hibernating	Local	Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	Medium adverse impact, temporary, likely.	Adverse significant effect at the Local level.
Bats – tree roosting		Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Site level.
Bats – commuting and foraging		Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
Raptors – golden eagle	National	Noise, vibration, or lighting	Disturbance – reduced survival/ reproduction rates.	High adverse impact, temporary, unlikely.	Adverse significant effect at the Council level.

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
		Loss of foraging habitat due to construction compounds and works footprint.	Disturbance – reduced survival/ reproduction rates.	Low adverse impact, temporary and permanent, unlikely.	No significant effect.
Raptors – white-tailed eagle	Council	Noise, vibration or lighting	Disturbance – reduced survival/ reproduction rates.	High adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
		Loss of foraging habitat due to construction compounds and works footprint.	Disturbance – reduced survival/ reproduction rates.	Low adverse impact, temporary and permanent, unlikely.	No significant effect.
Nesting birds	Local	Loss of breeding /feeding habitat due to temporary compounds and permanent works features.	Disturbance – reduced survival/ reproduction rates.	Medium adverse impact, temporary and permanent, likely.	Adverse significant effect at the Site level.
		Noise, vibration, or lighting.	Disturbance – reduced survival/ reproduction rates.	Medium adverse impact, temporary, likely.	Adverse significant effect at the Site level.
Arctic charr	National	Noise and vibration.	Disturbance	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
		Changes in water quality.	Increased mortality and reduced foraging.	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
Atlantic salmon and Sea trout	Council	Noise, vibration, or lighting.	Disturbance	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
		Changes in water quality.	Increased mortality.	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
Brook lamprey	Site	Noise or vibration.	Disturbance	Low adverse impact,	Adverse significant effect at the Site level.

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
				temporary, unlikely.	
		Changes in water quality.	Increased mortality and reduced foraging.	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Site level.
		Dewatering of Cruachan Reservoir.	Fish strandings and increased mortality.	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
Brown trout	Local	Noise, vibration, or lighting.	Disturbance	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
		Changes in water quality.	Increased mortality and reduced foraging.	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
		Dewatering of Cruachan Reservoir.	Fish strandings and increased mortality.	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
European eel	National	Noise, vibration, or lighting.	Disturbance	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
		Changes in water quality.	Increased mortality and reduced foraging.	Low adverse impact, temporary, unlikely.	Adverse significant effect at the Local level.
		Dewatering of Cruachan Reservoir.	Fish strandings and increased mortality.	Low adverse impact, temporary, likely.	Adverse significant effect at the Site level.
Macroinvertebrates	Site	Changes in water quality.	Increased mortality and changes in species assemblages.	Low adverse impact, temporary, unlikely.	Adverse significance effect at the Site level.

Operational Phase Effects

- 8.9.24 During the operational phase of the Proposed Development, impacts on IEFs will arise through the introduction of disturbance sources, including the presence of vehicles and personnel at the Upper and Lower Control Works, and changes in the water regime of Cruachan Reservoir. There may also be changes in night light lighting provision at the Lower Control Works, and ongoing diurnal changes in water levels and intake/discharge between or at Loch Awe and Cruachan Reservoir.

Designated Sites

- 8.9.25 No significant operational phase effects on designated sites are predicted.

Habitats

- 8.9.26 No significant operational phase effects on habitats are predicted.

Otter

- 8.9.27 No operational phase effects on otter are predicted for the Upper Works, the A85 works, the Access Track or the Lower Site Compound. The Lower Works will however involve the permanent presence of the Quayside along the northern shoreline of Loch Awe, with ongoing vehicular access to the new power station, and discharge/abstraction of water from the inlet/outlet point. This will mean that this stretch of the shoreline of Loch Awe will remain fragmented in terms of its availability to otter. The otter population has clearly habituated to the presence of the existing power station over time, and it is likely that this will be the case again. However, at least in the medium term, these features will result in the loss of foraging and commuting areas for the species, and this will be an adverse effect significant at the **Local** level.

- 8.9.28 An increase in vehicle use of the Access Track and roads within the Lower Works may also increase the risk of road traffic collisions. This would be an adverse effect significant at the **Site** level.

Badger

- 8.9.29 An increase in vehicle use of the Access Track and roads within the Lower Works may increase the risk of road traffic collisions. This would be an adverse effect significant at the **Site** level.

Red Squirrel

- 8.9.30 An increase in vehicle use of the Access Track and roads within the Lower Works may increase the risk of road traffic collisions. This would be an adverse effect significant at the **Site** level.

Pine Marten

- 8.9.31 An increase in vehicle use of the Access Track and roads within the Lower Works may increase the risk of road traffic collisions. This would be an adverse effect significant at the **Site** level.

Bats

- 8.9.32 No significant operational phase effects are predicted for hibernating or tree-roosting bats, as it is unlikely that disturbance impact arising from operation and maintenance activities would be sufficient to disturb these animals. However, the permanent lighting solution for the Lower Works along Loch Awe could disrupt commuting and foraging routes used by bats, and this would be an adverse effect significant at the Site level.

Raptors

- 8.9.33 No significant operational phase effects on raptors are predicted.

Other Breeding Birds

- 8.9.34 No significant operational phase effects on other breeding birds are predicted.

Fish

- 8.9.35 Migratory fish including salmon, sea trout and European eel have the potential to be impacted during the operational phase of the Proposed Development. Upstream migrating adult salmon and sea trout are likely to be attracted to the outfall during generation. This is likely to result in delays to migration or entrapment of fish within the underground waterway system, causing translocation, injury or mortality. Downstream migrating smolts may be similarly impacted with delays, in particular making them more vulnerable to predation from mammalian, avian and aquatic predators whilst congregating. European eels could also be impacted in similar ways, potentially affecting elvers on their upstream migration and/or silver eels on their downstream migration.

- 8.9.36 Arctic charr and brown trout may also become entrapped within the underground waterway system causing translocation, injury, or mortality.
- 8.9.37 Brook lamprey have the potential to be impacted by substrate changes caused by erosion at the Upper and Lower Works. There is the potential for nursery habitat (soft sediments) to be affected which would impact on the species recruitment. However, this is unlikely to be a significant effect as any impacts would be very localised.

Macroinvertebrates

- 8.9.38 Macroinvertebrates have the potential to be impacted by substrate changes caused by erosion at the Upper and Lower Works, and there is a possibility that nursery habitat and species assemblages could be lost as a result of this. However, this is unlikely to result in a significant effect as a low species richness and relatively low abundance of macroinvertebrates was recorded at sampling points in both Loch Awe and Cruachan Reservoir during surveys undertaken by Gavia Environmental in 2021. No nature conservation species were recorded.

Table 8.13: Likely Operational Phase Impacts and Effects on Designated Sites Prior to Mitigation

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Glen Etive and Glen Fyne SPA	International	Disturbance from maintenance noise, vehicles and/or personnel.	Disturbance of SPA features – reduced survival/ reproduction rates.	Low adverse impact, ongoing, unlikely.	No significant effect.

Table 8.14: Likely Operational Phase Impacts and Effects on Habitats Prior to Mitigation

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
C1: Standing water	Council	Altered drawdown regime for Cruachan Reservoir	Changes in minimum extent of open water available at peak drawdown.	Low adverse impact, ongoing, likely.	No significant effect.

Table 8.15: Likely Operational Phase Impacts and Effects on Habitats Prior to Mitigation

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Otter	Local	Elevated noise, lighting, and presence of personnel in vicinity of Loch Awe.	Disturbance – reduced survival/ reproduction rates.	Medium adverse, ongoing, certain.	Adverse significant effect at the Local level.
		Collision with maintenance vehicles.	Injury or death.	Medium adverse, ongoing, unlikely.	Adverse significant effect at the Site level.

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Badger	Site	Collision with maintenance vehicles.	Injury or death.	Medium adverse, ongoing, unlikely.	Adverse significant effect at the Site level.
Red squirrel	Council	Collision with maintenance vehicles.	Injury or death.	Medium adverse, ongoing, unlikely.	Adverse significant effect at the Site level.
		Elevated noise, lighting, and presence of personnel in vicinity of Loch Awe and along Access Track.	Disturbance – reduced survival/ reproduction rates.	Low adverse, ongoing, unlikely.	No significant effect.
Pine marten	Local	Elevated noise, lighting, and presence of personnel in vicinity of Loch Awe.	Disturbance – reduced survival/ reproduction rates.	Low adverse, ongoing, certain.	Adverse significant effect at the Site level.
		Collision with maintenance vehicles.	Injury or death.	Medium adverse, ongoing, unlikely.	Adverse significant effect at the Site level.
Bats - hibernating	Local	Elevated noise and vibration within aqueduct tunnels, arising from turbine hall.	Disturbance – reduced survival/ reproduction rates.	Low adverse, ongoing, unlikely.	No significant effect.
Bats – tree roosting	Local	Elevated noise and vibration from maintenance vehicles.	Disturbance – reduced survival/ reproduction rates.	Low adverse, ongoing, unlikely.	No significant effect.
Bats – commuting and foraging	Local	Altered lighting regime around Loch Awe.	Disturbance – reduced survival/ reproduction rates.	Medium adverse, ongoing, likely	Adverse significant effect at the Site level.
Raptors – golden eagle	National	Elevated noise and vibration from	Disturbance – reduced survival/ reproduction rates.	Low adverse, ongoing, unlikely	No significant effect.

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
		maintenance vehicles.			
Raptors – white-tailed eagle	Council	Elevated noise and vibration from maintenance vehicles.	Disturbance – reduced survival/ reproduction rates.	Low adverse, ongoing, unlikely	No significant effect.
Nesting birds	Local	Elevated noise and vibration from maintenance vehicles.	Disturbance – reduced survival/ reproduction rates.	Low adverse, ongoing, unlikely	No significant effect.
Arctic charr	National	Entrapment within the underground waterway system.	Entrapment potentially causing translocation, injury, or mortality.	Low adverse impact, ongoing, likely.	Adverse significant effect at the Local level.
Atlantic salmon and sea trout	Council	Attraction of adult fish to outfall during generation.	Delays on upstream migration of adult fish. Entrapment causing translocation, injury, or mortality.	Medium adverse impact, ongoing, likely.	Adverse significant effect at the Council level.
		Impacts on downstream migration of smolts.	Delays on downstream migration of smolts. Entrapment causing increased mortality.	Medium adverse impact, ongoing, likely.	Adverse significant effect at the Council level.
Brook lamprey	Site	Substrate changes / erosion from outfall or take off.	Loss of nursery habitat and increased mortality.	Low adverse impact, ongoing, unlikely.	No significant effect.
Brown trout	Local	Entrapment within the underground waterway system.	Entrapment causing translocation, injury or mortality.	Low adverse impact, ongoing, likely.	Adverse significant effect at the Local level.
European eel	National	Attraction of eels to outfall during generation.	Delays migration of eels. Entrapment causing translocation, injury or mortality.	Medium adverse impact, ongoing, likely.	Adverse significant effect at the Council level.

IEF	Importance Level	Impacts	Effects	Impact Scale and Certainty	Effect Significance Prior to Mitigation
Macroinvertebrates	Site	Substrate changes / erosion from outfall or take off.	Loss of nursery habitat and increased mortality.	Low adverse impact, likely.	No significant effect.

8.10 Further Mitigation and Enhancement

Construction

- 8.10.1 It will be possible to reduce some of the identified construction phase impacts and their effects through the use of avoidance, mitigation, enhancement and compensation measures.

Designated Sites

- 8.10.2 In practice, it is not anticipated that there will be any direct impacts on ancient woodland nor the Loch Etive Woods SAC or Coille Leitire SSSI. However, in all cases, the working areas along the Access Track and the works to the A85 will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas, including the fencing-off and clear signage of no-go zones for construction personnel, plant, and vehicles.
- 8.10.3 Mitigation measures relevant to the SPA are described below under **Raptors**.

Habitats

- 8.10.4 The main habitat impacts are associated with the Lower Site Compound and the Upper Works. As described above, works areas in these locations will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas, including the fencing-off and clear signage of no-go zones for construction personnel, plant, and vehicles. A full Habitat Restoration and Landscape Mitigation Plan will be prepared for the temporary compound areas, including those which are currently bare peat, to ensure that the biodiversity value of these areas are maintained in the long-term after the works have been completed. Where possible, this will include the careful stripping, storage and replacement of heathland and other peat-based habitats.

Otter

- 8.10.5 A licence will be needed for all works directly affecting otter shelters, and this will need to be supported by up-to-date survey information and a Species Protection Plan which will detail how the works will be carried out and the mitigation needed in order to ensure that there are no long term impacts on the conservation status of the local otter population. A pre-construction survey for otter will therefore be needed for the Site and a buffer of at least 200 m, 6 months prior or closer to the commencement of the works in order to ensure that a robust licence application can be made to NatureScot.
- 8.10.6 A detailed mitigation strategy will be devised based on those pre-construction survey data, but it is anticipated that the following measures will likely be needed:
- The site induction for construction personnel will include a Toolbox Talk provided by the ECoW regarding otter, and the identification of shelters of this species. The briefing will also emphasise the importance of protection of key freshwater habitats and their margins;
 - Screening and sound barriers for the Lower Works at Loch Awe;
 - Site speed limit of 15 mph during the construction phase;
 - General good practice measures for working in or near to watercourses must be strictly adhered to (see above);

- Fuels and other chemicals must be stored securely and as far as practicable from any watercourse or water body, and preferably over 50 m away;
- Appropriate wash-out/wash-down facilities will be available for vehicles and machinery which will not discharge into watercourses or waterbodies;
- Trenches and excavations must be covered at the end of each working day, or will include ramps, and stored pipes will be capped (or stored vertically) to prevent entrapment of animals. Strict compliance with this will be enforced by the ECoW given the activity levels of otter at the Site. During longer periods of Site shut-down, trenches and excavations will be infilled or covered;
- Machinery left on-site overnight must be carefully checked each morning for the potential presence of resting up otter;
- If Site activities are undertaken during the hours of darkness, machinery and floodlighting will be directed away from watercourses and waterbodies, ensuring wherever possible an unlit corridor of 10 m; and
- The use of heavy machinery within 30 m of the shore of Loch Awe should be avoided during the 2 hrs before and after sunset and sunrise during the months of March to October inclusive, and between 1 hr before and after sunset/sunrise during November to February inclusive. This is because these are the times of day when otter will be most active, although it is recognised that the Loch Awe otters are seemingly active during all daylight hours.

Badger

8.10.7 Construction phase impacts on badger will be reduced through:

- Pre-construction surveys will be carried out for badger for all relevant habitat within 100 m of construction. If necessary, licences will be sought for any relevant setts discovered as a result of this;
- The site induction for construction personnel will include a Toolbox Talk provided by the ECoW regarding badger, and the identification of shelters of this species. The briefing will also emphasise the importance of protection of key habitats such as woodland, and the ECoW will keep a watching brief for the signs of this species;
- Site speed limit of 15 mph;
- Trenches and excavations must be covered at the end of each working day, or will include ramps, and stored pipes will be capped (or stored vertically) to prevent entrapment of animals. During longer periods of Site shut-down, trenches and excavations will be infilled or covered; and
- If Site activities are undertaken during the hours of darkness, machinery and floodlighting will be directed away from woodland edges, ensuring wherever possible an unlit corridor of 10 m.

Red Squirrel

8.10.8 Construction phase impacts on red squirrel will be reduced through:

- Pre-construction surveys will be carried out for red squirrel for all relevant habitat within 50 m of construction. If necessary, licences will be sought for any relevant dreys discovered as a result of this;
- The site induction for construction personnel will include a Toolbox Talk provided by the ECoW regarding red squirrel, and the identification of shelters of this species. The briefing will also

emphasise the importance of protection of key habitats such as woodland, and the ECoW will keep a watching brief for the signs of this species;

- Site speed limit of 15 mph; and
- If Site activities are undertaken during the hours of darkness, machinery and floodlighting will be directed away from woodland edges and tree canopies, ensuring wherever possible an unlit corridor of 10 m.

Pine Marten

8.10.9 Construction phase impacts on pine marten will be reduced through:

- Pre-construction surveys will be carried out for pine marten for all relevant habitat within 250 m of construction. If necessary, licences will be sought for any relevant dens discovered as a result of this;
- The site induction for construction personnel will include a Toolbox Talk provided by the ECoW regarding pine marten, and the identification of shelters of this species. The briefing will also emphasise the importance of protection of key habitats such as woodland, and the ECoW will keep a watching brief for the signs of this species;
- Site speed limit of 15 mph;
- Trenches and excavations must be covered at the end of each working day, or will include ramps, and stored pipes will be capped (or stored vertically) to prevent entrapment of animals. Strict compliance with this will be enforced by the ECoW given the activity levels of pine marten at the Site. During longer periods of Site shut-down, trenches and excavations will be infilled or covered; and
- If Site activities are undertaken during the hours of darkness, machinery and floodlighting will be directed away from woodland edges and tree canopies, ensuring wherever possible an unlit corridor of 10 m.

Bats

- 8.10.10 No direct impacts on tree-roosting bats are predicted, and indirect construction phase impacts will be reduced through avoidance possible. If potential indirect effects on trees cannot be discounted, then further survey will be necessary for tree-roosting bats, prior to commencement of the works. Indirect disturbance effects as a result of the A85 widening and/or the Quayside/Lower Works will require a follow-up ground level Preliminary Roost Assessment (PRA). These areas were recorded as "continuous trees with bat roost suitability" during the initial assessment due to a lack of detailed footprint for the Proposed Development at the time of survey, and the sheer number of mature trees.
- 8.10.11 Where it is not practical to avoid impacts on potential roost features (PRFs) in trees that have been classified as having high or moderate bat roosting suitability, works on or in close proximity to these trees will require formal confirmation of their bat roosting status. The PRFs will need to be inspected at-height and endoscopically by an appropriately licensed bat worker (LBW). Where PRFs are located at-height, the checks will need to be carried out by an LBW who is also a qualified tree climber.
- 8.10.12 Formal surveys of these trees will confirm the presence or absence of roosting signs and may result in the trees being downgraded to low suitability (if presence/absence is still not conclusive), or negligible suitability. If PRFs are still classed as having moderate or high suitability, then this would require the features to be rechecked during the main bat active period (May-September). If roosting is confirmed, then a licence would be needed from NatureScot (see "Licensing" below). Where trees are listed as not being safe to climb, other survey methods are likely to be required such as dusk or dawn activity surveys with the aid of infrared cameras, prior to works taking place.

- 8.10.13 If further survey work identifies the presence of a bat roost in trees which will be indirectly impacted by the Proposed Development, it will be necessary to apply to NatureScot for a derogation licence, to allow the works to proceed legally. The licence will need to be supported by sufficient survey information recorded at an appropriate time of year, and details regarding proposed methods of working and mitigation, commensurate with the predicted impacts on the Site's bat population.
- 8.10.14 Construction phase impacts on foraging or commuting bats will be reduced through:
- If Site activities are undertaken during the hours of darkness, machinery and floodlighting will be directed away from woodland edges and tree canopies, ensuring wherever possible an unlit corridor of 10 m; and
 - Where wider-scale night lighting is needed and where this may present a barrier to commuting or foraging bats, higher wavelength lighting will be needed rather than standard white lights. The Bat Conservation Trust (BCT) provides a range of information sources relating to bats and lighting which should be consulted and these measures incorporated into the CEMP.
- 8.10.15 With respect to hibernating bats, blasting will not occur within 100 m of the known hibernation roost location within the core hibernation months, namely November to February inclusive.

Raptors

- 8.10.16 It is unlikely that the 3 km distance between the Upper Works and the known golden eagle nest will mean that there will be any construction phase impacts on this nest location which would require mitigation. However, an increased presence of disturbance influences at and around Cruachan Dam could dissuade both this golden eagle pair, and/or the nearby white-tailed eagles, from hunting over this ground. Therefore, no above-ground works, and no blasting within 100 m of Cruachan Dam, will occur within the core months of the eagles' breeding season, namely March to July inclusive. This mitigation will minimise the risk that a nest site could be abandoned as a result of the Proposed Development.

Other Breeding Birds

- 8.10.17 Tree-felling and or vegetation removal will not be undertaken during the bird nesting season, including vegetation clearance of non-tree-ed habitat at the Upper Control Works, the Upper Site Compound and the Lower Site Compound. If this is not possible, the relevant areas will need to be inspected by a suitably qualified ecologist in advance of the works, to ensure that no breeding birds are present. If nesting is noted or suspected, works will need to cease until it has been ascertained that all fledglings have hatched and have left the nest(s).
- 8.10.18 A range of bird nest boxes will be installed as part of the Proposed Development around the Quayside and Lower Works, including dedicated boxes for spotted flycatcher and redstart, two BOCC species of red and amber status respectively recorded at the Site during breeding bird surveys. In addition, boxes for more common species such as blue and great tits, and robins will also be installed.

Fisheries

- 8.10.19 See Embedded Mitigation (Section 8.8) for mitigation during the construction phase relevant to fisheries.
- 8.10.20 Fish rescue and relocation will be conducted during the drawdown of Cruachan Reservoir, if the water level is predicted to reach a point at which fish would be endangered due to strandings, a reduction in oxygen levels, or high turbidity levels. A coffer dam will be installed around the works area and the drawdown will be timed so as to take place during the summer months (June-September inclusive) to reduce impacts on salmonid fish and will last for approximately 6 weeks.
- 8.10.21 In addition to the embedded mitigation, prior to commencement of works, a baseline walkover SFCC fish habitat assessment will be undertaken on the River Awe, consisting of a minimum 500 m stretch of river downstream from the Loch Awe Barrage. If the duration of the Construction Phase is greater than two years then an updated walkover survey will be required 24 months after the commencement of the works, to monitor any impacts of the Proposed Development.

- 8.10.22 If Site activities are undertaken during the hours of darkness, machinery lights and floodlighting will be directed away from watercourses and waterbodies, ensuring wherever possible an unlit corridor of 10 m., to minimise disturbance to adult migratory fish during their key upstream migration and to smolts during their downstream migration periods.
- 8.10.23 When working within 100 m of watercourses or waterbodies, to minimise effects of noise from any impact piling operations on all fish, a 'soft start' approach should be adopted (using reduced power) to deter fish initially from the immediate area, where physical injury could occur prior to piling at full power. Mason and Collett (2011) suggest a soft start to piling using a below energy of 150 kJ lowers potential impacts on salmon. Impact piling works will not be undertaken during the smolt migration period (March – end of June) as smolts are passive migrators and less likely to react to a soft start.
- 8.10.24 The Pollution Prevention Plan included in the CEMP will include appropriate mitigation in order to reduce the risk of drill lubricant spillages / frack outs from entering watercourses.

Macroinvertebrates

- 8.10.25 See Embedded Mitigation (Section 8.8) for mitigation during the construction phase relevant to macroinvertebrates.
- 8.10.26 The Pollution Prevention Plan included in the CEMP will include appropriate mitigation in order to reduce the risk of drill lubricant spillages / frack outs from entering watercourses.

Operational

Otter

- 8.10.27 Ideally, a vegetated strip should be reinstated along the edge of the jetty, as is present along the existing A85 embankment, including the potential translocation of at least the trunk of the favoured tree at the well-used otter resting location. However, the nature of the jetty construction and topography of the loch at this location, will mean that the exact location and nature for this mitigation will need to be determined at the detailed design stage. Compensatory measures will therefore be needed for otter, and this will require the creation of two artificial holts in the wider area, preferably also incorporating the resting place tree in some form. The details of these holts will be included in the licence application for otter.
- 8.10.28 The permanent lighting strategy for the Lower Works area will be designed so as to avoid any direct lighting of Loch Awe. No permanent lighting will be installed around the Upper Works.
- 8.10.29 A speed limit of 20 mph will be maintained during the operational phase, for all access roads associated with the Site, this is the current speed limits enforced for Cruachan 1.

Badger

- 8.10.30 The permanent lighting strategy for the Lower Works will be designed so as to avoid any direct lighting of wooded habitats along Loch Awe. No permanent lighting will be installed around the Upper Works or Access Track.
- 8.10.31 A speed limit of 20 mph will be enforced during the operational phase, for all access roads associated with the Site.

Red Squirrel

- 8.10.32 The permanent lighting strategy for the Lower Works will be designed so as to avoid any direct lighting of wooded habitats along Loch Awe. No permanent lighting will be installed around the Upper Works or Access Track.
- 8.10.33 A speed limit of 20 mph will be enforced during the operational phase, for all access roads associated with the Site.

Pine Marten

- 8.10.34 The permanent lighting strategy for the Lower Works will be designed so as to avoid any direct lighting of wooded habitats along Loch Awe. No permanent lighting will be installed around the Upper Works or Access Track.
- 8.10.35 A speed limit of 20 mph will be enforced during the operational phase, for all access roads associated with the Site.

Bats

- 8.10.36 The permanent lighting strategy for the Lower Works will be designed so as to avoid any direct lighting of wooded habitats along Loch Awe and will utilise lighting wavelengths considered non-disruptive for foraging or commuting bats. No permanent lighting will be installed around the Upper Works or Access Track.
- 8.10.37 A speed limit of 20 mph will be enforced during the operational phase, for all access roads associated with the Site.

Fish

- 8.10.38 Certain design elements will be required in order to ameliorate some of the operational phase effects of the Proposed Development on fish. These will include:
- An appropriately designed fish guidance system (e.g., bubble curtain or equivalent) implemented in order to guide fish away from water movement/turbulence which may attract them and leave them open to increased risks of entrapment and predation at the inlet/outlet (lower control works); and
 - Screens with appropriately sized apertures to cover the inlet/outlet pipes will be implemented to prevent fish from entering into the underground waterway system at Loch Awe and Cruachan reservoir to reduce the risks of fish entrapment, injury and mortality or translocation. The screens will require regular inspection and maintenance to prevent blockage / damage from foliage and debris.
- 8.10.39 A comprehensive Fish Monitoring and Management Plan (FMMP) will be devised, prior to the commencement of the Proposed Development. This will incorporate a range of monitoring activities to be undertaken pre-, during- and post-construction of the works. The main elements of this FMMP will include:
- A baseline smolt tracking study to be undertaken prior to the operational phase of the Proposed Development. This will provide baseline data and a better understanding of movements of migrating smolts as they travel from the River Orchy through Loch Awe and inform any additional mitigation measures or management that might be required;
 - An annual monitoring programme for the first 5 years of the operational phase of the Proposed Development, to track the movements and behaviour of downstream migrating smolts in relation to the works;
 - An updated SFCC fish habitat survey walkover consisting of a minimum 500 m stretch of river downstream from the Loch Awe Barrage to be carried out during the operational phase to monitor impacts associated with the Proposed Development. These surveys should be conducted every two years for the first 6 years post-construction (three surveys in total); and
 - Monitoring of the underground waterway system for entrapment of fish to determine the effectiveness of screens.
- 8.10.40 The water velocity at the Lower Control Works will be reduced (maximum 0.3 m/s) to reduce turbulence and the likelihood of attracting and delaying migratory adult salmon, sea trout and European eels.

8.11 Residual Effects and Statement of Significance

- 8.11.1 A summary of the residual significance following successful implementation of mitigation and enhancement is provided in Table 8.16 below.
- 8.11.2 Following the implementation of the mitigation hierarchy, residual impacts are only anticipated for northern wet heaths (and their associated GWDTEs) and otter. A precautionary worst-case assessment has identified potential residual impacts for, Atlantic salmon and sea trout, and European eel., significant at the **Site** level. A comprehensive Fish Monitoring and Mitigation Plan, covering key aspects of fish ecology and behaviour, will be prepared, prior to commencement of the works to cover these precautionary residual effects.

Table 8.16: Residual Effects

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
Construction Phase						
Glen Etive and Glen Fyne SPA	Adverse significant effects at the Local level.	Upper Site Compounds located on already disturbed ground or hard standing wherever possible. Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into other SPA ground. No above ground works or underground blasting within 100 m of Cruachan Dam between March and July inclusive.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Disturbed peat habitats will be restored as described in the Habitat Restoration and Landscape Mitigation Plan which will be produced prior to commencement of the works.	n/a	No significant effect.
C1: Standing water	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive habitats.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.	n/a	n/a	No significant effect
D1.21: Low altitude blanket bog/ D1.22: Bog pools in blanket bog	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive habitats.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Disturbed peat habitats will be restored as described in the Habitat Restoration and Landscape Mitigation Plan which will be produced	n/a	No significant effects

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
				prior to commencement of the works.		
D2: Valley mire	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive habitats.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Disturbed peat habitats will be restored as described in the Habitat Restoration and Landscape Mitigation Plan which will be produced prior to commencement of the works.	n/a	No significant effects
D4.19: British <i>Carex demissa</i> flushes	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive habitats.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Disturbed peat habitats will be restored as described in the Habitat Restoration and Landscape Mitigation Plan which will be produced prior to commencement of the works.	n/a	No significant effects
F4.11: Northern wet heaths (GWDTE)	Adverse significant effects at the Council level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive habitats.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Disturbed peat habitats will be restored as described in the Habitat Restoration and Landscape Mitigation Plan which will be produced prior to commencement of the works.	n/a	Adverse significant effect at the Site level. (Lower Site Compound)
G1.91: Oak/birch woodland	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced and marked to avoid unnecessary encroachment into sensitive habitats.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Any felled trees along the shore of Loch Awe will be replaced like-for-like, as will be detailed in the Habitat Restoration and Landscape Mitigation Plan which will be produced prior to the commencement of the works. (See also Chapter 11 – Landscape and Visual Impact Assessment.)	Details of tree planting will be provided in the Habitat Restoration and Landscape Mitigation Plan.	No significant effects

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
G1.A: Oak woodland	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced and marked to avoid unnecessary encroachment into sensitive habitats.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Any felled trees along the shore of Loch Awe will be replaced like-for-like, as will be detailed in the Habitat Restoration and Landscape Mitigation Plan which will be produced prior to the commencement of the works. (See also Chapter 11 – Landscape and Visual Impact Assessment.)	Details of tree planting will be provided in the Habitat Restoration and Landscape Mitigation Plan.	No significant effects
Otter	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced and marked to avoid unnecessary encroachment into licensable zones.	<p>Pre-commencement survey for otter and production of Species Protection Plan.</p> <p>All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.</p> <p>Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.</p> <p>Screening and sound barrier for the Lower Works at Loch Awe.</p> <p>Site speed limit of 15 mph.</p> <p>Cover/ramp trenches and excavations.</p> <p>Check all plant each morning for resting up otter.</p> <p>No floodlighting of watercourses or edges of waterbodies.</p>	Two artificial holts to be provided in the wider area. Re-use of the “otter tree” from the well-used resting site within compensatory feature.	n/a	Adverse significant effect at the Site level. (Lower Works and Quayside/ Jetty)

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
			Restricted use of heavy machinery either side of dawn and dusk within 30 m of waterbodies/ watercourses.			
Badger	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced and marked to avoid unnecessary encroachment into licensable zones.	Pre-commencement survey for badger and production of Species Protection Plan; review of licensing situation. All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. Site speed limit of 15 mph. Cover/ramp trenches and excavations. No floodlighting of woodland or woodland edges.	n/a	n/a	No significant effects.
Red squirrel	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced and marked to avoid unnecessary encroachment into licensable zones.	Pre-commencement survey for red squirrel and production of Species Protection Plan; review of licensing situation. All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. Site speed limit of 15 mph. No floodlighting of woodland or woodland edges.	n/a	n/a	No significant effects.
Pine marten	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced and marked to avoid	Pre-commencement survey for pine marten and production of	n/a	n/a	No significant effects.

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
		unnecessary encroachment into licensable zones.	Species Protection Plan; review of licensing situation. All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. Site speed limit of 15 mph. Cover/ramp trenches and excavations. No floodlighting of woodland or woodland edges.			
Bats – tree roosting	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced and marked to avoid unnecessary encroachment into licensable zones.	Pre-commencement PRA for tree roosting bats, followed by aerial survey where required. Production of Species Protection Plan and review of licensing situation. All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. Construction phase lighting plan to utilise bat-friendly lighting strategy; no floodlighting of woodland or woodland edges.	n/a	Provision of XX tree-mounted bat boxes within the Proposed Development footprint, to be detailed in the Species Protection Plan for bats.	No significant effects.
Bats – commuting and foraging	Adverse significant effects at the Site level.	n/a	Construction phase lighting plan to utilise bat-friendly lighting strategy; no floodlighting of woodland or woodland edges (to be	n/a	Details of tree planting will be provided in the Habitat Restoration and	No significant effects.

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
			included in Species Protection Plan for bats – see above).		Landscape Mitigation Plan.	
Bats - hibernating	Adverse significant effects at the Local level.	No blasting within 100 m of the known hibernation roost location between November and February inclusive. To be included in Species Protection Plan for bats (see above).	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	n/a	n/a	No significant effect.
Raptors – golden eagle	Adverse significant effects at the Local level.	No above ground works or underground blasting within 100 m of Cruachan Dam between March and July inclusive.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	n/a	n/a	No significant effect.
Raptors – white-tailed eagle	Adverse significant effects at the Site level.	No above ground works or underground blasting within 100 m of Cruachan Dam between March and July inclusive.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	n/a	n/a	No significant effect.
Nesting birds	Adverse significant effects at the Site level.	Works with the potential to disturb nesting birds will be avoided during the nesting bird season. All potential nesting bird habitat will be pre-checked by the ECoW in advance of any construction activities.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	Provision of 15 tree-mounted nest boxes. This will comprise five boxes for redstart, five open-fronted boxes for spotted fly/robin, and five generic boxes for tit spp.	n/a	No significant effect.
Arctic charr	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary	Pre-commencement production of Fish Monitoring and Management Plan (FMMP). All on-site work will be supervised by an ECoW who	n/a	n/a	No significant effect.

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
		encroachment into sensitive ecological areas.	will aim for ecological effects to be minimised wherever possible. Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times. No floodlighting of watercourses or edges of waterbodies. Use of a 'soft start' to deter fish initially from the immediate area where physical injury could occur prior to impact piling at full power. Fish rescue and relocation if appropriate.			
Freshwater invertebrates	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive ecological areas.	All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.	n/a	n/a	No significant effect.
Atlantic salmon and sea trout	Adverse significant effect at the Local level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive ecological areas.	Pre-commencement production of Fish Monitoring and Management Plan (FMMP). All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.	n/a	n/a	No significant effect.

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
			<p>Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.</p> <p>No floodlighting of watercourses or edges of waterbodies.</p> <p>Use of a 'soft start' to deter fish initially from the immediate area where physical injury could occur prior to impact piling at full power.</p> <p>Fish rescue and relocation if appropriate.</p>			
Brook lamprey	Adverse significant effects at the Site level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive ecological areas.	<p>Pre-commencement production of Fish Monitoring and Management Plan (FMMP).</p> <p>All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.</p> <p>Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.</p> <p>Fish rescue and relocation if appropriate.</p> <p>No floodlighting of watercourses or edges of waterbodies.</p>	n/a	n/a	No significant effect.

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
Brown trout	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive ecological areas.	<p>Pre-commencement production of Fish Monitoring and Management Plan (FMMP). All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.</p> <p>Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.</p> <p>No floodlighting of watercourses or edges of waterbodies.</p> <p>Use of a 'soft start' to deter fish initially from the immediate area where physical injury could occur prior to piling at full power.</p> <p>Fish rescue and relocation if appropriate.</p>	n/a	n/a	No significant effect.
European eel	Adverse significant effects at the Local level.	Work areas will be tightly contained, fenced, and marked to avoid unnecessary encroachment into sensitive ecological areas.	<p>Pre-commencement production of Fish Monitoring and Management Plan (FMMP). All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.</p> <p>Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.</p>	n/a	n/a	No significant effect.

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
			<p>No floodlighting of watercourses or edges of waterbodies.</p> <p>Use of a 'soft start' to deter fish initially from the immediate area where physical injury could occur prior to piling at full power.</p> <p>Fish rescue and relocation to be conducted.</p>			
Macroinvertebrates	Adverse significance effects at the Site level.	Work areas will be tightly contained, fenced and marked to avoid unnecessary encroachment into sensitive ecological areas.	<p>All on-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.</p> <p>Good practice measures when working in or near to watercourses or waterbodies will be adhered to at all times.</p>	n/a	n/a	No significant effect.
Operational Phase						
Otter	Adverse significant effects at the Local level.	n/a	<p>Permanent lighting plan for the operational phase to utilise wildlife-friendly strategy, no floodlighting of woodland, woodland edges, watercourses, or waterbodies.</p> <p>Site speed limit of 20 mph.</p>	<p>Two artificial holts to be provided in the wider area.</p> <p>Re-use of the "otter tree" from the well-used resting site within compensatory feature.</p> <p>(See above)</p>	n/a	No significant effect
Badger	Adverse significant effects at the Site level.	n/a	<p>Permanent lighting plan for the operational phase to utilise wildlife-friendly strategy, no floodlighting of woodland, woodland edges, watercourses, or waterbodies.</p>	n/a	n/a	No significant effect

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
			Site speed limit of 20 mph.			
Red squirrel	Adverse significant effects at the Site level.	n/a	Permanent lighting plan for the operational phase to utilise wildlife-friendly strategy, no floodlighting of woodland, woodland edges, watercourses, or waterbodies. Site speed limit of 20 mph.	n/a	n/a	No significant effect
Pine marten	Adverse significant effects at the Site level.	n/a	Permanent lighting plan for the operational phase to utilise wildlife-friendly strategy, no floodlighting of woodland, woodland edges, watercourses, or waterbodies. Site speed limit of 20 mph.	n/a	n/a	No significant effect
Bats – commuting and foraging	Adverse significant effects at the Site level.	n/a	Permanent lighting plan for the operational phase to utilise wildlife-friendly strategy; no floodlighting of woodland, woodland edges, watercourses, or waterbodies.	n/a	n/a	No significant effect
Arctic charr	Adverse significant effects at the Local level.	n/a	Appropriately designed screens to prevent fish from entering in the underground waterway system at Loch Awe and Cruachan to reduce risk of fish entrapment, injury and mortality or translocation.	n/a	n/a	No significant effect
Atlantic salmon and sea trout	Adverse significant effects at the Council level.	The reduction in water velocities at the Loch Awe inlet/outlet will produce less turbulence and reduce the likelihood of attraction	Implementation of an appropriately designed fish guidance system (e.g., bubble curtain).	n/a	n/a	Adverse significant effect at the Site level (on a precautionary basis).

Ecological Feature	Maximum Significance of Effect Prior to Mitigation	Avoidance	Mitigation	Compensation	Enhancement	Residual Significance of Effect
		to the outlet and delays to migration.	Appropriately designed screens to cover the inlet/outlet pipes. Pre-commencement production of Fish Monitoring and Management Plan (FMMP).			
Brown trout	Adverse significant effects at the Local level.	n/a	Appropriately designed screens to cover the inlet/outlet pipes. Pre-commencement production of Fish Monitoring and Management Plan (FMMP).	n/a	n/a	No significant effect
European eel	Adverse significant effects at the Council level.	The reduction in water velocities at the Loch Awe inlet/outlet will produce less turbulence and reduce the likelihood of attraction to the outlet and delays to migration.	Implementation of an appropriately designed fish guidance system (e.g. bubble curtain). Appropriately designed screens to cover the inlet/outlet pipes. Pre-commencement production of Fish Monitoring and Management Plan (FMMP).	n/a	n/a	Adverse significant effect at the Site level (on a precautionary basis).

8.12 Monitoring

- 8.12.1 Post-construction monitoring is recommended for key IEFs present at the Site. This will include:
- Monitoring use of the Site by golden eagle and other scarce raptors via vantage point surveys, and dedicated nesting season eagle surveys. These data will be used to detect whether there are any changes in use of the Site by eagles in response to the Proposed Development, to inform approaches to similar proposals and in particular to increase understanding of habitat use by this pair of golden eagle. As this pair of golden eagle does not seemingly nest successfully every year, at least 5 years of data are recommended in order to capture breeding and non-breeding years. This monitoring should also be undertaken during the construction phase;
 - Before-, during- and after-construction surveys of bat activity at both the Upper and Lower Works sites should be undertaken to inform the lighting strategy and to evaluate its effectiveness once installed;
 - Monitoring of otter activity will be required as part of the Species Protection Plan and licence application. It is recommended that this includes fixed-point camera monitoring before, during and after construction, as well as regularly repeat surveys for field signs of activity throughout the licensable zone. This may require survey by kayak in order to access some stretches of the Loch Awe shoreline; and
 - As described earlier, a comprehensive Fish Monitoring and Mitigation Plan, covering key aspects of fish ecology and behaviour, will be prepared, prior to commencement of the works.
- 8.12.2 Monitoring may also be required for any other protected species for which licences are needed, and this would be detailed in the relevant Species Protection Plan submitted as a supporting document for any licence application.

8.13 Cumulative Effects

River Awe Barrage

- 8.13.1 The existing barrage on the River Awe has an influence on water levels within Loch Awe. A Borland lift fish pass allows passage for migratory salmon and sea trout through the barrage on their upstream migration. The design of the barrage allows for the passage of downstream migrating fish when floodwater is released under the gates of the barrage. During periods of drought or low rainfall, the operators (SSE) halts or limits power generation at the barrage until water levels within Loch Awe return to the target ranges. Published statistical analysis in the Scoping Report (Appendix C) shows that the operation of the existing Cruachan 1 scheme has negligible influence on water levels within Loch Awe, even at a water level monitoring point close to the inlet/outlet point, as compared to outputs from natural rainfall events. The main hydrological impact of the Proposed Development will be more frequent water level changes within Cruachan Reservoir. The storage capacity of the reservoir will not increase in volume, therefore the total volume abstracted from Loch Awe will not change with the project expansion.
- 8.13.2 The volume of water to be extracted during the operational phase of the Proposed Development will be the same as the existing Cruachan 1 scheme, therefore, there is unlikely to be an increased significant adverse effect to water levels within Loch Awe from the cumulative impacts of the Cruachan schemes (1 and 2) and the River Awe barrage.
- 8.13.3 Without mitigation, there is likely to be an increase in delays to migration and in predation levels to fish species. However, providing the mitigation described above is adhered to, the impacts on fish species will not be significant. As a result, there will be no significant cumulative effects for fish or macroinvertebrates.

Balliemeanoch

- 8.13.4 Although still at a very early (scoping) stage, and yet to be consented, the Applicant has been made aware of a proposed 1.5 GW pumped storage hydro scheme at Balliemeanoch, approximately 12 km south of the Proposed Development. At the time of preparing this EIA Report, the Scoping Report for the Balliemeanoch scheme had been lodged with the ECU.
- 8.13.5 Given the status of the Balliemeanoch scheme (at Scoping stage), there is no statutory requirement for the Applicant to consider the Balliemeanoch scheme as part of the cumulative impact assessment for the Proposed Development. Despite this, it is considered good practice to consider all publicly available information, given the nature of the project.
- 8.13.6 Based on a review of information in the Balliemeanoch Scoping Report, as well as the distance from the Proposed Development, there is likely to be very limited potential for cumulative effects between the two projects, this is based on the following key factors:
- Different construction timescales, so that whilst there is potential for overlap of the construction periods, it is very unlikely that both projects would be undertaking the same construction activities at the same time; and
 - Projects located over 12km away on opposite sides of Loch Awe, meaning limited potential for cumulative impacts on habitats or species, particularly given both projects would be subject to their own specific mitigation measures.

8.14 Shadow Habitats Regulations Assessments

Loch Etive Woods SAC

- 8.14.1 The conservation objectives of the Loch Etive Woods SAC habitats are listed as:
- To ensure that the qualifying features of Loch Etive Woods SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status;
 - To ensure that the integrity of Loch Etive Woods SAC is restored by meeting objectives 2a, 2b and 2c for each qualifying feature;
 - Maintain the extent and distribution of the habitat within the site;
 - Maintain the structure, function and supporting processes of the habitat; and
 - Maintain the distribution and viability of typical species of the habitat.
- 8.14.2 The qualifying features for the SAC are listed as:
- Mixed woodland on base-rich soils associated with rocky slopes (also known as *Tilio-Acerion* forests of slopes, screes and ravines);
 - Western acidic oak woods (also known as old sessile oak woods with *Ilex* and *Blechnum* in the British Isles); and
 - Alder woodland on floodplains (also known as alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).
- 8.14.3 The conservation objectives of the Loch Etive Woods SAC faunal species (otter) are listed as:
- To ensure that the qualifying features of Loch Etive Woods SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status;

- To ensure that the integrity of Loch Etive Woods SAC is restored by meeting objectives 2a, 2b and 2c for each qualifying feature;
- Maintain the population of the species (otter) as a viable component of the site;
- Maintain the distribution of the species throughout the site; and
- Maintain the habitats supporting the species within the site and availability of food.

The Need for HRA

- 8.14.4 Parts of the Access Track widening is situated within the Loch Etive Woods SAC, and the Lower Works are c. 30 m from the SAC at their closest point. There is therefore the potential for the Proposed Development to affect the qualifying interest features of this site, namely the named types of woodland, and disturbance to otter.
- 8.14.5 Due to the connection with the SAC and nature of the Proposed Development, the proposals fall under the provisions of Article 6(3) of the EU Habitats Directive, and hence Regulation 48 of the Habitat Regulations 1994 (as amended).
- 8.14.6 Under Regulation 48, an "appropriate assessment" needs to be undertaken in cases where any plan or project which:
- a) Either alone or in combination with other plans or projects would be likely to have a significant impact on a European site designated for nature conservation; and
 - b) Is not directly connected with the management of the site for nature conservation.
- 8.14.7 The term Habitats Regulations Assessment (HRA) is usually adopted to describe this appropriate assessment process.
- 8.14.8 In terms of the requirements listed above for HRA, it is clear that the Proposed Development is not directly connected with the management of the SAC for nature conservation (criterion b). Therefore, it must be demonstrated that the Proposed Development, either alone or in combination with other plans or projects, does not have a significant impact on the SAC. Guidance provided by SERAD (2000) and SNH (2012, updated in 2015) is clear that the HRA process is also relevant to projects or plans out with a Natura 2000 site boundary; it is the potential impacts on a site's qualifying interests which are relevant, and not necessarily the project or plan's location in respect to the Natura 2000 site boundary.
- 8.14.9 Under the terms of the Regulations, the HRA is to be carried out by the relevant competent authority. With respect to the Proposed Development, the competent authority is Argyll and Bute Council, and this section of the EclA seeks to provide the information required by Argyll and Bute Council to undertake a HRA of the Proposed Development on the SAC. It is based on a review of proposed construction and operational effects of the Proposed Development, and the known ecological characteristics of the relevant qualifying features.

Potential Impacts on the SAC's Conservation Objectives – Woodland Types

- 8.14.10 With regards to the qualifying woodland features, the Proposed Development will not have any effect on the condition of the part of the SAC falling within the Site boundary. Therefore, Conservation Objective (1) will be met.
- 8.14.11 With regards to the qualifying woodland features, the Proposed Development will theoretically result in the loss of 0.13 ha of the SAC as a result of the widening of the Access Track, thus not complying with Conservation Objective (2a). However, as stated earlier, the widening of the Access Track will involve non-wooded habitats that currently form the verges of the existing road. It is not anticipated that any significant incursion into any qualifying habitat features of the SAC will occur.

There will be no significant change in the extent or distribution of the qualifying habitat features, and therefore it is considered likely that Conservation Objective (2a) can be complied with.

- 8.14.12 The widening of the Access Track will not result in any changes in the structure, function and supporting processes of the qualifying habitats, and therefore Conservation Objective (2b) will be complied with.
- 8.14.13 With regards to maintenance of the distribution and viability of typical species of the qualifying habitats, again it is considered highly unlikely that the highly localised nature of the widening of the Access Track would cause such changes, and therefore Conservation Objective (2c).

Potential Impacts on the SAC's Conservation Objectives – Otter

- 8.14.14 With respect to Conservation Objective (1) for otter, surveys have identified that otter may occasionally use habitat within the Site that is also within the SAC, passing between Cruachan Reservoir, Allt Cruachan and Loch Awe. It is not certain as to whether the otter family recorded on Loch Awe includes the individuals which are commuting in this way, but it is likely to be so given the lack of any other suitable habitat for otter up at Cruachan Reservoir. Therefore, the mitigation measures described earlier will need to be implemented in full in order to ensure that this particular qualifying feature of Loch Etive Woods SAC remains in favourable condition so as to meet the requirements for Conservation Objective (1).
- 8.14.15 Conservation Objective (2a), the need to maintain the otter population as a viable component of the site, will also require all mitigation measures identified earlier to be implemented in full. This should ensure that there are no long-term impacts on the local otter population.
- 8.14.16 There will be at least medium-term changes to the likely use of habitat by otter along Loch Awe as a result of the Proposed Development, and this could affect the ability to comply with Conservation Objective (2b) which requires maintenance of the distribution of otter throughout the site. Technically, the Loch Awe shoreline does not comprise part of the SAC although the otter using these habitats may be considered to be part of the SAC population. However, given the availability of substantial lengths of habitat within the territory of these otters which will not be affected by the Proposed Development, it is considered unlikely that the distribution of otter within the whole SAC will be significantly affected by the proposals.
- 8.14.17 Conservation Objective (2c) requires maintenance of the habitats supporting otter within the site and availability of food. As described above, it is debateable as to whether the Loch Awe otters are part of the SAC population. Notwithstanding this, if the proposed mitigation is implemented in full, it is not expected that there will be any long-term effects on the overall supporting habitats for otter at this site, nor on the availability of sufficient foraging for the species. Conservation Objectives (2c) will therefore be met.

Conclusions of the Shadow HRA

- 8.14.18 A range of habitat and otter mitigation measures have been described which will be integrated into the CEMP and a Species Protection Plan. Collectively these will ensure that there will be no significant adverse effects on the SAC.

Glen Etive and Glen Fyne SPA

- 8.14.19 The conservation objectives of the Glen Etive and Glen Fyne SPA are listed as:
- To avoid deterioration of the habitats of the qualifying species (golden eagle) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained;
 - To ensure for the qualifying species that the following are maintained in the long term;

- Population of the species as a viable component of the site;
- Distribution of the species within site;
- Distribution and extent of habitats supporting the species;
- Structure, function and supporting processes of habitats supporting the species; and
- No significant disturbance of the species.

The Need for HRA

- 8.14.20 The temporary Upper Site Compounds for the Proposed Development, as well as part of the Access Track to the Upper Works are situated within the Glen Etive and Glen Fyne SPA, and golden eagle associated with the SPA regularly overfly the Site boundary. There is therefore the potential for the Development to affect the qualifying interest features of this site, namely golden eagle.
- 8.14.21 Due to the connection with the SPA and nature of the Proposed Development, the proposals fall under the provisions of Article 6(3) of the EU Habitats Directive, and hence Regulation 48 of the Habitat Regulations 1994 (as amended).
- 8.14.22 Under Regulation 48, an "appropriate assessment" needs to be undertaken in cases where any plan or project which:
- a) either alone or in combination with other plans or projects would be likely to have a significant impact on a European site designated for nature conservation, and
 - b) is not directly connected with the management of the site for nature conservation.
- 8.14.23 The term Habitats Regulations Assessment (HRA) is usually adopted to describe this appropriate assessment process.
- 8.14.24 In terms of the requirements listed above for HRA, it is clear that the Proposed Development is not directly connected with the management of the SPA for nature conservation (criterion b). Therefore, it must be demonstrated that the Proposed Development, either alone or in combination with other plans or projects, does not have a significant impact on the SPA. Guidance provided by SERAD (2000) and SNH (2012, updated in 2015) is clear that the HRA process is also relevant to projects or plans out with a Natura 2000 site boundary; it is the potential impacts on a site's qualifying interests which are relevant, and not necessarily the project or plan's location in respect to the Natura 2000 site boundary. This is particularly relevant for Natura 2000 sites designated for avian features because of the large distances the birds can travel between nesting, foraging and roosting locations.
- 8.14.25 Under the terms of the Regulations, the HRA is to be carried out by the relevant competent authority. With respect to the Proposed Development, the competent authority is Argyll and Bute Council, and this section of the EclA seeks to provide the information required by Argyll and Bute Council to undertake a HRA of the Development on the SPA. It is based on a review of proposed construction and operational effects of the Proposed Development, and the known characteristics of the relevant qualifying feature.

Potential Impacts on the SPA's Conservation Objectives

- 8.14.26 Conservation Objectives (1) requires an avoidance of the deterioration of the habitats of the qualifying species (golden eagle) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained. The GET model has shown that the Site contains only a very small percentage of the open golden eagle habitat likely to be utilised by the pair of golden eagles which nest in closest proximity to the Proposed Development. In addition, the closest nest site is c. 3 km away from the nearest disturbance source likely to arise from the works. The majority

of the direct habitat loss within the SPA, which is minimal at 0.55 ha, will involve the temporary re-use of already disturbed ground that will be properly restored following cessation of the need for the temporary Site Compounds. Above-ground works will also be avoided during the key eagle nesting season, and therefore no disturbance of eagles during this sensitive time will occur. Therefore, the integrity of the SPA will not be affected and the requirements of Conservation Objective (1) will be met.

- 8.14.27 With regards to Conservation Objective (2i), the mitigation measures proposed for working outwith the nesting eagle period will ensure that there will be no impacts on the population of the qualifying species of the SPA, and consequently Conservation Objective (2ii) will also be met, as there will be no changes to the distribution of golden eagle within the SPA.
- 8.14.28 As noted above, there will be a very small decrease in the extent of habitats within the SPA which could impair the ability to meet Conservation Objective (2iii). These impacts will in the main be temporary, and use of a GET model has shown that there is ample unaffected habitat suitable for use by golden eagle in the vicinity of the Proposed Development. Therefore, the requirements for Conservation Objective (2iii) will likely be met. As any changes in habitat extent within the SPA will be minimal, this will mean that Conservation Objective (2iv) will also be met as there will be no significant changes to the structure, function or supporting processes of the habitats on which these particular golden eagles rely.
- 8.14.29 Conservation Objective (2v) requires there to be no significant disturbance of golden eagle as a result of the Proposed Development. The vast majority of the Proposed Development will be underground, both during construction and operation, and the eagle pair closest to the Site are already habituated to the presence of activity at Cruachan Dam (and, for that matter, recreational hillwalkers). The closest nest is located c. 3 km from the Proposed Development, and at these distances, no disturbance would be expected. However, to ensure that there are no disturbance impacts, no above-ground construction works will occur at the Upper Works and Upper Site Compound locations during the key eagle breeding months. This will ensure that Conservation Objective (2v) will be met.

Conclusions of the Shadow HRA

- 8.14.30 Field surveys and GET modelling have been used to assess the usage of the Site by golden eagle associated with the Glen Etive and Glen Fyne SPA. The closest golden eagle nest to the Proposed Development is c. 3 km away, and land-take within the SPA will be minimal, making use where possible of previously disturbed ground and/or areas of existing hard standing. Above-ground works will be avoided during the key eagle breeding period of March to July inclusive, and if these mitigation measures are implemented in full, there will be no significant adverse effects on the qualifying features of the SPA.

8.15 References

- 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.
- SEPA (2013). Pollution Prevention Guidelines.
- European Commission (2000). Managing Natura 2000 Sites: The provisions of Article 6 of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.
- SERAD (2000) Habitats and Bird Directives: implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna, and the Conservation of Wild

Birds ("The Habitats and Bird Directives"). Revised Guidance updating Scottish Office Circular No. 6/1995.

- SNH (2015). Habitat Regulations Assessment of Plans: Guidance for Plan-Making Bodies in Scotland. Version 3.0. Updated version of 2012 guidance initially prepared by David Tyldesley and Associates.
- Scottish Power (2018) Cruachan Power Station Fisheries Habitat & Fish Fauna Survey Report 2018.

9 Transport and Access

9.1 Introduction

- 9.1.1 This Chapter provides an assessment of the likely significant transport effects arising from the construction and operation of the Proposed Development taking into account relevant national, regional and local policy, guidance and regulations. The assessment is based on the characteristics of the site, its surrounding area and the key parameters of the Proposed Development as detailed in **Chapters 2 and 3**.
- 9.1.2 The Chapter describes the methods used to establish the baseline traffic and transport conditions which exist in the vicinity of the Site, the potential direct and indirect effects of the Proposed Development arising from increased traffic movements, the mitigation measures required to prevent, reduce, or offset these effects, and the remaining residual transport effects associated with the Proposed Development.
- 9.1.3 The Proposed Development has the potential to affect the transport network primarily during the construction phase through increased traffic movements and a change to the composition of vehicle types associated with the transport of construction plant and materials and removal of spoil. The operational phase of the project has been scoped out for assessment as detailed in Table 9.2.
- 9.1.4 As development parameters for the Project have been included in order to provide a degree of design flexibility, each topic specific assessment has tested a realistic worst-case scenario, as set out in this chapter, such that the likely significant impacts arising from the Proposed Development have been adequately assessed.
- 9.1.5 A separate Transport Assessment (TA) has been prepared for the Proposed Development, to a scope agreed with Transport Scotland and Argyll & Bute Council and is appended to the EIAR at **Appendix 9.1**. This Chapter has been prepared on the basis of the information presented in the TA, and as such the chapter should be read in conjunction with the TA.
- 9.1.6 The aims of this chapter are to:
- Identify the relevant policy context in which the assessment of transport effects has been undertaken;
 - Describe the methods used to undertake the assessment;
 - Outline the relevant baseline conditions currently existing at the site and surroundings;
 - Identify the potential direct and indirect transport effects of the Proposed Development;
 - Identify mitigation and enhancement measures, where required, to address identified effects;
 - Assess residual predicted effects; and
 - Assess cumulative effects on transport from the Proposed Development in combination with other relevant cumulative developments.
- 9.1.7 This Chapter has links with other topic chapters including **Chapter 10 – Noise and Vibration** (which addresses any noise impacts from transport movements) and **Chapter 14 – Waste Management** (which provides more detail on waste handling):

9.2 Policy Context, Legislation, Guidance and Standards

9.2.1 This section outlines the planning policy and legislation that is specifically relevant to transport and access issues. Policy, legislation, and guidance applicable to the wider project can be found in **Chapter 5 – Planning Policy**.

9.2.2 Planning policy considerations of specific relevance to this assessment are captured in **Table 9.1**.

Table 9.1: Policy Overview

	Policy	Key Consideration
National	Scottish Planning Policy (SPP), 2014	<ul style="list-style-type: none"> Promotion of sustainable travel to/from the development (paragraph 270); Implications of development proposals on traffic, travel patterns and road safety should be taken into consideration (Paragraph 271); and Carefully planned material movements during construction and operation of the development (paragraph 291).
	National Transport Strategy (NTS2), 2020	<ul style="list-style-type: none"> Reduce inequalities; Take climate action; Help deliver inclusive economic growth; and Improve health and wellbeing.
	National Planning Framework 3 (NPF3), 2014	Expansion of the Cruachan Power Station will assist on greenhouse gas emissions reduction that the Scottish Government aims for. The Proposed Development is recognised as development of national significance.
	National Planning Framework 4 (NPF4), (Draft 2021)	Draft NPF4 supports pumped storage hydro across all of Scotland but emphasises an initial focus on Cruachan. It recognises that pumped storage hydro will support the transition to a net zero economy through its ability to optimise electricity generated from renewables by storing and releasing energy when required. The Proposed Development is recognised as development of national significance. Chapter 5 of the EIAR sets out the support for pumped hydro in more detail.
	Construction Logistics and Community Safety Standard, 2019	It covers a wide range of issues including routeing for deliveries, site access/egress, and controlled delivery times, heavy goods vehicle driver vision, and vehicle safety features.
	Planning for Construction Safety, 2019	A Transport Assessment will be submitted in support of the planning application which includes consideration of likely development's transport safety impacts during construction, and measures to mitigate these such as traffic management and temporary crossing facilities.
Regional	HITRANS Regional Transport Strategy, 2017	<ul style="list-style-type: none"> Help communities to actively participate in economic and social activities; and Protect the environment and mitigate adverse impacts of transport and travel

	Policy	Key Consideration
Local	Argyll & Bute Local Development Plan, 2015	This Plan does not indicate any policies or Proposed Development allocations that would impact on the delivery of the Cruachan Expansion Project. The importance of environmentally sound travel, the need for safe travel and the importance of A85 and A82 as strategic transport links are recognised within the document.
	Argyll & Bute Draft Local Development Plan 2, 2019	The Plan makes reference to the Cruachan Facility Expansion under Proposal E which states that that “The Council will work with the relevant bodies to...help manage the impacts of the construction phase on transport and other infrastructure. Argyll and Bute Council supports the delivery of this nationally identified project that would bring significant benefits in economy, communities, and environment.

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

- Guidelines for the Environmental Assessment of Road Traffic, 1993 (Institute of Environmental Assessment (now IEMA), 1993) (the ‘IEMA Guidelines’);
- Transport Assessment Guidance (2012);
- Construction Logistics Planning Guidance (2021); and
- Design Manual for Roads and Bridges (in relation to trunk roads) (2020).

9.3 Consultation

9.3.1 Liaison with Transport Scotland and Argyll & Bute Council, took place in May 2021 and July 2021 respectively, regarding the scope of the TA and this Chapter.

9.3.2 Initial scoping discussions were also undertaken with Transport Scotland and Argyll & Bute Council with regard to:

- The content of the TA, this EIA Chapter and the principles of the Proposed Development;
- Materials handling strategy during the construction phase;
- Impacts of the Proposed Development that would affect the transport network during construction and operational phases;
- Potential constraints on the A85 trunk road network;
- Available traffic surveys in proximity to the study area; and
- The possibility of whether any junction modelling exercise would be required to assess the additional traffic volume that the Proposed Development could generate.

9.3.3 In July 2021 an EIA Scoping Report was submitted to the Scottish Government Energy Consents Unit (ECU) and key consultees as part of the Section 36 Application process. The ECU, Transport Scotland and Argyll & Bute Council responded, and their key comments are summarised in **Table 9.2** below, along with how they have been considered in this assessment.

Table 9.2: Transport Scotland and Argyll & Bute Council Key Responses to the EIA Scoping Report

Comment	Response
Transport Scotland	
It is noted that any impacts associated with the operational phase of the development are to be scoped out of the EIA.	Noted. The operational phase of the Proposed Development has been scoped out of the EIA assessments presented in this Chapter given the limited number of additional traffic movements, as set out and justified in the Scoping Report.
Any proposed changes to the trunk road network must be discussed and approved (via a technical approval process) by the appropriate Area Manager.	No permanent changes to the trunk road network will be made. The construction of the main access tunnel portal will require a temporary bypass on the northern side of the A85, as detailed in Chapter 4 of the TA.
The application will require to be accompanied by a Stage 1 Safety Audit.	A Stage 1 Road Safety Audit will be undertaken for the widening of St Conan's Road within the adopted highway and the two proposed access points onto the Lower Control Works site (as detailed in Section 6.4 of the TA).
The TA will require to address both capacity and safety issues	Noted. The TA discusses both highways capacity and safety.
Use of National Road Traffic Forecast (NRTF) low growth factors to forecast the future traffic flows would be acceptable.	Noted. These have been used to inform our assessment as described in section 9.4.
Transport Scotland noted that the assessment of the construction phase will be based upon the worst-case 'all by road' scenario, in terms of the amount of material to be moved by road.	Noted. The assessment undertaken for the TA and ES Transport & Access chapter are based on a 100% by road scenario in relation to the excavated material to be transported offsite. This is presented in section 9.9.
Transport Scotland will require to be satisfied that the size of Abnormal Indivisible Loads proposed can negotiate the selected route and that their transportation will not have any detrimental effect on structures within the trunk road route path. A full Abnormal Loads Assessment report should be provided with the EIA that identifies key pinch points on the trunk road network. Swept path analysis should be undertaken at identified pinch points and details provided with regard to any required changes to street furniture or structures along the route.	An Abnormal Loads Assessment has been undertaken and included within Appendix D of the TA.
Responses From Argyll & Bute Council	
It is accepted that the operational phase of the proposal is unlikely to lead to long term concerns, but the construction phase has potential for significant impacts in respect to waste and transportation matters given the locational characteristics of the site.	Noted. The operational phase of the Proposed Development has been scoped out of the EIA assessments, as described in section XX. .

Comment	Response
Details on how the waste production, storage, processing, and distribution on the Road/Rail/Water network will be coordinated should be included within the EIA, and subject to further discussion with Transport Scotland, SEPA and The Planning Authority to provide clarity on alternatives considered and reasons for solutions proposed	An assessment of Waste Management is presented in Chapter 14 of the EIA Report. At present, the most viable and the 'worst case' scenario is to assume that all residual spoil generated from the Proposed Development will be transported off-site by road for re-use. This is primarily driven by the lack of suitable rail / port facilities within the immediate surrounding area.
Development proposals for a new temporary pier, port or harbour facilities will only be considered where it has been clearly demonstrated how the whole site including any related access and working areas can be restored to the satisfaction of the planning authority once the facilities are no longer required.	Loch Awe will not be used for the transport of materials during the construction or operational phases of the Proposed Development and all materials will be transported by road, as detailed in Section 4 of the TA. A quayside structure will be developed on the bank of Loch Awe to allow access for construction of the underground power station, and all associated tunnels and for temporary spoil storage. This is described in Chapter 2 . It is not proposed to remove this structure as the environmental impacts associated with its removal would outweigh the benefits of leaving it in-situ, and it will be required for the future operation of the development.
The applicant is to submit a Transport Assessment (TA) together with their EIA in support of the final planning application. The TA must provide complete proposed pier/jetty and wharf construction details. The proposal will need to consider cumulative infrastructure impacts during the works and to ensure continued safe access / egress during this time.	Details of the proposed quayside in Loch Awe, which will not require marine transport or access, are included in Chapter 3 of this EIAR.

9.4 Methodology

Study Area

- 9.4.1 The IEMA Guidelines suggest two broad rules to identify the appropriate extent of the assessment area, as follows:
- links with all vehicle or heavy goods vehicles (HGV) with traffic flow increases in any assessment year of more than 30%; and
 - links with medium or high sensitivity receptors with traffic flow increases greater than 10%.
- 9.4.2 The assessment area includes the links from the Site's access points to the surrounding local and strategic highway network that would be subject to daily traffic flow changes as a result of construction of the Proposed Development. This includes the following links, based on the extents of the available surveyed data:

- St Conan's Road;
- A85; and
- A82.

9.4.3 It should be noted that the thresholds, are only triggered on St Conan's Road. Notwithstanding this, the A85 and A82 highway links in close proximity to the Site have been included as part of the assessment during the construction phase, due to the high proportion of HGVs expected.

Baseline Data Collection

9.4.4 The baseline traffic flows for the EIA have been determined using automatic traffic count (ATC) data from Transport Scotland's National Traffic Data System (NTDS) platform and ATC surveys undertaken as part of the 'Baseline Traffic and Access Report', produced by Arcus Consultancy Services Ltd in 2017. Details of all ATC locations within close proximity to the site, from both of the above-mentioned data sources, have been included in the TA Scoping Report ([Appendix A](#) of TA).

9.4.5 Following a review of the available traffic count data, the relevant and most up-to-date traffic counts for each location were taken forward and traffic counts which were determined to be erroneous were excluded. The final traffic counts which have been used as part of this study, along with information on their sources and latest available count dates, are listed in [Table 9.3](#).

Table 9.3: Baseline Traffic Counts

Reference	Source	Location	Latest Available Traffic Counts
ATC1	TS NTDS (Ref: ATC8059)	A85 - 5.5km east of the B845	Mar - Dec 2019
ATC2	Arcus (Ref: ATC 2)	A85 - East of dam access road	Sep 2017
ATC3	Arcus (Ref: ATC 3)	A819 - 0.8km south of A85 Junction)	Sep 2017
ATC4	Arcus (Ref: ATC 4)	A85 - East of B8074 Glen Orchy Road	Sep 2017
ATC5	TS NTDS (Ref: JTC00536)	A85 - 5.5km west of Tyndrum	Mar - Dec 2019
ATC6	Arcus (Ref: ATC 5)	A82 - Between A85 junction and north of Tyndrum	Sep 2017
ATC7	TS NTDS (Ref: 108370)	A82 - 3.5km south of Tyndrum	Jan - Dec 2019
ATC8	TS NTDS (Ref: ATC00003)	A82 - 1.7km north of the A85 junction	Jul - Dec 2019

9.4.6 As a result of the COVID-19 pandemic, travel patterns and growth in travel are expected to change from those pre-existing and predicted prior to the pandemic. As such, it has been agreed with Transport Scotland that the current baseline traffic flows for the study will be based on 2019 data (i.e., prior to the start of the pandemic). Therefore, 2019 Transport Scotland NTDS traffic data has been used and the 2017 Arcus traffic counts have been uplifted to 2019 levels based on a factor derived by comparing the 2017 Transport Scotland NTDS traffic counts to 2019 Transport Scotland NTDS traffic counts.

9.4.7 The Annual Average Daily Traffic (AADT) and Annual Average Weekday Traffic (AAWT) values for each location were calculated based on the available data in 2019 factored to annual average flows based on the most recent year for which complete annual data was available. This allowed for a more accurate calculation of the AADT and AAWT values when compared to using standard conversion factors. The annual factors for the Arcus survey data flows were based on the nearest

NTDS traffic counter for which annual data was available. The AADT factors used have been included within **Appendix C** of the TA.

- 9.4.8 Based on a review of the traffic count data, the AM and PM peak hours vary in time between the different count locations which is expected due to the large spatial coverage and varied character of the highway network considered. Furthermore, typical AM and PM peaks in traffic flows are not generally present, as the AM and PM peak hours across the different count locations occur after 10:00 and before 17:00, respectively.
- 9.4.9 In order to establish the AM and PM hour flows for the purposes of assessment, for each traffic count location separately, the busiest hour between 06:00-12:00 was taken as the AM peak hour and the busiest hour between 12:00 -18:00 was taken as the PM peak hour. As such, the AM and PM peak hours used in the assessment are not uniform across all the traffic count locations and instead relate to the highest hourly AM and PM traffic flows for each location separately.
- 9.4.10 Traffic flows for St Conan's Road have been estimated assuming a daily and peak hour trip generation of 7 and 1 vehicle movements (one way) per house, respectively, for the 25 houses on St Conan's Road and 20 daily and 5 peak hour vehicle movements associated with the Cruachan dam access road. In terms of HGV movements, 4 daily servicing trips have been assumed all outside of the AM and PM peak hours.
- 9.4.11 A summary of the baseline traffic flows and 85th percentile vehicle speeds are shown in **Table 9.4** and included in full within **Appendix C** of the TA. The baseline peak hour flows relate to the average weekday peak hour flows for the month of September which was chosen as a neutral month (e.g., no peaks in tourist traffic or low traffic flows during the winter).

Table 9.4: Baseline Traffic Flow and Speed

Link Reference and Location	Direction	85th Percentile Speed (mph)	AM Peak Hour		PM Peak Hour		AADT		AAWT	
			Total	HGV	Total	HGV	Total	HGV	Total	HGV
L1: A85, 5.5km east of the B845 (ATC1)	EB	30.4	197	32	230	32	2335	331	2319	388
	WB	33.6	203	33	223	31	2362	317	2357	370
	Combined	32.0	400	65	452	62	4697	648	4676	759
L2: St Conan's Road (Estimated)	NB	-	5	0	25	0	98	2	98	2
	SB	-	25	0	5	0	98	2	98	2
	Combined	-	30	0	30	0	195	4	195	4
L3: A85, East of dam access road (ATC2)	NB	50.4	207	34	184	30	1759	250	1749	293
	SB	51.8	164	26	185	21	1782	239	1790	281
	Combined	51.2	371	61	369	51	3541	489	3539	574
L4: A819, 0.8km south of A85 Junction (ATC3)	NB	40.5	102	14	92	15	825	118	849	137
	SB	37.0	79	18	81	13	774	126	812	149
	Combined	38.9	181	32	173	28	1599	244	1661	286
L5: A85, East of B8074 Glen Orchy	EB	50.6	174	29	155	23	1420	192	1384	227
	WB	53.2	126	25	150	17	1390	197	1384	237
	Combined	51.9	300	53	305	40	2810	389	2769	464

Link Reference and Location	Direction	85th Percentile Speed (mph)	AM Peak Hour		PM Peak Hour		AADT		AAWT	
			Total	HGV	Total	HGV	Total	HGV	Total	HGV
Road (ATC4)										
L6: A85, 5.5km west of Tyndrum (ATC5)	EB	68.4	123	23	130	16	1369	235	1306	242
	WB	65.2	141	27	135	27	1327	234	1240	252
	Combined	67.1	264	50	265	44	2696	469	2546	494
L7: A82, Between A85 junction and north of Tyndrum (ATC6)	NB	33.7	366	63	370	40	3354	440	3265	511
	SB	28.6	360	57	330	50	3321	423	3102	467
	Combined	31.3	725	120	699	90	6675	863	6368	977
L8: A82, 3.5km south of Tyndrum (ATC7)	NB	59.0	389	35	397	27	3359	336	3131	348
	SB	57.8	380	35	364	33	3289	329	2981	358
	Combined	58.4	769	67	761	61	6648	665	6111	709
L9: A82, 1.7km north of the A85 junction (ATC8)	NB	50.3	251	26	255	18	2130	194	1947	199
	SB	55.9	238	19	234	18	2051	181	1832	196
	Combined	54.1	489	45	489	36	4182	372	3779	393

Note: Peak hour flows relate to the average weekday peak hour flows for the month of September. The AM and PM peak hour flows relate to the highest hourly flows for each location separately.

Assessment

- 9.4.12 The significance of the effects of the Proposed Development on the topics listed below has been determined on the basis of the magnitude of the effect and sensitivity of the receptor, as well as whether the impact is temporary or permanent, and beneficial or adverse. This is described below.

Magnitude of Impact

- 9.4.13 The main transport impacts identified in IEMA Guidelines that have been assessed in this EIAR are:

- Severance;
- Driver delay;
- Pedestrian delay and amenity;
- Pedestrian fear and intimidation;
- Accidents and road safety;
- Dust and dirt; and
- Hazardous loads.

- 9.4.14 It is noted that the following items are also included, but have been assessed in separate chapters of the EIAR:
- Noise;
 - Vibration;
 - Visual Effects;
 - Ecological Effects; and
 - Heritage and Conservation Areas
- 9.4.15 These impacts could arise during both the construction and operational phases of the development. However, this chapter of the EIA report only considers the construction phase of the development as the operational phase has been scoped out, as detailed in Table 9.2.
- 9.4.16 The 'dust and dirt' criterion is not considered in this chapter as it is unlikely that the Proposed Development would have a potential for a significant effect on receptors. Similarly, the 'hazardous loads' criterion is also not considered in this assessment, as it is deemed unlikely that the construction, of the Proposed Development would require the transportation of hazardous loads that would have the potential for a significant effect on receptors.

Severance

- 9.4.17 The IEMA Guidelines state that "severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery." Furthermore, "changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively". However, the IEMA Guidelines acknowledge that the measurement and prediction of severance is extremely difficult. The assessment of severance needs to pay full regard to specific local conditions, in particular the location of pedestrian routes to key local facilities, and whether or not crossing facilities are provided.
- 9.4.18 **Volume 11, Section 3, Part 8, Chapter 6** of the Design Manual for Roads and Bridges entitled 'Pedestrians and Others and Community Effects' provides further guidance on the aspect of New Severance within a community in terms of the two-way AADT flow on a link. It states that new severance should be described in terms of "Slight", "Moderate" or "Severe" and that these categories "... should be coupled with an estimate of the numbers of people affected, their location and the community facilities from which they are severed."
- 9.4.19 The potential effects as set out later in this Chapter are based on an assessment, which takes into account IEMA's thresholds and guidance set out in the DMRB. **Table 9.5** summarises these thresholds.

Table 9.5: Severance – Magnitude of Impact

Magnitude	Definition
Large	90% or greater change in AADT flows as a result of the Proposed Development
Moderate	Between 60 – 89% change in AADT flows as a result of the Proposed Development
Small	Between 30 – 59% change in AADT flows as a result of the Proposed Development
Negligible	Less than 30% change in AADT flows as a result of the Proposed Development

Driver Delay

- 9.4.20 Delay to drivers can be estimated through capacity assessments at key points on the local highway network. The addition of new development-generated traffic could result in an increase in the

number of vehicles using key routes and junctions. This may lead to additional delays depending on the existing operation, levels of background traffic and development-generated traffic. Additionally, temporary, or permanent changes on routes or junctions, such as temporary traffic signals or changes in junction configuration, could also result in additional delays compared to the baseline. As stated in the IEMA Guidelines, driver delay is only likely to be an issue requiring mitigation where junctions are operating at, close to or beyond capacity.

- 9.4.21 **Table 9.6** shows the magnitude of impact scale applied to the category of ‘driver delay’. The magnitude of impact scale is based on professional judgement in the absence of IEMA thresholds.

Table 9.6: Driver Delay – Magnitude of Impact

Magnitude	Definition
Large	Average vehicle delay changes of more than 3 minutes as a result of the Proposed Development during the peak hours
Moderate	Average vehicle delay changes are between 1 minute and 2 minutes and 59 seconds as a result of the Proposed Development during the peak hours
Small	Average vehicle delay changes are between 30 seconds and 59 seconds as a result of the Proposed Development during the peak hours
Negligible	Average vehicle delay changes are less than 30 seconds as a result of the Proposed Development during the peak hours

Pedestrian Delay and Amenity

- 9.4.22 Pedestrian delay for a particular walking journey can be increased by changes to traffic flows making it harder to crossroads. This, therefore, would affect an individual’s desire to make a particular walking journey. Changes in the volume, speed or composition of traffic are most likely to affect pedestrian delay, with the level of severity dependent on the general level of pedestrian activity and the physical condition of crossing points.
- 9.4.23 It is important to note that qualitative aspects, such as the quality of the pedestrian environment and the trip generators served by these environments, also influence the propensity for individuals to walk. The sense of personal security and safety, gradient, permeability, legibility, and maintenance of these infrastructures aid in encouraging their use and discouraging the use of the private car. These, in addition to the quantitative aspects of assessment such as changing traffic flows, are therefore an important consideration for a number of the criteria.
- 9.4.24 The determination of what constitutes a material impact on pedestrian delay is generally left to the judgement of the assessor and knowledge of local factors and conditions. However, the IEMA Guidelines suggest “a lower threshold of 10 seconds’ delay and an upper threshold of 40 seconds’ delay, for a link with no crossing facilities”. It further advises that the lower threshold equates to a two-way flow of approximately 1,400 vehicles per hour.
- 9.4.25 **Table 9.7** shows the magnitude of impact categories applied to the assessment of pedestrian delay.

Table 9.7: Pedestrian Delay – Magnitude of Impact

Magnitude	Definition
Large	Link subject to a two-way traffic flow of more than 5,600 vehicles per hour
Moderate	Link subject to a two-way flow of 3,500-5,599 vehicles per hour
Small	Link subject to a two-way flow of 1,400-3,499 vehicles per hour
Negligible	Link subject to a two-way flow of less than 1,400 vehicles per hour

- 9.4.26 Pedestrian amenity is broadly defined as the relative pleasantness of a journey, which is affected by traffic flow, traffic composition and footway width/separation from traffic. The IEMA Guidelines suggest a “tentative threshold for judging the significance of changes in pedestrian amenity of where traffic flow (or its lorry component) is halved or doubled”. The magnitude of impact is a matter of professional opinion.

Pedestrian Fear and Intimidation

- 9.4.27 A further impact of traffic flows on pedestrian movements is the element of fear and intimidation individual travellers would experience with respect to vehicular movements. The impact of this factor is dependent on the volume of traffic, the HGV content, the width of footway and its proximity to the carriageway edge. As is the case with pedestrian delay and amenity, there are no commonly agreed thresholds for determining the magnitude of this impact, with appraisal being based on the judgement of the assessor.
- 9.4.28 Nevertheless, the IEMA Guidelines do suggest some thresholds, based on previous research, which can be used, and these are shown in **Table 9.8**.

Table 9.8: Suggested Threshold Guidelines for Pedestrian Fear and Intimidation

Degree of Hazard	Average Traffic Flow Over 18 Hour Day (Vehicles/Hour)	Average 18-Hour HGV Flow (Vehicles)	Average Speed Over 18 Hours (mph)
Extreme	1,800+	3,000+	20+
Moderate	1,200-1,800	2,000-3,000	15-20
Slight	600-1,200	1,000-2,000	10-15

- 9.4.29 Notwithstanding the thresholds set out above, the IEMA Guidelines suggest that they should be approached with a certain level of caution as the individual factors could be weighted by local circumstances to decide the overall value of intimidation. For example, a road may show higher speeds but lower flows, making crossing easier, or high flows but congested and constant traffic, therefore reducing total fear of passing vehicles but increasing crossing difficulties.
- 9.4.30 **Table 9.9** shows the magnitude-scale applied to pedestrian fear and intimidation.

Table 9.9: Pedestrian Fear and Intimidation – Magnitude of Impact

Magnitude	Definition
Large	Average traffic flow over 18 hours of 1800 + vehicles/hr;
	An average 18-hour HGV flow of 3000 +; or
	Average speed over 18 hours of 20 + mph.
Moderate	Average traffic flow over 18 hours of 1200-1799 vehicles /hr;
	An average 18-hour HGV flow of 2000-2999; or
	Average speed over 18 hours of 15-19 mph.
Small	Average traffic flow over 18 hours of 600-1199 vehicles/hr;
	An average 18-hour HGV flow of 1000-1999; or
	Average speed over 18 hours of 10-14mph.
Negligible	Average traffic flow over 18 hours of less than 600 vehicles/hr;
	An average 18-hour HGV flow of less than 1000; or
	Average speed over 18 hours of less than 10mph.

Accidents and Road Safety

- 9.4.31 The assessment of accident risk and highway safety is based upon existing accident rates and specific local circumstances to identify accident clusters. For example, should a particular link or junction be found to have a high existing accident rate, the addition of substantial traffic volumes generally would be expected to have an adverse effect on highway safety due to further increased opportunities for conflict. Mitigation measures may therefore be required.
- 9.4.32 A further assessment of highway safety may also include the comparison of accident rates at those locations identified for highway improvements related to capacity issues. An assessment of expected accident rates for a new junction design compared to the existing layout would identify future accident risk related to development-generated traffic.
- 9.4.33 The IEMA Guidelines state that “professional judgement will be needed to assess the implications of local circumstances, or factors, which may elevate or lessen risks of accidents, e.g., junction conflicts”.
- 9.4.34 As noted above, a review of accidents occurring over the most recent three-year period within the area surrounding the site has been undertaken in order to identify existing accident clusters, where 10 or more accidents occurred over the three-year period.
- 9.4.35 **Table 9.10** shows the magnitude of impact categories applied to accidents and road safety.

Table 9.10: Accidents and Road Safety – Magnitude of Impact

Magnitude	Definition
Large	Expected change in accident risk of >15% at the location of existing accident cluster
Moderate	Expected change in accident risk of 10%-14% at the location of existing accident cluster
Small	Expected change in accident risk of 5%-9% at the location of existing accident cluster
Negligible	Expected change in accident risk of < 5% at the location of existing accident cluster

Sensitivity of Receptors

- 9.4.36 The IEMA Guidelines identify groups and special interests which should be considered in the assessment. Categories of receptor sensitivity have been defined from the principles set out in the IEMA Guidelines and these have been used, to outline in broad terms, the sensitivity of receptors to traffic for the categories of impact. However, it is acknowledged that each receptor will have a different sensitivity to each specific impact. Typical sensitive receptors and their sensitivity to traffic are shown in Table 9.11. Based on the criteria shown on **Table 9.11**, the selected relevant sensitive receptors are specified in **Table 9.4**.

Table 9.11: Receptor Sensitivity

High Sensitivity	Medium Sensitivity	Low Sensitivity
<ul style="list-style-type: none"> Community facilities with users that are most sensitive to traffic (examples include: schools, hospitals and care homes); Pedestrian and cyclists on busy links with a high footfall and/or high number of cyclists (examples include very busy streets with high frontage activity and popular cycling routes); Pedestrian and cyclists at locations with known safety issues; Roads heavily used by pedestrians with no pedestrian facilities; and Drivers on the trunk road network on busy links with directional flows above 1800 veh/hr. 	<ul style="list-style-type: none"> Busy community facilities (examples include busy tourist areas, recreational areas and shops); Pedestrian and cyclists on links with moderate footfall and/or moderate number of cyclists (examples include typical streets with frontage activity and cycling routes, or locations with moderate footfall at specific times/days); Pedestrians on links which have low to moderate footfall that do not have adequate facilities such as footways or formal crossing points where crossing is required; and Drivers on the trunk road network on less busy links with directional flows below 1800 veh/hr. 	<ul style="list-style-type: none"> Community facilities with low to medium number of users (examples include open spaces, small shops and historical buildings); Pedestrian and cyclists on links with low footfall and/or low number of cyclists (examples include local access roads and rural/suburban areas); Residential dwellings and private property; and Drivers on all other roads.

Effect Nature, Scale and Significance

9.4.37 The assessment of significance within the EIA report is based on the criteria set out in **Table 9.12**.

Table 9.12: Significance Criteria

	Level of Effect	Criteria
Significant	Substantial	These 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 county scale site or feature may also enter this category.
	Major	These effects are likely to be important considerations at a local scale and may become key factors in the decision-making process.

	Level of Effect	Criteria
	Moderate	These effects, 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.
<i>Not significant</i>	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 or No Effect	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 be given no weight by the decision-maker.

9.4.38 The scale of transport and access effects has been determined based on the criteria set out above, the magnitude of impact for each effect, receptor sensitivity and professional judgement. This is shown in **Table 9.13**.

9.4.39 In terms of the nature of effects, these can either be beneficial or adverse.

Table 9.13: Significance Matrix for Transport Effects

Effect Significance		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Impact	Large	Substantial	Major	Moderate	Negligible
	Moderate	Major	Moderate	Minor	Negligible
	Small	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Limitations

9.4.40 A number of assumptions have been made, based on best practice guidance and professional judgement. A number of assumptions relating to the construction phase trip generation forecast and trip distribution have been made, including: the capacity and load of vehicles, routing of vehicles on the highway network and the arrival and departure profiles of vehicles. Full details on all assumptions made as part of the construction phase assessment are detailed in **Chapter 5** of the TA.

9.5 Current Baseline Conditions

9.5.1 The TA includes a full review of the baseline conditions and includes supporting figures and plans. This section of the EIA Report contains a summary of the baseline conditions, focusing on the identification of key receptors in the Study Area.

Highway Network

9.5.2 The A85, which is designated as a Trunk Road by the Scottish Ministers, provides direct access to most areas of the overall development Site. The A85 is a single-carriageway roadway with one lane

running in each direction and has no street lighting surrounding the Site location. A parking area has been established opposite the point where it is proposed to establish the lower site compound, which is immediately to the east of the Falls of Cruachan station. As described below, a footway of varied width is provided along the southern kerb of the carriageway to A85.

- 9.5.3 From the Site, the A85 provides access to the nearby villages of Lochawe (~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.
- 9.5.4 St Conan's Road provides access to the dam access road/ haul road, under the control of Drax, which is located approximately 230m into St Conan's Road from its junction with the A85. St Conan's Road itself is unlit and with no footway provision except for the residential spur road branching off from it. The dam access road/ haul road has cattle grids and 'no unauthorised access signs' at its entrance with gates to control unauthorised vehicular access located further along the dam access road/ haul road.

Walking and Cycling

- 9.5.5 Currently, pedestrian and cycle facilities are limited within the immediate locality of Cruachan Power Station. A narrow footway, approximately 0.5 – 1.0m in width, is present on the southern side of the A85 in the vicinity of the Site, extending to approximately 2.8m to the east and 1.6m to the west from the existing Power Station administrative building. Additionally, footways are present, mostly on a single side of the A85, from approximately 200m west of the A85/ St Conan's Road junction eastwards to the A85/ B8077 junction.
- 9.5.6 Notwithstanding the above, there are a number of tourist destinations at and surrounding the Site which attract walkers and cyclists to the site. These include Ben Cruachan, Falls of Cruachan, the Cruachan visitor centre, St Conan's Kirk, and Kilchurn Castle.
- 9.5.7 There are a number of designated walking and recreational routes in close proximity to the Site, identified as Argyll & Bute Council Core Paths. The nearest cycling route to the site is the National Cycle Network Route 78 between Oban and Fort Augustus, which crosses the A85 at Connel (approximately 20km to the west of the Site).

Public Transport

Rail

- 9.5.8 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. The train station can be accessed on foot from the visitor centre using the footway on the southern side of the A85.
- 9.5.9 Falls of Cruachan railway station lies on the Oban branch of the West Highland Line which links Oban with Glasgow. It is only open during the summer months, from March to October as it is mainly used by hikers to climb Ben Cruachan. When the station is operational, four eastbound trains to Glasgow Queen Street and five westbound trains to Oban stop on weekdays and Saturdays along with three each way on Sundays.
- 9.5.10 The second nearest rail station to Cruachan Power Station is Loch Awe Station, located 5.3km east of Cruachan Visitor Centre (approximately a 5-minute-drive or a 10-minute- bus journey). Bus no 976, operated by Scottish Citylink, connects Loch Awe rail station with Cruachan Visitor Centre three times per day and in each direction.
- 9.5.11 Loch Awe Station is also on the Oban branch of the West Highland Line and operates all year round. There are 7 departures in each direction Mondays to Saturdays eastbound to Glasgow Queen Street and westbound to Oban. On Sundays, there are three departures each way throughout the year,

plus a fourth in the summer months only which operates to Edinburgh Waverley, from late June until August.

Bus

9.5.12 Cruachan Power Station is accessible also by bus. The nearest bus stops are located on the A85, approximately 120m east of the Cruachan Visitor Centre. Buses that serve this bus stop include the following:

- Route 975 (Glasgow to Oban) – 3 buses daily; and
- Route 403 (Taynuilt to Dalmally) – 4 buses daily.

9.5.13 Additionally, there are a number of fortnightly Scottish Express bus services serving the bus stop at Cruachan Power Station. These include bus routes 222, 248 and 266, each running a single departure and return journey fortnightly.

Road Safety

9.5.14 Road traffic accident data was compiled from publicly available information published by the Department for Transport, as detailed in **Section 3.6** of the TA. All fatal, serious, and slight accidents which occurred in proximity to the site and during the last five years (January 2016 to– December 2020) were identified.

9.5.15 No collisions occurred in the vicinity of the proposed construction works on or adjacent to the A85. There are not considered to be any existing highway safety issues in the vicinity of the Proposed Development. Two serious accidents occurred approximately 1.5 km to the south-west of the proposed worksite access. These incidents both occurred in July 2018, in daylight and fine weather (without high winds). One incident involved a car and motorcycle both going ahead, and the other incident involved a single car going ahead.

Receptors

9.5.16 Based on the sensitive receptors to traffic, defined by the IEMA Guidelines, **Table 9.14** outlines the key sensitive receptors across the links included as part of the assessment. The sensitivity of the most sensitive receptor on each link is identified, which provides an overall sensitivity for each link under consideration.

Table 9.14: Transport Receptors on Links Assessed

Link Assessed	Extents of Link Assessed	Key Receptors on Link Assessed	Sensitivity of Most Sensitive Receptor
L1	A85 surrounding the existing Cruachan Power Station	<ul style="list-style-type: none"> ▪ Pedestrians and Cyclists (moderate levels at specific times); ▪ Low Volume Tourist Destination; and ▪ Recreational Site. 	Medium
L2	St Conan's Road within the public highway boundary	<ul style="list-style-type: none"> ▪ Houses on St Conan's Road which has no pedestrian facilities; 	Medium

Link Assessed	Extents of Link Assessed	Key Receptors on Link Assessed	Sensitivity of Most Sensitive Receptor
L3	A85 through the village of Loch Awe, inc. between St Conan's Road eastwards to the ATC count location	<ul style="list-style-type: none"> ▪ Sensitive locations (e.g. Church); ▪ Village amenities; ▪ Tourist/ visitor locations; and ▪ Pedestrians and cyclists (pedestrian facilities available on at least one side of street). 	High
L4	Northern section of the A819 including the Kilchurn Castle viewpoint	<ul style="list-style-type: none"> ▪ Tourist/ visitor attraction (Kilchurn Castle); ▪ Small number of tourist/ visitors locations; ▪ Small number of houses directly accessed from the A85; and ▪ Village amenities which are not directly accessed from A85 but via access roads. 	Low
L5	A85 through the village of Dalmally	<ul style="list-style-type: none"> ▪ Pedestrians and cyclists (pedestrian facilities available on one side of street); ▪ Small number of tourist/ visitor locations; ▪ Small number of houses directly accessed from the A85; and ▪ Village amenities which are not directly accessed from A85 but via access roads. 	Medium
L6	A85, 10km to the west from its junction with the A82 where a small number of houses are present	<ul style="list-style-type: none"> ▪ 3/4 houses directly accessed from the A85; 	Low

Link Assessed	Extents of Link Assessed	Key Receptors on Link Assessed	Sensitivity of Most Sensitive Receptor
L7	A82 through the village of Tyndrum	<ul style="list-style-type: none"> Village amenities; Tourist/ visitor attractions; Pedestrians and cyclists (pedestrian facilities available on both sides of street); and Recreational Site. 	Medium
L8	A82 approximately 3.5km south of Tyndrum	<ul style="list-style-type: none"> Small number of houses and recreational/ touristic areas via access roads from the A82. 	Low
L9	A82 from its junction with the A85, 1km to the north	<ul style="list-style-type: none"> No sensitive receptors identified. 	Negligible

9.6 Baseline Evolution and Expected Future Baseline

9.6.1 The peak in construction traffic is anticipated to occur in 2026. The following construction activities are expected to coincide during this period:

- Deposition of the excavated construction material offsite;
- Upper Control Works site construction activity; and
- Transport of concrete to the Lower Control Works site

9.6.2 In order to determine how the identified baseline for transport could change in the future assessment year of 2026 considered in this Chapter, traffic growth has been factored into future year assessments.

9.6.3 Background traffic growth, associated with housing and employment growth, between 2021 – 2026 has been determined based on the National Road Traffic Forecast (NRTF) growth factors. The NRTF 'Low' growth factor has been used, resulting in a growth factor of 1.027 between 2021 – 2026. This factor was subsequently applied to the baseline traffic flows.

9.6.4 In terms of potential cumulative effects, , a pumped storage facility (known as Balliemeanoch) is planned approximately 4.4 km to the south of the village of Portsonachan and 9 km northwest of Inveraray, approximately 12km from the Proposed Development. The EIA Scoping Report for Balliemeanoch, dated February 2022, has been reviewed and it is considered that in transport terms, there are unlikely to be cumulative effects in combination with the Proposed Development due to the following reasons:

- Only part of the construction traffic from the Balliemeanoch scheme would route via the A85 and overlap with the construction traffic from the Proposed Development;
- Background traffic flows on the surrounding trunk network on the A85 and A82 are considered very low (as highlighted in **Section 3** of the TA);

- The construction trip generation associated with the Proposed Development as set out in **Section 5** of the TA, is considered to be very low relative to typical volumes on rural trunk roads and within typical daily variation in flows. The construction trip generation for the Balliemanoach scheme is expected to be of a similar scale to the trip generation from the Cruachan Expansion Project; and
 - The peak periods of construction at Cruachan and Balliemanoach are not expected to overlap.
- 9.6.5 Based on the above, no assessment of the Balliemanoach pumped storage scheme has been undertaken.
- 9.6.6 No committed highway improvements have been identified based on the scoping discussion with Transport Scotland and Argyll & Bute Council.

9.7 Embedded Mitigation

- 9.7.1 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:
- The construction process for the Proposed Development has considered: 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 minimising workforce travel – such as the use of local accommodation. The works programme will be reviewed to seek to reduce effects on sensitive receptors where reasonably practicable;
 - Prior to any remediation or construction taking place a Construction Traffic Management Plan (CTMP) 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;
 - The construction sequence and traffic management related to the construction of the main access tunnel portal will be managed to minimise impacts on vulnerable road users and minimise disruption to vehicles on the A85. A temporary signalised pedestrian crossing on the A85 will be provided near the location of the Falls of Cruachan railway station during the construction of the main access tunnel portal. Further details of the traffic management measures, and the pedestrian crossing have been included within the TA; and
 - Once operational, the workforce would be encouraging to travel to site by non-car or car share modes of travel where practicable. However, given the limited increase in operational workforce over current staffing levels at Cruachan 1, workforce travel plans or e.g., shuttle busses are not considered necessary. 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.

9.8 Realistic Worst-Case Parameters for Assessment

- 9.8.1 This chapter of the EIA assesses the peak construction traffic of the construction phase of the Proposed Development which provides a worst-case assessment in terms of traffic and transport. Additionally, a number of assumptions have been made regarding the trip generation and trip distribution during the construction phase which have been detailed within **Chapter 4** of the TA. All assumptions made are consistent with a realistic worst-case assessment approach, as detailed in the TA.

- 9.8.2 A summary of the key assumptions and assessment methodology which result in a worst-case scenario include the following:
- The assessment is focused on the peak construction traffic phase of development which includes the following elements of construction: peak construction worker trips; excavated material to be transported offsite; and Upper Control Works Site construction activity;
 - The assessment has assumed that the peaks in workforce numbers and in construction traffic will coincide so as to provide a worst-case scenario. However, in reality, the peak in workforce numbers will not coincide with the peak in construction traffic, since the peak in construction traffic will occur during main tunnel excavation, which requires fewer workers;
 - The assessment considers an 'all by road' scenario where 100% of the residual spoil is exported off-site by road. This represents a worst-case scenario in terms of traffic on the highway network; and
 - It has been assumed that the construction morning and afternoon peak periods align to the network peak periods, this is due to the flat profile of the exported material movements and the assumption that workforce travel would also coincide. This is unlikely to be the case in reality and so the assessment is therefore a worst-case scenario.

9.9 Assessment of Likely Effects

Construction

Assessment Parameters

- 9.9.1 The primary construction activities generating additional traffic movements will be from:
- Export of spoil from the proposed development onto the local road networks for re-use off-site (residual quantity of 1.85M tonnes);
 - Import of material to create the initial stages of the quayside structure (21,700 tonnes); and
 - Daily movements from the construction compound to the main site.
- 9.9.2 Construction of the Proposed Development is anticipated to generate up to 2.30 million tonnes of excavated rock arisings over the 5.5 -year construction period (2024-mid of 2029). An average of 1,600 tonnes per day with peak generation of c. 3,000 tonnes per day. The Excavation Arisings will be in the form of rock 'chippings' ranging from boulders to fines produced by drill and blast techniques.
- 9.9.3 The spoil will be generated through the following primary activities:
- Upper Intake: 332,254 tonnes;
 - Lower Works (underground excavations including excavation of tunnels and power cavern):1,799,360 tonnes; and
 - Lower Works (10% overbreak to ensure a worst-case assessment): 160,291 tonnes.
- 9.9.4 Approximately one fifth of this material (0.45Mt) will be re-used on site. Therefore, there will be a residual volume of 1.85 Mt of spoil which will be re-used off-site.
- 9.9.5 The primary re-use for spoil will be the quayside structure in Loch Awe, which is shown on **Figure 3.1**. It has a depth of about 12 m and a length of 510m. It will require approximately 162,500 tonnes

spoil, 21,700 tonnes which will be imported to form the initial tunnel access and 140,800 tonnes will be from excavation arisings.

- 9.9.6 Approximately 15,000 tonnes spoil could be stored on the quayside structure at any one time, prior to removal by road. The material would be stored under a canopy structure, enclosed on three sides which would prevent runoff and wind-blown silt from entering Loch Awe. The structure is shown on **Figure 3.1**.
- 9.9.7 As previously stated, 100% of the exported construction material to be taken off-site will be transported by road and the peak off-site haulage is expected to be about 2,987 tonnes / day.
- 9.9.8 A heavy goods vehicle (HGV) loading capacity of 20 tonnes, based on a standard rigid tipper HGV, has been assumed in the calculation of construction material vehicle movements. It should be noted that in practice, articulated tipper vehicles with a loading capacity of 28 tonnes are likely to be used, which is aligned with hauliers carrying out similar operations in the study area. This would result in a significantly lower number of HGVs than has been assumed in this assessment. However, 20 tonne vehicles have been assumed as a worst-case assessment at the request of consultees.
- 9.9.9 Based on the above, 300 daily HGV movements (150 trips) are expected to occur with the export of material off-site, during the peak in construction traffic. All exported construction material will be transported off-site from the Lower Control Works site, as explained in Section 4.
- 9.9.10 The construction material HGV movements are expected to have a flat profile over 8-hours between 09:00-17:00. This equates to 15 HGV arrivals and 15 HGV departures per hour during the peak shifts.
- 9.9.11 The transport of concrete from the lower site construction compound to the Lower Control Works site would be required. This is expected to result in 100 daily HGV movements (50 trips) between the lower site construction compound and the Lower Control Works site during the peak period of construction in 2026. It is noted that there may be concrete batching plant on the Quayside in Loch Awe, although assuming transport from the construction compound is a worst case.
- 9.9.12 The transport of concrete would be made using standard concrete mixer HGVs. The HGV movements are expected to have a flat profile over 8-hours between 09:00-17:00. This equates to 13 HGV arrivals and 13 HGV departures per hour.

Upper Control Works Trip Generation

- 9.9.13 There will be construction activity related to the Upper Control Works site during the peak in construction traffic. The expected daily vehicle movements associated with these activities include the following:
- 24 vehicle/ light goods vehicle (LGV) movements (12 trips); and
 - 16 HGV movements (8 trips).
- 9.9.14 The vehicle movements at the Upper Control Works site are expected to have a flat profile across the 08:00 – 18:00 working shift. This equates to 2 movements in and 2 movements out per hour during the period.

Severance

- 9.9.15 **Table 9.15** shows the percentage change in average daily traffic flows on the links assessed. It compares traffic flows of the 2026 Future Baseline with 2026 With Development scenario.

Table 9.15: Construction Phase - Severance

Link	Direction	Daily Construction Traffic Trips	% Change in Link AADT
L1: A85 (Cruachan Power Station)	EB	160	6.7%
	WB	160	6.6%
	Combined	320	6.6%
L2: St Conan's Road	NB	26	26.7%
	SB	26	26.7%
	Combined	52	26.7%
L3: A85 (Loch Awe)	NB	232	12.8%
	SB	232	12.7%
	Combined	464	12.8%
L4: A819	NB	0	0.0%
	SB	0	0.0%
	Combined	0	0.0%
L5: A85 (Dalmally)	EB	160	11.0%
	WB	160	11.2%
	Combined	320	11.1%
L6: A85 (west of A82)	EB	160	11.4%
	WB	160	11.7%
	Combined	320	11.6%
L7: A82 (Tyndrum)	NB	160	4.6%
	SB	160	4.7%
	Combined	320	4.7%
L8: A82 (south of Tyndrum)	NB	160	4.6%
	SB	160	4.7%
	Combined	320	4.7%
L9: A82 (north of A85)	NB	0	0.0%
	SB	0	0.0%
	Combined	0	0.0%

- 9.9.16 As shown, the maximum percentage increase in traffic flows across all links is 26.7% which occurs at L2: St Conan's Road with the remaining links having a percentage increase in traffic flows of under 12%. Thus, the percentage increase across all links falls below the IEMA threshold of 30% (as outlined in **Table 9.2**), resulting in a **Negligible** magnitude of impact in terms of severance and hence a **Negligible** significance of effect.

Driver Delay

Driver Delay at Junctions

- 9.9.17 There are three junctions within the study area that are considered to have the potential to experience driver delay impacts as a result of the Proposed Development. These are A85/ St Conan's Road, A85/ Cruachan Power Station Access Road (main site access) and A85/Proposed Secondary Site Access Road. As set out in **Section 6.5** of the TA, background traffic flows on the A85 in 2026 (peak period of construction), at the location of the three junctions, are estimated to be 411 vehicles

(2-way) in the AM peak hour and 464 vehicles (2-way) in the PM peak hour. These are considered to be low levels of traffic flow on a trunk road and are significantly lower than the typical capacity. A85 is a rural route and as such saturation levels for traffic lanes of this type are generally considered to be in excess of 1500 passenger car units per hour before congestion is anticipated.

- 9.9.18 As reported within **Section 5** of the TA, the peak hourly trip generation across all access points, associated with the peak period of construction, would be 79 vehicles (2-way) across both the AM and PM peak hours. This, combined with the low background traffic flows on the A85, would result in very small flow increases at the three junctions on the A85 in the AM and PM peak hours, with all junctions expected to operate comfortably within capacity. No significant increases to driver delay are therefore expected. It should also be noted that although for the purpose of assessment, the network peak hours have been assumed to coincide with the construction phase peak hours of trip generation, in reality the peak construction traffic vehicle movements are expected to occur outside of network peak hours.
- 9.9.19 Overall, it is considered that the Proposed Development traffic at the junctions of A85/ St Conan's Road, A85/ Cruachan Power Station Access Road and A85/Proposed Secondary Site Access Road would cause a **Negligible** magnitude of impact in terms of driver delay during the construction phase of the Proposed Development, which would result in a **Negligible** significance of effect.

Driver Delay on A85 During Construction of the Main Access Tunnel Portal

- 9.9.20 The construction of the main access tunnel portal will require temporary traffic management on the A85. As part of this work, signalised shuttle working will be required during the A85 bypass construction and subsequently the bridge construction stages of the construction sequence, lasting approximately 2-3 months. Details of the construction sequence and traffic management are provided in **Section 4** of the TA.
- 9.9.21 To assess the potential impacts of the traffic management on driver delay, the shuttle working arrangement on the A85 has been modelled on LinSig V3, as detailed in **Section 6.3** of the TA. It should be noted that the shuttle working arrangement includes a signalised pedestrian crossing at its western end. The modelling results indicate an average delay of approximately 38 seconds per vehicle in each direction of the A85. This level of delay is only just over the 30 second threshold for a negligible magnitude of impact and would therefore result in a **small** magnitude of impact in terms of driver delay. This, in combination with the overall 'medium' sensitivity for drivers on L1: A85 (Cruachan Power Station), results in a temporary direct effect of **Minor Adverse** significance, which is considered to be **Not Significant** in EIA terms. It should be noted that outside of the highway peak hours, traffic flows would be lower and therefore delays would be slightly reduced.
- 9.9.22 As set under the IEMA Guidelines, driver delay is only likely to be an issue requiring mitigation where junctions are operating at, close to or beyond capacity. Based on the modelling results, the shuttle working arrangement would operate comfortably within capacity and no further mitigation would be required.

Pedestrian Delay and Amenity

- 9.9.23 As outlined within the methodology section of this Chapter, the assessment of pedestrian delay considers the increase in hourly two-way traffic flows as primary cause for increased walking journey times. The IEMA Guidance thresholds, as set out in **Table 9.3**, have been used for the assessment of pedestrian delay for the 2026 With Development scenario, which is presented in **Table 9.16**.
- 9.9.24 In the links assessed for pedestrian delay, it has been identified that none are forecast to increase above the 1,400 vehicles per hour threshold, which represents the Negligible threshold. Therefore, it is considered that the construction phase of the Proposed Development would cause a **Negligible** magnitude of impact in terms of pedestrian delay and hence a **Negligible** significance of effect.

Table 9.16: Construction Phase - Pedestrian Delay

Link	Average Hourly Flow During Peak Construction (Vehicles)
L1: A85 (Cruachan Power Station)	214
L2: St Conan's Road	10
L3: A85 (Loch Awe)	171
L4: A819	68
L5: A85 (Dalmally)	134
L6: A85 (west of A82)	129
L7:A82 (Tyndrum)	299
L8: A82 (south of Tyndrum)	298
L9: A82 (north of A85)	179

- 9.9.25 Pedestrian amenity is affected by factors including traffic flow, traffic composition and footway or footpath width / separation from traffic. A tentative threshold for judging the significance of changes in pedestrian amenity is described by the IEMA guidance as instances “where traffic flow (or its lorry component) is halved or doubled”.
- 9.9.26 The only link which has doubled its vehicle or HGV component as a result of the Proposed Development, is St Conan's Road. On this link, the HGV component of the AADT values have increased by a multiple of 5 (from 4 HGVs to 20 HGVs). However, this large multiple is solely due to flows on St Conan's Road being very low in the baseline scenario (4 HGVs), thus even a very small increase in HGV movements on this link results in a large change compared to the baseline. The absolute number of daily HGV movements on this link under the 2026 With Development scenario is 20 HGV vehicles. This is considered a very low volume and is expected to have a negligible impact in terms of pedestrian amenity, which is defined as the relative pleasantness of a journey. It is considered that the construction phase of the Proposed Development would cause a **Negligible** magnitude of impact in terms of pedestrian amenity and hence a **Negligible** significance of impact.
- 9.9.27 In terms of both pedestrian delay and pedestrian amenity impacts during the construction of the main access tunnel portal, a signalised pedestrian crossing would be provided at the western end of the shuttle working arrangement, as part of the traffic management, to minimise potential impacts on vulnerable road users and to provide a safe and direct crossing point near the pedestrian desire line between the existing Cruachan Power Station administrative buildings/ visitor centre and the railway station. As such, there would be a temporary **Small Beneficial** magnitude of impact in terms of pedestrian delay and pedestrian amenity during the construction of the main access tunnel portal. This, in combination with the ‘medium’ sensitivity for pedestrians on L1: A85 (Cruachan Power Station), results in a temporary direct effect of **Minor Beneficial** significance, which is **Not Significant** in EIA terms.

Pedestrian Fear and Intimidation

- 9.9.28 As outlined above, an increase in hourly two-way traffic flows or in the proportion of HGV movements can cause adverse effects on pedestrian fear and intimidation. The suggested IEMA threshold guidance for pedestrian fear and intimidation, as shown in Table 9.8, suggests a slight adverse impact if average traffic flows over 18 hours is in the region of 600 to 1200 vehicles per hour or if average 18-hour HGV movements are in the region of 1,000 to 2,000.

9.9.29 **Table 9.17** shows average movements (including arrivals and departures) over 18 hours in vehicles per hour as well as 18-hour two-way HGV flows for the 2026 Future Baseline and 2026 With Development scenarios.

Table 9.17: Construction Phase - Pedestrian Fear and Intimidation

Link	Direction	2026 Future Baseline		2026 With Development	
		Average Movements over 18 Hours (Veh/hr)	Average 18hr HGV Movements (Veh)	Average Movements over 18 Hours (Veh/hr)	Average 18hr HGV Movements (Veh)
L1: A85 (Cruachan Power Station)	EB	132	399	141	553
	WB	134	380	143	534
	Combined	267	779	285	1087
L2: St Conan's Road	NB	5	2	7	10
	SB	5	2	7	10
	Combined	11	4	14	20
L3: A85 (Loch Awe)	NB	100	301	113	505
	SB	102	289	115	493
	Combined	202	590	228	998
L4: A819	NB	48	141	48	141
	SB	46	153	46	153
	Combined	95	294	95	294
L5: A85 (Dalmally)	EB	79	233	88	387
	WB	79	244	88	398
	Combined	158	477	176	785
L6: A85 (west of A82)	EB	75	248	83	402
	WB	71	259	80	413
	Combined	145	507	163	815
L7: A82 (Tyndrum)	NB	186	525	195	679
	SB	177	479	186	633
	Combined	363	1004	381	1312
L8: A82 (south of Tyndrum)	NB	179	357	188	511
	SB	170	367	179	521
	Combined	349	728	366	1036
L9: A82 (north of A85)	NB	111	204	111	204
	SB	105	201	105	201
	Combined	216	404	216	404

- 9.9.30 This, in combination with the 'medium' sensitivity for pedestrians on L1: A85 (Cruachan Power Station), results in a temporary direct effect of **Minor Adverse** significance, which is **Not Significant** in EIA terms.
- 9.9.31 All links, except for L1: A85 (Cruachan Power Station) and L8: A82 (south of Tyndrum), when assessed against the criteria set out in Table 9.9 would not be subject to a change in the level of pedestrian fear and intimidation in the 2026 With Development scenario when compared against the 2026 Future Baseline scenario, resulting in a **Negligible** magnitude of impact and **Negligible** significance of effect.
- 9.9.32 The links L1: A85 (Cruachan Power Station) and L8: A82 (south of Tyndrum) have 2-way 18hr HGV flow below 1000 vehicles in the 2026 Future Baseline scenario, which marginally increase over 1000 vehicles in the 2026 With Development scenario. This pushes the 18hr HGV flow marginally over the 1000 vehicle threshold for Negligible impact and changes the pedestrian fear and intimidation magnitude of impact from Negligible to **Small**. This, in combination with the respective 'medium'

and 'low' sensitivities for pedestrians on L1: A85 (Cruachan Power Station) and L8: A82 (south of Tyndrum), results in a temporary direct effect of **Minor Adverse** significance, which is **Not Significant** in EIA terms.

- 9.9.33 In addition to traffic flow and HGV flow changes, fear and intimidation can also be caused by an increase in traffic speeds. It is not envisaged that the construction of the Proposed Development would lead to any increase in traffic speeds.

Accidents and Road Safety

- 9.9.34 **Section 3.6** of the TA provides a review of the road traffic accident data for the five years between January 2016 to December 2020. The review concluded that no collisions occurred in this period in the vicinity of the proposed construction works on the A85, including the A85 junctions with St Conan's Road and the Cruachan Power Station Access Road.
- 9.9.35 As set out previously, the total two-way daily trip generation during the peak period of construction is estimated to be 326 vehicles. This is considered to be a low level of traffic in the context of surrounding trunk road network and is not considered sufficient to derive a change in the number or pattern of collisions in the study area. As such, the additional vehicle movements generated during the peak period of construction are not expected to have an impact on accidents and road safety.
- 9.9.36 As part of the traffic management for the A85 diversion and bridge construction for the main access tunnel works, a temporary speed limit reduction would be considered, in consultation with Transport Scotland, for the purposes of road and construction worker safety. Additionally, a signalised pedestrian crossing would be provided during the construction of the main access tunnel portal to minimise potential impacts on vulnerable road users and thus on accidents and road safety.
- 9.9.37 Safety audits will be undertaken to review the proposed improvements on St Conan's Road and for the two proposed access points onto the Lower Control Works site, to provide reassurance that these are unlikely to lead to any increases in accidents or reduction in road safety.
- 9.9.38 Overall, the construction phase of the Proposed Development would result in a **Negligible** magnitude of impact and hence a **Negligible** significance of effect.

9.10 Further Mitigation and Enhancement

- 9.10.1 No further mitigation is proposed above and beyond the embedded mitigation proposed in section 9.7.

9.11 Cumulative Effects

- 9.11.1 The Balliemeanoch pumped storage facility is proposed approximately 12km from the Proposed Development. There is no statutory requirement for the Applicant to consider the Balliemeanoch scheme as part of the cumulative impact assessment for the Proposed Development. Despite this, it is considered good practice to consider all publicly available information, given the proximity and similarity of the project. It is considered that, in transport terms, there are unlikely to be cumulative effects in combination with the Proposed Development, as access to and from the pumped storage site at Ford would be via the A816 and A83, based on the publicly available information, and therefore no assessment of the Balliemeanoch pumped storage scheme has been undertaken.

9.12 Referencing

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10 Noise and Vibration

10.1 Introduction

- 10.1.1 This Chapter provides an assessment of the noise and vibration effects associated with the construction and operational phases of the Proposed Development on noise and vibration sensitive receptors, taking into account relevant national, regional and local policy, guidance and regulations.
- 10.1.2 The Chapter describes the methods used to establish the baseline environmental sound conditions which exist in the vicinity of the Site, the potential direct and indirect effects of the Proposed Development arising from noise and vibration, the mitigation measures required to prevent, reduce, or offset these effects, and the remaining residual noise and vibration effects associated with the Proposed Development.
- 10.1.3 The Proposed Development has the potential for noise and vibration effects through construction of the main infrastructure (e.g. tunnels and quayside) and construction traffic noise and through operational noise associated with operational traffic noise.
- 10.1.4 This Chapter has links with other topic chapters, including **Chapter 9 Transport and Access**, where traffic modelling has been used to inform the assessment of construction and operational effects. Where applicable, the effects of noise and vibration on ecological receptors are addressed in **Chapter 8 of** the EIA Report.
- 10.1.5 As development parameters for the Proposed Development have been included in order to provide a degree of design flexibility, each topic specific assessment has tested a realistic worst-case scenario, as set out in this chapter, such that the likely significant impacts arising from the Proposed Development have been adequately assessed.
- 10.1.6 A description of the technical terminology used in this Chapter is provided in **Appendix 10.1** and a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIA Report is provided in **Appendix 1.2**.
- 10.1.7 This chapter is supported by the following appendices:
- **Appendix 10.1:** Glossary of Acoustic Terminology;
 - **Appendix 10.2:** Policy Context, Legislation, Guidance and Standards;
 - **Appendix 10.3:** Instrumentation;
 - **Appendix 10.4:** Sound Time History Graphs; and
 - **Appendix 10.5:** Construction Plant and Equipment Source Sound Levels.
- 10.1.8 This chapter is supported by the following figures:
- **Figure 10.1:** Acoustic Survey and Receptor Locations.

10.2 Policy Context, Legislation, Guidance and Standards

- 10.2.1 A review of the policy context, legislation, guidance, and standards considered relevant to this chapter can be found in **Appendix 10.2**.

10.3 Consultation

- 10.3.1 **Table 10.1** summarises details of consultation, comments and responses received in relation to the Proposed Development.

Table 10.1: Summary of Consultation

Reference	Comment	Response
Scoping Opinion		
Response from Marine and Coastal Development Policy Officer, Argyll & Bute Council	Mitigation measures to abate noise and vibration should be deployed during the construction and operational phase of the Proposed Development. Predicted noise and vibration levels should be detailed within the CEMP and EIA.	Where relevant, predicted noise and vibration levels and appropriate mitigation for the construction and operational phases have been outlined in this Chapter (Section 10.9.).
Argyll and Bute Council (ABC)		
Email correspondence with Mark Parry, Environmental Health Officer, Argyll & Bute Council, dated 05 July 2021	Scope of environmental sound survey agreed. Measurements should be close to receptors as possible, dependent on access.	Revised scope of the environmental sound survey presented in this EIA Report has included relevant additional receptors.

10.4 Methodology

Study Area

- 10.4.1 The Study Area adopted in this assessment includes both residential and non-residential receptors located in close proximity to the Proposed Development and the red line boundary originally presented in the EIA Scoping Report. Furthermore, the Study Area outlined within the Transport and Access chapter (**Chapter 9**) has been considered so that potential noise sensitive receptors (both existing and future) which could be affected by changes in construction and operational traffic levels and associated noise generation are considered. This considers noise sensitive receptors located within a 600 m radius from the red line boundary, as per guidance outlined in the Design Manual for Roads and Bridges (DMRB) LA111. The environmental sound monitoring locations have been agreed with ABC.

Receptors

- 10.4.2 The assessment approach considers the noise impact at the nearest noise and vibration sensitive receptors to the Proposed Development.
- 10.4.3 In this context, receptors are defined as those aspects of the environment which are sensitive to changes in the baseline sound climate, such as existing residential properties, schools, hospitals, etc. The sensitivity of a particular receptor depends upon the extent to which it is susceptible to such changes. Where applicable, the effects of noise and vibration on ecological receptors are addressed in the **Chapter 8** of the EIA Report.
- 10.4.4 Due to the scale of the Proposed Development, and the nature of the surrounding area, a selection of noise and vibration sensitive receptors have been identified to represent the worst-case change in the environmental noise climate, as stated in **Paragraph 10.8.3**. **Figure 10.1** details the approximate locations of the identified receptors along with a reference letter as defined in **Table 10.2**. The sensitivity of the receptors has been defined as per guidance outlined in The Assessment of Noise:

Technical Advice Note (The Scottish Government, 2011). Where the sensitivity of receptors is not defined in The Assessment of Noise: Technical Advice Note, professional judgement has been used.

Table 10.2: Noise and Vibration Sensitive Receptors

Receptor Reference	Description of Receptor	Type of Receptor	Sensitivity of Receptor
R1	Dwelling located at Tervine House	Residential including Private Gardens	High
R2	Tervine Fish Farm	Commercial, Business and Service	Low
R3	1 Railway Cottage, Falls of Cruachan	Residential including Private Gardens	High
R4	Cruachan Visitor Centre	Visitor Attraction	Medium
R5	Cruachan Power Station	Energy Production	Low
R6	Dwellings on the A85	Residential including Private Gardens	High
R7	Dwellings on St. Conan's Road and the A85, Lochawe (including Tradewinds B&B)	Residential including Private Gardens	High
R8	St. Conan's Kirk	Place of Worship	High
R9	Dwellings on the A85	Residential including Private Gardens	High
R10	Dwellings on the A85 (including 2 Railway Cottages)	Residential including Private Gardens	High
R11	Lochawe Village Centre	Residential including Private Gardens Hotel Accommodation Commercial, Business and Service	High
R12	Dwellings on the A85 (including Cruachan Buildings)	Residential including Private Gardens	High
R13	Kilchurn Castle	Historic Ruin	Medium
R14	Dwelling at Tigh Na Mhoille	Residential including Private Gardens	High
R15	Castle's Farm	Residential including Private Gardens Agricultural	High

Baseline Data Collection

Baseline Sound Monitoring Methodology

- 10.4.5 An unattended environmental sound survey was undertaken between approximately 09:00 hours on Wednesday 15 December 2021 until approximately 13:00 hours on Wednesday 22 December 2021

in order to determine the existing sound climate at locations considered representative of the nearest noise sensitive receptors.

- 10.4.6 The survey was undertaken over a 7-day period to obtain measurements representative of the existing sound climate during a typical weekday and weekend.
- 10.4.7 The sound level meters were located in environmental cases, with the microphones connected to the meters via an extension cable. The microphones were fitted with the manufacturers' windshields.
- 10.4.8 The instrumentation used in the survey (including calibration information) is listed in **Appendix 10.3**.
- 10.4.9 Field calibrations were performed before and after the measurements with no significant fluctuations recorded (< 0.3 dB). Calibration certificates are available upon request.

Measurement Locations

- 10.4.10 Unattended sound measurements were undertaken in eight locations considered representative of the existing sound climate at the nearest noise sensitive receptors.
- 10.4.11 The measurement positions are detailed in **Figure 10.1** and described in **Table 10.3**.

Table 10.3: Description of Measurement Locations

Position	Description
P1	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole, approximately 30 m to the south of Loch Awe and approximately 95 m from Tervine Fish Farm.
P2	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole at Cruachan Visitor Centre, approximately 40 m from the A85.
P3	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole at 1 Railway Cottage at Falls of Cruachan, approximately 20 m from the A85.
P4	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole in the front garden of 21 St. Conan's Road, approximately 10 m from St. Conan's Road and approximately 25 m from the A85.
P5	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole at Kilchurn Castle, approximately 490 m from the A85.
P6	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole at a dwelling located at Tigh Na Mhoille, approximately 5 m from Stronmilchan Road and approximately 575 m from the A85.
P7	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole at Castle's Farm, approximately 525 m from Stronmilchan Road and approximately 1.25 km from the A85.
P8	The microphone was positioned at an approximate height of 1.5 m above local ground level in free field conditions on an extending pole in the front garden of 2 Railway Cottages, approximately 5 m from the A85.

- 10.4.12 Sound measurements obtained at Position P8 are considered to be representative of residential dwellings located at Receptor R12 (including Cruachan Buildings), as both receptors are located in similar proximity to the A85. Vehicular movements on the A85 are considered to be the dominant noise source at both receptors.
- 10.4.13 Due to the nature of the unattended survey, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, **Table 10.4** describes the weather conditions at the start and end of the unattended survey.

Table 10.4: Meteorological Conditions

Description	Wednesday 15 December 2021	Wednesday 22 December 2021
Temperature (°C)	11	3
Precipitation (mm)	0	0
Cloud Cover (%)	Overcast	60
Wind Description	Gentle Breeze	Light Breeze
Wind Speed (m/s)	5	3
Wind Direction	South	North-west

- 10.4.14 A review of publicly available weather data indicates that rainfall occurred during the following periods¹²:
- Thursday 16 December 2021 between approx. 01:00 and 07:00 hours at a rate of 1 mm/h;
 - Sunday 19 December 2021 between approx. 13:30 and 14:00 hours at a rate of 0.25 mm/h; and
 - Tuesday 21 December 2021 between approx. 08:00 and 09:00 hours at a rate of 0.25 mm/h.
- 10.4.15 Based on the results of the environmental sound survey, sound levels at the measurement positions are not considered to have significantly increased as a result of precipitation during these periods. Therefore, the survey results are considered to be representative of the environmental sound climate at the measurement positions.
- 10.4.16 The L_{Aeq} , L_{A90} and fast-weighted L_{Amax} sound levels were measured over 15-minute periods at all measurement positions.

Assessment

Significance of Impacts

- 10.4.17 In accordance with relevant standards and guidance documents, assessment criteria have been proposed for each noise and vibration source which has been assessed.
- 10.4.18 The Assessment of Noise: Technical Advice Note (The Scottish Government, 2011) provides useful descriptions of adverse effect levels and recommends actions for each significance level. These have been used to inform the noise and vibration significance criteria, as presented in **Table 10.5**.

¹² <https://www.wunderground.com/dashboard/pws/IDALMA4/graph/2021-12-22/2021-12-22/daily> (Accessed 25 January 2022)

Table 10.5: Significance Criteria

	Significance Level	Impact	Action
Significant	Major	Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm.	Prevent
	Moderate	Causes an important change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	Avoid
Not Significant	Minor	Noise can be heard and may cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows more often. Potential for non-awakening sleep disturbance. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Mitigate and reduce to a minimum
	Negligible	Noise can be heard but does not cause any change in behaviour or attitude, e.g. increasing volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	No specific measures required
	No Change	None	

10.4.19 The assessment of the significance of the following effects have been undertaken in accordance with relevant standards and guidance documents detailed in **Chapter 4** of the EIA Report.

- Noise and vibration due to construction activities within the Site;
- Noise due to construction traffic; and
- Noise and vibration due to operational traffic on the surrounding network.

10.4.20 Mitigation measures have been identified where the proposed assessment criteria have been exceeded and significant effects are likely.

Construction

Construction Noise

10.4.21 BS 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' does not provide specific limits for construction noise, but it does define methods of assessing the significance. The standard also provides information on construction noise and vibration reduction measures promoting a 'Best Practice Means' approach to control noise and vibration. A method for determining the sound levels associated with construction activities is also detailed and considers the numbers and types of equipment operating, their associated Sound Power Level (Lw), and the distance to receptors, along with the effects of any screening.

10.4.22 As set out in **Chapter 3** of this EIA Report, construction hours are expected to be:

- Monday to Saturday between 07:00 hours and 19:00 hours; and
- Sundays between 07:00 hours and 12:00 hours.

- 10.4.23 Underground construction works are expected to take place 24 hours a day. It has been assumed that no construction work will take place on Sundays or Bank Holidays. Agreement would be sought from ABC for any works occurring outside of these times.
- 10.4.24 According to the DMRB, assessment criteria for construction noise should be established for all noise sensitive receptors within the construction activity study area, with reference to baseline noise levels. The construction noise baseline can be determined through the use of one or more of the following methods:
- Noise measurements based upon actual survey data;
 - Predicted noise levels; and
 - Existing noise mapping undertaken by public bodies or as part of other developments.
- 10.4.25 The magnitude of impacts associated with construction noise should be determined in accordance with the guidance outlined in **Table 10.6** below.
- 10.4.26 The Baseline Noise Level (dB $L_{Aeq,T}$) is derived from the results of the environmental sound survey (where T is equal to 12 hours Monday to Saturday and is equal to 5 hours on Sunday) and the threshold levels is determined as per guidance outlined in BS5228-1:2009+A1:2014 Section E3.2 and Table E.1.

Table 10.6: Magnitude of Impacts for Construction Noise Levels

Magnitude of Impact	Construction Noise Level	
	High Sensitivity Receptors	Medium and Low Sensitivity Receptors
Major	Above or equal to Threshold Level + 5 dB	Above or equal to Threshold Level + 5 dB
Moderate	Above or equal to Threshold Level and below Threshold Level + 5 dB	Above or equal to Threshold Level and below Threshold Level + 5 dB
Minor	Above or equal to Baseline Noise Level and below Threshold Level	Above or equal to Baseline Noise Level + 10 dB and below Threshold Level
Negligible	Below Baseline Noise Level	Below Baseline Noise Level + 10 dB

- 10.4.27 The DMRB also states that construction noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:
- 10 or more days or nights in any 15 consecutive days or nights; and
 - A total number of days exceeding 40 in any 6 consecutive months.

Construction Vibration

- 10.4.28 The magnitude of impacts associated with construction vibration should be determined in accordance with the guidance outlined in **Table 10.7** below.

Table 10.7: Magnitude of Impacts for Construction Vibration Levels

Magnitude of Impact	Vibration Level (PPV)
Major	Above 10 mm/s
Moderate	Between 1.0 mm/s and 10 mm/s
Minor	Between 0.3 mm/s and 1.0 mm/s
Negligible	Below 0.3 mm/s

- 10.4.29 The DMRB also states that construction vibration shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; and
- A total number of days exceeding 40 in any 6 consecutive months.

Construction Road Traffic Noise

- 10.4.30 The assessment of construction traffic noise associated with the Proposed Development on the existing sound climate in the surrounding area is largely based on the change in sound levels at existing noise sensitive receptors due to a change in the volumes of road traffic generated by construction traffic.
- 10.4.31 The following scenarios have been modelled in accordance with DMRB guidance:
- Existing conditions and traffic growth without construction traffic (Base 2021 plus growth); and
 - Existing conditions and traffic growth with construction traffic (Base 2021 plus growth plus construction vehicles).
- 10.4.32 DMRB provides a magnitude scale of impact for the change in noise levels in the short-term. This is summarised in **Table 10.8** below and compared against adverse effect levels.

Table 10.8: Magnitude of Impacts for Change in Noise Levels Due to Construction Road Traffic

Magnitude of Impact	Change in $LA_{10,18\text{hour}}$ Noise Levels due to Construction Road Traffic
Major	Above 5
Moderate	Between 3 and 4.9
Minor	Between 1 and 2.9
Negligible	Between 0.1 and 0.9
No Change	0

- 10.4.33 The DMRB also states that construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:
- 10 or more days or nights in any 15 consecutive days or nights; and
 - A total number of days exceeding 40 in any 6 consecutive months.

Blasting

- 10.4.34 The magnitude of impacts associated with blasting vibration should be determined in accordance with the guidance outlined in **Table 10.9** below, based on up to three blast vibration events per day. This is based on guidance outlined in BS6472-2:2008.

Table 10.9: Magnitude of Impacts for Blasting Vibration Levels

Magnitude of Impact	Vibration Level (PPV)
Major	Above 20.0 mm/s
Moderate	Between 10 mm/s and 20 mm/s
Minor	Between 6.0 mm/s and 10.0 mm/s
Negligible	Below 6.0 mm/s

- 10.4.35 In accordance with Section 6.2 of BS6472-2:2008, the above blasting vibration levels can be adjusted should the number of blasting events exceed three per day by applying a multiplying factor, F , using the below formula:
- 10.4.36 When more than three blast vibration events occur in a working day the following relationship should be used to apply an additional multiplying factor, F , to reduce the satisfactory magnitudes.

$$F = 1.7N^{0.5}T^{-d}$$

Where:

N is the number of blast vibration events per day (and is greater than 3);

T is the blast vibration event duration typical for the site or sites; and

d is zero where T is less than 1 s, 0.32 for wooden floors and 1.22 for concrete floors.

Operation

Transportation Noise Affecting Existing Receptors

- 10.4.37 The assessment of noise at existing noise sensitive receptors associated with the Proposed Development is primarily concerned with the change to the existing sound climate resulting from the change to traffic flows on the surrounding road network.
- 10.4.38 The 'short-term' future year assessment criterion as outlined in DMRB has been used for the assessment of noise at existing noise sensitive receptors associated with the Proposed Development.
- 10.4.39 **Table 10.10** details the Classification of Magnitude of Impacts in the short term, as outlined in the DMRB.

Table 10.10: Magnitude of Impacts for Change in Noise Levels Due to Operational Road Traffic

Magnitude of Change	Increase in $L_{A10,18\text{hour}}$ Noise Levels Due to Operational Road Traffic (dB)
Large	Above 5
Medium	Between 3 and 4.9
Small	Between 1 and 2.9
Negligible	Between 0.1 and 0.9
No Change	0

Limitations

- 10.4.40 The environmental sound survey was undertaken over a period of one week, where typical traffic flows were expected (i.e., during school term time). The acoustician noticed nothing unusual in terms of the noise climate at the time of the survey. This report refers to, within the limitations stated, the environment of the Site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the Site and surrounding area at different times.
- 10.4.41 The survey was undertaken over a seven-day period, during a period of relaxed restrictions (i.e., when schools were open) during the COVID-19 pandemic. A review of freely available traffic count data undertaken by Transport Scotland and provided to us by the Applicant's transport consultants indicates a difference in the Average Daily Traffic (ADT) flows between 2019 and 2021 of around 800 vehicle movements, which is likely to equate to around a 1 dB difference in the $L_{A10,18\text{hour}}$ level at the receptors. Therefore, it is considered that the results of the environmental sound survey are representative of the typical environmental sound climate at the receptors.

10.5 Current Baseline Conditions

Environmental Sound Survey Results

- 10.5.1 A summary of the unattended environmental sound survey results is presented in **Table 10.11**. Time-history graphs detailing the full results of the unattended survey is contained in **Appendix 10.4**.

Table 10.11: Summary of Unattended Environmental Sound Survey Results

Position	Period, (T)	Measured Sound Levels (dB)		
		L _{Aeq,T}	L _{A90,15minutes} *	
			Typical	Minimum
P1	Daytime (07:00–23:00 hours)	51	49	34
	Night-time (23:00–07:00 hours)	43	40	33
P2	Daytime (07:00–23:00 hours)	55	39	32
	Night-time (23:00–07:00 hours)	48	36	32
P3	Daytime (07:00–23:00 hours)	58	34	30
	Night-time (23:00–07:00 hours)	49	34	29
P4	Daytime (07:00–23:00 hours)	51	35	26
	Night-time (23:00–07:00 hours)	45	29	26
P5	Daytime (07:00–23:00 hours)	40	29	24
	Night-time (23:00–07:00 hours)	35	25	23
P6	Daytime (07:00–23:00 hours)	50	35	31
	Night-time (23:00–07:00 hours)	41	32	31
P7	Daytime (07:00–23:00 hours)	49	32	25
	Night-time (23:00–07:00 hours)	45	26	25
P8	Daytime (07:00–23:00 hours)	58	43	40
	Night-time (23:00–07:00 hours)	52	43	40

* Calculated based on the statistical distribution of background sound levels during the measurement period in general accordance with guidance in BS 4142:2014+A1:2019.

Environmental Sound Climate

- 10.5.2 Due to the nature of the unattended sound survey, it is not possible to accurately comment on the dominant noise sources or specific noise events during the entire survey period. However, **Table 10.12** details the dominant noise sources observed at the beginning and end of the survey period.

Table 10.12: Dominant Noise Sources

Position	Dominant Noise Source
P1	Noise associated with the operation of a nearby fish farm. Distant traffic noise from vehicular movements on the A85 audible.
P2	Vehicular movements on the A85
P3	Vehicular movements on the A85
P4	Vehicular movements on the A85
P5	Noise associated with people visiting Kilchurn Castle. Distant traffic noise from vehicular movements on the A85 audible.
P6	Distant traffic noise from vehicular movements on the A85. Vehicular movements on Stronmilchan Road dominant when occurring.
P7	Noise associated with the operation of the farm, Distant traffic noise from vehicular movements on the A85 audible.
P8	Vehicular movements on the A85

- 10.5.3 Operational data from Cruachan 1, which indicates the times and durations that the power station was in operation during the environmental sound survey, was reviewed. This data indicates that noise levels associated with the operation of Cruachan 1 has not affected the results of the environmental sound survey and are likely to be inaudible at the measurement positions.

10.6 Baseline Evolution and Expected Future Baseline

- 10.6.1 In the absence of the Proposed Development, the noise climate in and around the Site has the potential to change as a result of local development and a change in traffic flows.
- 10.6.2 A 25% increase in traffic flows would be required to result in a 1 dB increase in sound levels, described as a negligible magnitude of impact within guidance outlined within the DMRB. A 100 % increase in traffic flows would be required to result in a 3 dB increase in sound levels, described as a minor magnitude of impact within the DMRB. It is unlikely that traffic flows on the surrounding road network would increase by these levels in the absence of the Proposed Development. Therefore, noise impacts associated with any change in traffic flows in the absence of the Proposed Development and cumulative developments are likely to be insignificant and have therefore not been considered further.

10.7 Embedded Mitigation

Construction

- 10.7.1 A number of management practices would be adopted during the construction phase. These would be secured through a CEMP, an outline of which is included in [Appendix 3.1](#) of the EIA Report. This would outline noise mitigation measures and management practices that could be adopted for site-based construction activities. Typical measures that could be included within a CEMP include:
- Locating noisy plant and machinery as far away as possible from neighbours or sensitive environmental receptors, as identified through pre-construction noise baseline surveys;
 - Selecting quiet or low noise equipment e.g., use of silent generators;
 - Using acoustic screens and enclosures;

- Turning off plant and equipment, when not in use;
- Control of construction times and durations;
- Ensuring site working hour restrictions are effectively communicated to all site staff and subcontractors to ensure strict conformance to working hour restrictions;
- Conducting regular means of communication and liaison with potentially affected parties to minimise the potential for noise and vibration nuisance related complaints;
- Agreeing construction works outside of daytime hours with ABC;
- Restriction of number of plant items in use at any one time;
- Frequent maintenance of plant and equipment;
- Where practical, carry out loading and unloading activities at a suitable distance away from residential dwellings;
- Avoiding excessive revving of engines, unnecessary use of reversing alarms and restricting construction vehicle movements to sociable daytime hours;
- Closing of compressor, generator and engine compartment doors when in use or idling;
- Careful lowering of materials/equipment and the minimisation of drop heights; and
- Undertaking piling work with a method that minimises the transmission of noise (and vibration) to residential dwellings.

10.7.2 Measures specific to blasting may include:

- Maintaining good relations with the public and advising occupiers of sensitive properties of any imminent blasting;
- Publicising blasting times and avoid blasting outside of these;
- Good blast design to reduce vibration and air overpressure from blasting, which may include practical measures such as:
 - Use of free faces (a rock surface that enables rock to expand when blasted) to relieve blasting energy;
 - Ensuring appropriate burden to avoid over or under confinement of the charge;
 - Accurate setting out and drilling;
 - Appropriate charging;
 - Stemming with appropriate material such as sized gravel or stone chippings;
 - Using delay detonation to ensure smaller maximum instantaneous charges (MICs);
 - Using decked charges and in-hole delays;
 - Blast monitoring to enable adjustment of subsequent charges;

- Designing each blast to maximize its efficiency and reduce the transmission of vibration; and
 - Avoiding the use of exposed detonating cord on the surface in order to minimize air overpressure.
- 10.7.3 The assessment of potential effects during the construction phase considers the implementation of measures typically outlined within a CEMP.

10.8 Realistic Worst-Case Parameters for Assessment

- 10.8.1 The assessment considers a scenario where road works will occur continuously in sections of the A85 that fall within the Site boundary and at a point on the Site boundary that is located closest to the noise sensitive receptor. The assessment also considers a scenario where other construction activities will occur at the closest point where the main works will occur to the noise sensitive receptor. Calculations have been undertaken over the working hours on weekdays and Saturdays.
- 10.8.2 The maximum project parameters identified in **Chapter 3** of this EIA Report have been used as the basis for the assessment.
- 10.8.3 Due to the scale of the Proposed Development and the nature of the surrounding area, a limited selection of noise sensitive receptors has been identified to represent the worst-case change in the environmental noise climate as detailed in the Assessment Methodology section. As such, not every single noise-sensitive receptor has been included within this assessment and only worst-case receptors have been selected.

10.9 Assessment of Likely Effects

Construction

Construction Noise

- 10.9.1 The construction phase of the Proposed Development is likely to include activities associated with site preparation, foundation/substructure (e.g., for construction compounds), building erection/superstructure, surface level facilitation works for underground construction (e.g. drilling of blast holes), road works (widening of the existing Cruachan 1 access road to accommodate construction traffic and landscaping).
- 10.9.2 Construction noise and vibration is considered a temporary effect.
- 10.9.3 An assessment of noise during the construction stage at varying distances from the Site boundary has been undertaken, based on typical plant noise level data contained within Annex C of BS 5228-1:2009+A1:2014.
- 10.9.4 As the construction of the Proposed Development will be undertaken in phases, calculations of construction activities at the proposed receptors have been considered for each phase of construction. **Appendix 10.5** details the construction plant, equipment and activities used within the assessment.
- 10.9.5 **Table 10.13** details the results of the assessment for typical construction activities, calculated as the $\text{dB } L_{\text{Aeq},12\text{hours}}$ with a minimum distance of 10 m from the activity to the nearest noise sensitive receptor and considers the implementation of measures typically outlined within a CEMP.

Table 10.13: Calculated Indicative Construction Activity Noise Levels at Receptors

Receptor	Site Preparation Works	Foundation Works and Substructure	Building Erection Works and Superstructure	Surface Level Facilitation Works for Underground Construction	Road Works	Landscaping Works
	Sound Pressure Level (dB L _{Aeq,12hours})					
R1	52	48	49	57	53	41
R2	56	52	54	62	57	46
R3	66	62	63	71	67	55
R4	66	62	63	71	67	55
R5	74	70	71	79	75	63
R6	36	32	34	42	53	26
R7	33	29	30	38	81	22
R8	33	28	30	38	59	22
R9	33	29	31	39	51	23
R10	36	32	34	42	42	26
R11	45	41	43	33	41	35
R12	66	62	63	32	33	55
R13	46	41	43	32	36	35
R14	51	47	49	31	31	41
R15	46	41	43	30	30	35

- 10.9.6 Based on the calculated noise levels outlined above and the baseline sound levels as determined in Table 10.6 Table 10.14 assesses the magnitude of impacts for each of the considered construction phases at the receptors.

Table 10.14: Assessment of Construction Noise Magnitude of Impacts

Receptor	Site Preparation Works	Foundation Works and Substructure	Building Erection Works and Superstructure	Surface Level Facilitation Works for Underground Construction	Road Works	Landscaping Works
R1	Minor	Negligible	Negligible	Minor	Minor	Negligible
R2	Negligible	Negligible	Negligible	Minor	Negligible	Negligible
R3	Moderate	Minor	Minor	Major	Moderate	Negligible
R4	Minor	Negligible	Negligible	Moderate	Minor	Negligible
R5	Moderate	Minor	Moderate	Major	Moderate	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Minor	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Major	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Minor	Negligible

Receptor	Site Preparation Works	Foundation Works and Substructure	Building Erection Works and Superstructure	Surface Level Facilitation Works for Underground Construction	Road Works	Landscaping Works
R9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R11	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R12	Moderate	Minor	Minor	Negligible	Negligible	Negligible
R13	Minor	Minor	Minor	Negligible	Negligible	Negligible
R14	Minor	Negligible	Negligible	Negligible	Negligible	Negligible
R15	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

- 10.9.7 Based on the results of the assessment above, road works have the potential to result in effects that are of **temporary direct major adverse** significance at Receptor R7, which is considered to be significant. Construction activities have the potential to result in effects that are of **temporary direct moderate or major adverse** significance at Receptors R3, R4 and R5, which is considered to be significant. Construction activities at other receptors are likely to result in effects that are of **temporary direct minor or negligible adverse** significance, which is considered to be not significant.

Construction Vibration

- 10.9.8 Vibration during the construction phases is likely to be primarily concerned with piling activity associated with the construction of the quayside on Loch Awe.
- 10.9.9 The use of continuous flight auguring, or a similar piling method is likely to minimise likely significant impacts with respect to vibration, as this does not involve driving piles into the ground using impulsive forces.
- 10.9.10 The nearest existing vibration sensitive residential receptor is Receptor 3 (R3 – 1 Railway Cottage, Falls of Cruachan), which falls within the Site boundary and is likely to be approximately 300 m from any potential piling activities.
- 10.9.11 BS5228-2:2009+A1:2014 provides indicative levels of vibration associated with auger piling. These indicate a PPV of 0.2 mm/s at a distance of 9 m from the piling activity. This is below the proposed criteria of 0.3 mm/s at which vibration would be considered to have a negligible magnitude of impact. Vibration levels at receptors further from the Proposed Development are expected to fall further below the proposed criteria.
- 10.9.12 Therefore, as piling activities would likely occur at a greater distance away from the nearest existing vibration sensitive receptor, it is considered that vibration during the construction phase is likely to be of **temporary direct negligible adverse** significance, which is considered not significant.

Construction Road Traffic Noise

- 10.9.13 Based on the information provided to us, it is understood that construction traffic would access the Site using the following road links:
- A85 between Falls of Cruachan and the junction with the A82;
 - A85 to the west of Falls of Cruachan;
 - A819, south of the junction with the A85;

- A82 between north of Tyndrum and 3.5 km south of Tyndrum; and
 - St. Conan's Road.
- 10.9.14 Construction road traffic flows have been provided by the Applicant's transport consultants in terms of the 18-hour Average Annual Weekday Traffic (AAWT), percentage of heavy goods vehicles (HGV) and average speed data for the following assessment scenarios:
- 2026 (Peak Construction Year) Future Baseline without construction traffic; and
 - 2026 (Peak Construction Year) Future Baseline with construction traffic.
- 10.9.15 Based on the construction traffic flows provided, an assessment of the change in the $L_{A10,18\text{hour}}$ sound level between the above traffic scenarios has been undertaken:
- 10.9.16 **Table 10.15** outlines the results of the change in $L_{A10,18\text{hour}}$ Sound level assessment associated with construction traffic.

Table 10.15: Results of Construction Road Traffic Noise Assessment

Road Link	Direction	Change in dB $L_{A10,18\text{hour}}$ Sound Level (dB)
A85 (at Falls of Cruachan)	Two-Way	1
St. Conan's Road	Two-Way	3
A85 (between Loch Awe Village and Kilchurn Castle)	Two-Way	1
A819 (south of A85 Junction)	Two-Way	0
A85 (between B8074 Junction and Arrivain)	Two-Way	1
A85 (5.5 km west of Tyndrum)	Two-Way	1
A82 (between A85 Junction and North of Tyndrum)	Two-Way	1
A82 (3.5 km south of Tyndrum)	Two-Way	1
A82 (north of A85 Junction)	Two-Way	0

- 10.9.17 The results of calculations indicate that the change in dB $L_{A10,18\text{hour}}$ sound level is likely to be 3 dB at Receptor R7, which is a moderate magnitude of impact and is likely to be of **temporary direct moderate adverse** significance, which is considered significant.
- 10.9.18 The traffic flows for St. Conan's Road used within the assessment of construction road traffic noise at Receptor R7 are considered to be low (less than 1000 AAWT 18 hour), based on guidance within CRTN. CRTN notes that calculations of noise levels associated with traffic flows less than 1000 AAWT 18 hour have the potential to be unreliable and care should be taken when interpreting the calculated noise level within the assessment. The assessment undertaken assumes that the sound climate at the receptor is dominated by road traffic using St. Conan's Road. However, in reality and based on the engineer's experience on-site during the survey, other sound sources contribute to the sound climate on St. Conan's Road close to Receptor 7 (i.e., the A85). On this basis, the change in sound level from vehicle movements along St. Conan's Road is a worst-case indicator of the construction traffic noise impact at Receptor 7 and receptors represented by Receptor 7, as the change in sound level from construction traffic noise is likely to be less than calculated and presented in Table 10.16.
- 10.9.19 The results of calculations indicate that the change in dB $L_{A10,18\text{hour}}$ sound level is likely to be 1 dB at Receptors R3, R4, R5, R6, R8, R9, R10, R11, R12 and R13, which is a minor magnitude of impact and is likely to be of **temporary direct minor adverse** significance, which is considered insignificant.

- 10.9.20 The results of calculations indicate that the change in dB LA10,18hour sound level at other receptors is likely to be less than 1 dB, which is a negligible magnitude of impact and is likely to be of **temporary direct negligible adverse** significance, which is considered insignificant.

Blasting

- 10.9.21 The construction of tunnels, power caverns and shafts at the Proposed Development would be undertaken using a 'drill and blast' method. This is likely to be primarily associated with the construction of the proposed main access tunnel, tailrace access tunnel, access shafts and spoil handling tunnels located between the proposed tailrace at Loch Awe and Cruachan Reservoir. The proposed tunnels, power caverns and shafts are indicated in **Figure 3.3 and 3.4 in Appendix 1.1**.
- 10.9.22 In the absence of trial blasting measurements, noise and vibration levels associated with blasting has the potential to be of **temporary direct major adverse significance**, which is considered significant.
- 10.9.23 The noise and vibration impact of blasting should be considered further once the outcome of trial blasting is known, with mitigation then agreed to prevent a significant impact from occurring.

Operation

Transportation Noise Affecting Existing Receptors

- 10.9.24 Major road links close to the Proposed Development include the A85.
- 10.9.25 Based on assumptions in relation to increased staffing at the Site as a result of the Proposed Development, traffic flows on the surrounding network associated with the operational phase of the Proposed Development (the 'Do Something' scenario) are unlikely to increase significantly from those expected in the absence of the Proposed Development (the 'Do Minimum' scenario). The Proposed Development is likely to generate between approximately 5 and 10 additional vehicles, which falls within the typical daily variations in baseline traffic flows on the surrounding road network.
- 10.9.26 As outlined in Section 10.6 of this Chapter, a 25% increase in traffic flows would be required to result in a 1 dB increase in sound levels, described as a negligible magnitude of impact within guidance outlined within the DMRB. A 100 % increase in traffic flows would be required to result in a 3 dB increase in sound levels, described as a minor magnitude of impact within the DMRB.
- 10.9.27 Therefore, vehicle generation associated with the operational phase of the Proposed Development is unlikely to significantly increase the dB LA10,18hour sound level at nearby existing receptors. As such, the impact of transportation noise at the nearest noise sensitive receptors likely to be of **negligible adverse direct** significance, which is considered not significant.

10.10 Further Mitigation and Enhancement

Construction

Construction Noise

- 10.10.1 As indicated by the results in **Tables 10.14 and 10.15**, if construction activities occur continuously on the Site for the entire 12-hour assessment period road works have the potential to result in effects that are of temporary direct major adverse significance at Receptor R7, which is considered to be significant. Construction activities have the potential to result in effects that are of temporary direct moderate or major adverse significance at Receptors R3, R4 and R5, which is considered to be significant. Construction activities at other receptors are likely to result in effects that are of temporary direct minor or negligible adverse significance, which is considered to be not significant.
- 10.10.2 The above significance of effects considers the use of measures typically included within a CEMP. Best practicable means should be implemented throughout the construction phase to minimise

impacts as far as reasonably practicable, with further provisions made if significant impacts are likely to continue for a period longer than outlined in BS 5228-1:2009+A1:2014 (six months), such as noise insulation and/or temporary rehousing.

Construction Vibration

- 10.10.3 No significant effects have been identified and therefore no further mitigation or enhancement is proposed.

Construction Road Traffic Noise

- 10.10.4 The results of the assessment of construction road traffic noise indicate that significant effects have the potential to occur at Receptor R7.
- 10.10.5 It is likely to be difficult to implement mitigation measures to reduce any potential significant effect at Receptor R7 due to vehicles passing along the public highway on St. Conan's Road. Therefore, significant effects may occur at Receptor R7 and those associated with R7 along St. Conan's Road.

Blasting

- 10.10.6 In the absence of trial blasting measurements, blasting has the potential to be of **temporary direct major adverse** significance, which is considered significant.
- 10.10.7 A detailed assessment should be undertaken once detailed information regarding the methodology and outcome of trial blasting is known in order to determine the noise and vibration impact of blasting at nearby noise sensitive receptors.
- 10.10.8 Subject to the outcome of trial blasting, the likely significance of effects associated with blasting at the nearest noise sensitive receptors has the potential to be reduced to a level that is between **temporary direct negligible** and **moderate adverse** significance.

Operation

Transportation Noise Affecting Existing Receptors

- 10.10.9 No significant effects have been identified and therefore no further mitigation or enhancement is proposed.

10.11 Residual Effects

- 10.11.1 **Table 10.16** below summarises the residual effects for noise and vibration.

Table 10.16: Summary of Noise and Vibration Residual Effects

Receptor	Description of Effect	Classification of Effect	Further Mitigation	Classification of Residual Effect	Significant / Not Significant
Construction					
Receptors R1, R2, R6, R8, R9, R10, R11, R12, R13, R14 and R15.	Noise associated with site preparation works, foundation works and substructure, building erection works and superstructure, underground construction works, road works and landscaping works	Temporary Direct Minor Adverse significance	None Required	Temporary Direct Minor Adverse significance	Not Significant
Receptor R3	Noise associated with site preparation works, underground construction works and road works	Temporary Direct Major Adverse significance	Mitigation included as embedded mitigation.	Temporary Direct Major Adverse significance	Significant
	Noise associated with foundation works and substructure, building erection works and landscaping works	Temporary Direct Minor Adverse significance	None Required	Temporary Direct Minor Adverse significance	Not Significant
Receptor R4	Noise associated with underground construction works	Temporary Direct Moderate Adverse significance	Mitigation included as embedded mitigation.	Temporary Direct Moderate Adverse significance	Significant
	Noise associated with site preparation works, foundation works and substructure, building erection works and superstructure, road works and landscaping works	Temporary Direct Minor Adverse significance	None Required.	Temporary Direct Minor Adverse significance	Not Significant

Receptor	Description of Effect	Classification of Effect	Further Mitigation	Classification of Residual Effect	Significant / Not Significant
Receptor R5	Noise associated with site preparation works, building erection works, underground construction works and road works	Temporary Direct Major Adverse significance	Mitigation included as embedded mitigation	Temporary Direct Major Adverse significance	Significant
	Noise associated with foundation works and substructure and landscaping works	Temporary Direct Minor Adverse significance	None Required	Temporary Direct Minor Adverse significance	Not Significant
Receptor R7	Noise associated with road works	Temporary Direct Major Adverse significance	Mitigation included as embedded mitigation	Temporary Direct Major Adverse significance	Significant
	Noise associated with site preparation works, foundation works and substructure, building erection works and superstructure, underground construction works and landscaping works	Temporary Direct Minor Adverse significance	None Required.	Temporary Direct Minor Adverse significance	Not Significant
All Receptors	Vibration associated with construction activities	Temporary Direct Negligible Adverse significance	None Required	Temporary Direct Negligible Adverse significance	Not Significant
Receptor R7	Noise associated with construction road traffic	Temporary Direct Moderate Adverse significance	Mitigation included as embedded mitigation.	Temporary Direct Moderate Adverse significance	Significant
Receptors R3, R4, R5, R6, R8, R9, R10,		Temporary Direct Minor Adverse significance	None Required	Temporary Direct Minor Adverse significance	Not Significant

Receptor	Description of Effect	Classification of Effect	Further Mitigation	Classification of Residual Effect	Significant / Not Significant
R11, R12 and R13					
Receptors R1, R2, R14 and R15		Temporary Direct Negligible Adverse significance	None Required	Temporary Direct Negligible Adverse significance	Not Significant
All Receptors	Noise and vibration associated with blasting	Temporary Direct Major Adverse significance	Implementation of practical measures. Detailed assessment to determine impacts at receptors.	Temporary Direct Moderate Adverse significance	Significant
Operation					
All Receptors	Transportation noise affecting existing receptors	Negligible Adverse Direct significance	None Required	Negligible Adverse Direct Significance	Not Significant

10.12 Monitoring

Construction

- 10.12.1 A requirement for construction noise and vibration monitoring, and the agreement of monitoring locations and methodology with ABC prior to commencement of development, can be secured as a condition of the Section 36 consent.

Operation

- 10.12.2 No significant adverse residual effects have been identified. Therefore, in accordance with EIA Regulations, no monitoring during the operation phase is required.

10.13 Cumulative Effects

Construction

- 10.13.1 **Chapter 4** of the EIA Report outlines the cumulative developments considered within the assessment of noise and vibration cumulative effects.
- 10.13.2 Any cumulative developments that are under construction or fully constructed before the completion of the Proposed Development are likely to make use of effective mitigation to reduce the impact such that the cumulative impact from the Proposed Development should not be significant regardless of these projects. Each cumulative development is also expected to employ similar noise and vibration mitigation measures, secured by planning condition, and included in a CEMP. Therefore, noise and vibration effects associated with the construction of cumulative developments is likely to be of **negligible adverse** significance, which is considered to be not significant.

Operation

- 10.13.3 A 25% increase in traffic flows would be required to result in a 1 dB increase in sound levels, described as a negligible long-term magnitude of change within guidance outlined within the DMRB LA111 Noise and Vibration. A 100 % increase in traffic flows would be required to result in a 3 dB increase in sound levels, described as a minor long-term magnitude of change within the DMRB and is considered as the level in that minor significant effects are likely to occur.
- 10.13.4 Based on assumptions in relation to increased staffing at the Site as a result of the Proposed Development, there is likely to be between approximately 5 and 10 additional vehicles on the surrounding road network associated with the operation of the Proposed Development. Furthermore, there is unlikely to be a significant increase in traffic flows on the surrounding road network based on a review of nearby cumulative developments. Therefore, noise effects associated with vehicular movements on the surrounding road network as a result of cumulative developments are considered to be not significant.

10.14 Referencing

- Argyll and Bute Council (2015) “Argyll and Bute Local Development Plan”, Argyll and Bute Council Development and Infrastructure.
- Argyll and Bute Council (2019) “Argyll and Bute Proposed Local Development Plan”, Argyll and Bute Council Development and Infrastructure.
- The Scottish Government (2014) “Scottish Planning Policy”, The Scottish Government.

- The Scottish Government (2011) “Planning Advice Note PAN 1/2011”, The Scottish Government.
- Planning (Scotland) Act 2019 (2019), The Scottish Parliament.
- Control of Pollution Act (1974), HMSO.
- Environmental Protection Act (1990), HMSO.
- British Standards Institution (2003) “BS 7445-1:2003. Description and Measurement of Environmental Noise. Guide to Quantities and Procedures”. BSI.
- British Standards Institution (2013) “BS EN 61672-1:2013. Electroacoustics. Sound Level Meters. Specifications” BSI.
- British Standards Institution (2014) “BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1 Noise”. BSI.
- British Standards Institution (2014) “BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2 Vibration”. BSI.
- British Standards Institution (2008) “BS 6472-2:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings Part 2: Blast-Induced Vibration Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2 Vibration”. BSI.
- Scottish Government (2011) *Assessment of noise: technical advice note*. Available at: <https://www.gov.scot/publications/technical-advice-note-assessment-noise/pages/1/> (Accessed 08 February 2022).
- National Highways (2020) “Design Manual for Roads and Bridges LA 111 Noise and Vibration”. National Highways.
- Department of Transport Welsh Office (1988) “Calculation of Road Traffic Noise” HMSO.
- Institute for Environmental Management and Assessment (2014) “IEMA Guidelines for Environmental Noise Impact Assessment 2014, IEMA.

11 Landscape and Visual Amenity

11.1 Introduction

11.1.1 This chapter presents the findings of the Landscape and Visual Impact Assessment (LVIA) and addresses the likely significant effects of the Proposed Development on views obtained by those living, working and visiting in the area, and the wider landscape resource. The LVIA has been undertaken, in accordance with best practice guidance, set out within GLVIA3 (Landscape Institute (LI) / Institute of Environmental Management and Assessment (IEMA), 2013).

11.1.2 The chapter describes the methods used to establish the baseline landscape and visual conditions which exist in the vicinity of the Site, the potential direct and indirect effects of the Proposed Development on these conditions, the mitigation measures required to prevent, reduce or offset these effects, and the remaining residual impacts associated with the Proposed Development.

11.1.3 The chapter is supported by the following figures and appendices:

- Technical **Appendix 11.1**: Figures including:
 - **Figure 11.1**: Zone of Theoretical Visibility;
 - **Figure 11.2**: Designated and Protected Landscapes;
 - **Figure 11.3**: Landscape Character;
 - **Figure 11.4**: Visual Receptors;
 - **Figure 11.5**: Indicative Landscape Mitigation Proposals;
 - **Figure 11.6**: Developments included in the Cumulative Assessment;
 - **Figure 11.7** (a-d): Visualisation of Proposed Upper Intake Structure from Cruachan Reservoir Track;
 - **Figure 11.8** (a-d): Visualisation of Proposed Quayside Structure from above Tervine; and
- **Technical Appendix 11.2**: Visual Receptor Assessment.

Landscape and Visual Effects

11.1.4 Although closely related, landscape and visual effects differ, and are considered separately in this chapter for clarity and robustness.

Landscape Effects

11.1.5 The character of the landscape relates to the natural processes and human activities that have been at work overtime to shape the land to its present form. Factors contributing to landscape character include topography, vegetation cover, sense of space or enclosure and past and present land use. Landscape character and resources are considered to have an importance in their own right and are valued for their intrinsic qualities. Landscape effects may occur when elements of the landscape

which contribute to its key characteristics are changed, through for example the introduction of new built forms of development, removal of existing features or changes to experiential qualities.

Visual Effects

- 11.1.6 Visual amenity relates to the way in which people visually experience the surrounding landscape. Visual effects may occur through the introduction into established views of new features which modify the existing structure, scale, and composition of the view. Visual effects may also occur where existing features in the view are removed or altered.

Photomontages

- 11.1.7 Two photomontages have been produced to support the LVIA. These show the anticipated appearance of the Proposed Development after around 10 years post construction. The photomontages in **Appendix 11.1** show the upper intake structure (**Figure 11.7 (a – d)**) from across the Cruachan Reservoir, and the quayside (**Figure 11.8 (a-d)**) from the opposite side of Loch Awe near Tervine. The photomontages are supportive of the LVIA, intended to show the appearance of the Proposed Development and have been located to give a representative view of how these structures would appear within the landscape setting. These locations have not been considered in the assessment as particular viewpoints.

11.2 Policy Context, Legislation, Guidance and Standards

- 11.2.1 The assessment has taken account of national, regional, and local policy and guidance relating to landscape character and visual amenity relevant to the Proposed Development as follows:

National

- 11.2.2 National planning policy and guidance relevant to landscape and renewable energy includes:
- National Planning Framework for Scotland 3 (NPF3) – Section 4 of this central piece of government strategic policy expresses and aim to safeguard the landscape, and in particular those areas identified as nationally important including National Scenic Areas (NSAs), National Parks and wild land;
 - Scottish Planning Policy (SPP) – The SPP sets out national policy and requirements for local development planning. It identifies an aim to facilitate positive change while maintaining and enhancing distinctive landscape character and sets out the basis for local landscape designations identified by local planning authorities to protect locally or regionally valued landscapes, although notes that the level of protection should not be as high as national or international designations. It also addresses a requirement to identify and safeguard the character of Wild Land Areas (WLAs) identified by NatureScot;
 - Scottish Government Online Planning Guidance for Renewables (last updated December 2013)¹³ – Specific government advice relating to the development of different types of renewables projects. This identifies landscape as an important factor to be taken into consideration in planning for all types of renewable energy or energy storage projects;
 - Planning Advice Note 60 – Planning for Natural Heritage (PAN 60), 2000 – Identifies the importance of landscape character and biodiversity and promotes the protection of landscape through safeguarding of protected areas, protection of distinctive landscapes through policy objectives and the promotion of high standards of siting and design and use of materials in development;

¹³ Scottish Government Renewables Planning Advice [ONLINE: Available at <https://www.gov.scot/collections/planning-advice-notes-pans/>]

- Renewable Energy and the Natural Heritage, SNH (NatureScot)¹⁴ Policy Document, 2010 – Comprising NatureScot’s position statement on the development of renewable energy, this document acknowledges that some of Scotland’s landscapes will need to change to accommodate renewable energy but encourages an approach whereby development is guided towards the locations and the technologies most easily accommodated the landscape; and
- Wildness in Scotland’s Countryside, SNH (NatureScot) Policy Statement 02/03 – Recognises the concept of wildness and wild land in Scotland as valued but under pressure resource and identifies the aim of identifying and protecting such areas in the national interest.

Regional

Argyll and Bute Local Development Plan 2015

- 11.2.3 Policy LDP3 of the adopted Argyll and Bute Local Development Plan 2015 comprises the principal policy of relevance to landscape and visual concerns in relation to the Proposed Development. The aim of this policy is to protect, conserve and where possible enhance the built, human, and natural environment. This refers to features and qualities including:
- Woodland, green networks and wild land;
 - The established character and local distinctiveness of the landscape; and
 - The established character of the built environment in terms of its location, scale, form, and design.
- 11.2.4 Policy LDP3 also notes that a development proposal would not be supported where adverse effects, including cumulative effects on the integrity or special qualities of international or nationally designated sites; or, significant adverse effects, on the special qualities or integrity of locally designated natural and built environment sites, would occur.
- 11.2.5 In addition, Policy LDP9 concerns the design and setting of development, requiring development to be sited and positioned to pay regard to the context, and be compatible with the surroundings, particularly within sensitive locations including National Scenic Areas, Areas of Panoramic Quality or Gardens and Designed Landscapes.

Supplementary Guidance

- 11.2.6 Policy LDP3 is supported by various Supplementary Guidance with more specific regard to other landscape and visual considerations including:
- SG LDP ENV 6 Development Impact on Trees / Woodland;
 - SG LDP ENV 9 Development Impact on Areas of Wild Land;
 - SG LDP ENV 12 Development Impact on National Scenic Areas (NSAs);
 - SG LDP ENV 13 Development Impact on Areas of Panoramic Quality (APQs);
 - SG LDP ENV 14 Landscape; and
 - SG LDP ENV 15 Development Impact on Historic Gardens and Designed Landscapes.

¹⁴ In 2020, Scottish Natural Heritage (SNH) rebranded as NatureScot. However when referencing guidance published by the organisation before this date, SNH has continued to be referred to as this was the name under which the guidance was published at that time.

Argyll and Bute Proposed Local Development Plan 2 (LDP2)

- 11.2.7 The LDP2 is currently at examination stage and also comprises relevant policy for the Proposed Development. Section 9 of this plan concerns the aims for a high-quality environment. The safeguarding of areas designated or identified for protection for landscape purposes is central to this section, through Policies 70 (National Scenic Areas), 71 (Local Landscape Areas) and 72 (Wild Land). Further protection is identified to Gardens and Designed Landscapes through Policy 20 and requirements for the protection and where necessary compensation for loss of woodland and trees is discussed in Policies 77 and 78.
- 11.2.8 The LDP2 changes the name of Areas of Panoramic Quality (APQs) identified in the Argyll and Bute Local Development Plan (2015) to Local Landscape Areas. However, there is no change to the boundary of the North Argyll APQ which covers the LVIA study area.

11.3 Consultation

- 11.3.1 The EIA Scoping Opinion for the Proposed Development was issued on 29th October 2021. Issues of relevance to landscape and visual amenity highlighted in the EIA Scoping Opinion are summarised in **Table 11.1: Summary of Consultation**. Following receipt of the EIA Scoping Opinion, further consultation was undertaken with Argyll and Bute Council (ABC) to clarify the scope of cumulative assessment and locations for visualisations. This is also summarised in **Table 11.1**.

Table 11.1: Summary of Consultation

Reference	Comment	Response
EIA Scoping Opinion		
EIA Scoping Opinion, 29 th October 2021	Request to include cumulative assessment of other development as per the request of Argyll and Bute Council.	Cumulative effects are discussed in Section 111.14 of the LVIA.
Scoping Response from Argyll and Bute Council (ABC)		
Scoping Response, 19 th October 2021	Commentary on the cumulative effects of the Proposed Development with proposed electricity transmission works and another proposed pumped storage scheme on Loch Awe should be included.	Cumulative effects are discussed in Section 111.14 of the LVIA.
Scoping Response, 19 th October 2021: Appendix B	The LVIA should take account of the quality and sensitivity of the Loch Awe area, and role as a gateway.	Discussed in Section 111.10.25 and 11.10.26 and with reference to the A85 in Technical Appendix 11.1 .
Scoping Response, 19 th October 2021: Appendix B	Viewpoints from the Cruachan Ridge should be considered as this is a popular and important recreational resource	Assessment of the visual effect on users of the Cruachan Ridge walk is included as Route Receptor R11 in Appendix 11.2 .
Scoping Response, 19 th October 2021: Appendix B	In evaluating the qualities of the APQ and any citation evaluation the wider community and recreational value of the Cruachan Dam, not just in Landscape terms requires to be considered.	The role of the Cruachan dam as a feature of views is considered where relevant for visual receptors and this is considered in assessment of effects on the APQ, included in paragraph 111.10.26 .
Scoping Response from ABC (Marine and Coastal Development Policy Officer)		

Reference	Comment	Response
Scoping Response 24 th September 2021	The applicant is requested to submit a full Landscape and Visual Impact Assessment (LVIA) together with a Zone of Theoretical Visibility (ZTV), including schematics and photomontages from key viewpoints.	This Chapter comprises a full LVIA. A ZTV is included as Figure 1 . Representative photomontages of features at the upper and lower reservoir are included as Figures 11.7 (a – d) and 11.8 (a – d) .
Scoping Response from NatureScot		
Scoping Response, 10 th September 2021	Content with the scope of the LVIA as outlined in the Scoping Report and happy that significant effects to the Loch Etive Mountains WLA would be unlikely	The LVIA has been undertaken in accordance with the Proposed Scope.
Argyll and Bute Council / NatureScot		
Email – dated 7 th December 2021. Response from ABC, 13 th December 2021 Response from NatureScot 7 th December 2021	Further consultation on scope of cumulative assessment and visualisation locations. Confirmation from ABC that cumulative effects with the Balliemeanoch Pumped Storage Scheme should be considered. NatureScot are content with the proposed approach.	Cumulative assessment is included in Section 11.14 .

11.4 Methodology

Assessment Guidance

- 11.4.1 The LVIA has been prepared with reference to the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3) and Landscape Character Assessment: Guidance for England and Scotland (LI / IEMA, 2013).

Professional Judgement

- 11.4.2 GLVIA3 places a strong emphasis on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. As part of this assessment, professional judgement has been used in combination with structured methods and criteria to evaluate landscape value and landscape and visual sensitivity, magnitude and significance of effect. The assessment has been undertaken and verified by two landscape professionals (Chartered Landscape Architects) to provide a robust and consistent approach.

Zone of Theoretical Visibility

- 11.4.3 As an aid to establishing the scope for the LVIA, a ZTV has been produced for the Proposed Development and is presented in **Figure 11.1**. The ZTV is a computer-generated diagram which uses a terrain model to indicate areas from which the Proposed Development would be theoretically visible. The ZTV for the Proposed Development has been generated using ESRI ArcGIS software based on a terrain modelled using Ordnance Survey (OS) T5 DTM data.
- 11.4.4 Separate ZTVs have been produced for the Proposed Development indicating theoretical visibility of the upper intake structure and quayside and are shown on **Figures 11.1**. ZTVs have been produced using the following assumed heights of features:

- Upper intake – Gate hoist structure at 13m above proposed ground level; and
- Quayside – Three operational buildings at 4.5m above proposed ground level.

11.4.5 Whilst the ZTV is a useful tool for the identification of potential effects, it is not indicative of an effect in itself. The ZTV does not take into account the potential screening effects of woodland and other localised features such as buildings, trees or local landform which not captured by the OS data. Nor does it give indication of the way in which a development may relate to its broader landscape context and the receding scale and visibility of features with distance. However, consideration of these aspects is taken into account during the assessment including through professional judgement.

Study Area

11.4.6 As indicated by the ZTVs, potential visibility of the Proposed Development, particularly the permanent features, is likely to be limited by the surrounding landform. A study area has been identified of 3.5 km from the Proposed Development boundary to the north, east and west and extending up to 6km from the Proposed Development to the south in order to contain areas to the south of Loch Awe, where views of the upper inlet / outlet structure and pressure shaft may be obtained. The study area has been confirmed with ABC and NatureScot through the Scoping process and is considered to be sufficient to identify all potential significant effects.

11.4.7 The LVIA study area is shown on **Figure 11.1**.

Baseline Data Collection

11.4.8 Establishment of the baseline conditions has been undertaken through combination of desk study and site appraisal.

Desk Study

11.4.9 The following publications and resources have been referred to:

- Relevant development plans and supplementary planning guidance as described in **section 11.2**;
- The Special Qualities of the National Scenic Areas (SNH, 2010);
- NatureScot Landscape Character Types (LCTs) and Descriptions (SNH, 2019 [online]);
- NatureScot Map of Relative Wildness and Attribute Mapping datasets (SNH, 2014 Natural Spaces [online]);
- NatureScot Wild Land Area Maps and Descriptions (SNH, 2017 Natural Spaces [online]);
- Inventory of Gardens and Designed Landscapes (Historic Environmental Scotland, 2019 [online]);
- OS mapping resources and aerial photography; and
- Other web-based tourism, recreation and information resources (see list of references in section 11.16).

Site Appraisal

11.4.10 Site visits were undertaken by a team of two landscape architects in January 2022, to familiarise with the landscape baseline and context. Information gathered during the desk study was verified on-site and further information gathered where appropriate. The site visits fed into an appraisal of

landscape designations, protected areas and landscape character areas and an understanding of their key characteristics and components, and special qualities.

Landscape Value

- 11.4.11 Establishment of the baseline includes the consideration of the baseline landscape value. The relative value of the landscape is an important consideration in informing later judgement of the significance of effects. Landscape value concerns the perceived importance of the landscape when considered as a whole, and within the context of the study area and is established through consideration of the following factors:
- Presence of landscape designations, other inventory or registered landscapes / landscape features or identified planning constraints;
 - The scenic quality of the landscape;
 - Perceptual aspects, such as wildness or tranquillity;
 - Conservation interests such as cultural heritage features or associations, or if the landscape supports notable habitats or species;
 - Recreational value; and
 - Rarity, either in the national or local context, or if it is considered to be a particularly important example of a specific landscape type.
- 11.4.12 It should be noted that absence of a designation does not necessarily mean that a landscape or component is not highly valued, as factors such as accessibility and local scarcity can render areas of nationally unremarkable quality highly valuable as a local resource.
- 11.4.13 Criteria for the allocation of perceived landscape value are outlined in Table 11.2 below:
- Table 11.2: Landscape Value Criteria

Landscape Value	Criteria
High	<ul style="list-style-type: none"> ■ The landscape is closely associated with features of international or national importance which are rare within the wider context; ■ The landscape is of high scenic quality and forms a key part of an important designated landscape or planning constraint; and/or ■ The landscape is an example of a scarce resource within the local context and is of considerable local importance for its, scenic quality, recreational opportunities or cultural heritage associations.
Medium	<ul style="list-style-type: none"> ■ The landscape is associated with features of national or regional importance which are relatively common within the wider context; ■ The landscape forms part of a designated landscape or is associated with other features of importance but is not rare or distinctive within the local context; and/or ■ The landscape is one of a number within the local context appreciated for its scenic quality, recreational opportunities or cultural heritage associations.
Low	<ul style="list-style-type: none"> ■ The landscape characteristics are common within the local and regional context and the landscape is not associated with any particular features or attributes considered to be important; and/or ■ The landscape is of limited scenic quality and is not appreciated for any recreational or cultural associations.

Assessment

- 11.4.14 GLVIA3 suggests that landscape and visual effects are assessed from a clear understanding of the development proposed and any mitigation measures which are being adopted.
- 11.4.15 The GLVIA3 methodology for landscape assessment involves an appreciation of the existing landscape resource, the susceptibility of its key components to accept the change proposed, and an understanding of the potential effects which could occur and how these could affect these key components.
- 11.4.16 Familiarity with the site and the extent, nature and expectation of existing views is a key factor in establishing the visual sensitivity in terms of the development proposed. The guidelines require evaluation of magnitude of change to views experienced by sensitive receptors, comprising individuals living, working, travelling and carrying out other activities within the landscape, and subsequent evaluation of effect significance.
- 11.4.17 The potential to mitigate adverse effects should also be considered for both landscape and visual assessment.

Identification of Key Landscape and Visual Receptors

- 11.4.18 The identification of landscape and visual receptors is the first step in the analysis of the potential for significant effects to occur. Landscape and visual receptors can be described as follows:
- **Landscape receptors** comprise key characteristics or individual features which contribute to the value of the landscape and have the potential to be affected by the Proposed Development; Landscape receptors are identified through analysis of baseline characteristics when considered in relation to the impacts which might result from a development of the type proposed; and
 - **Visual receptors** comprise individuals experiencing views from locations such as buildings, recognised routes and popular viewpoints used by the public. Potential visual receptors are identified through analysis of desk resources, mapping and field survey, as in **paragraphs 11.4.9 and 11.4.10** above.

Identification of Potential Effects and Mitigation Measures

- 11.4.19 The second step in the assessment process involves the identification of potential effects which may occur as a result of the interaction of the effects of the Proposed Development with the identified landscape and visual receptors.
- 11.4.20 The assessment takes into account direct effects upon existing views, landscape elements, features and key characteristics and also indirect effects which may occur secondarily to changes affecting another landscape component or area. The identification of potential effects is a two-fold process, giving consideration to how these effects may arise from aspects of the Proposed Development and how they may be accommodated by the existing baseline features.
- 11.4.21 Where it is established that potential effects could be limited by mitigation measures, these are also given consideration.
- 11.4.22 Potential effects are evaluated through the allocation of criteria for sensitivity and magnitude.

Landscape and Visual Sensitivity

- 11.4.23 Landscape sensitivity considers the nature of the landscape and its ability to accommodate development of the type proposed without compromising its key characteristics and components. The appraisal of landscape sensitivity involves consideration of the sensitivity of individual landscape receptors. There are two aspects which are considered when establishing the landscape sensitivity:

- **Value:** The baseline value of the landscape and the contributory value of individual landscape receptors to the landscape as a whole; and
 - **Susceptibility to change:** The ability of landscape receptors to accommodate development of the type proposed without changing the intrinsic qualities of the landscape as a whole.
- 11.4.24 The evaluation of visual sensitivity considers both the perceived value of the existing view and the susceptibility of the visual receptor to change. It is important to note that the judgement of visual sensitivity is considered in relation to an understanding of both the existing view obtained by the receptor and the development proposed and therefore perceived value of the area of change as a part of the view as a whole contributes to the sensitivity evaluation
- 11.4.25 Criteria for landscape and visual sensitivity are presented in **Table 11.3** below:

Table 11.3: Landscape and Visual Sensitivity Criteria

Sensitivity Rating	Landscape Sensitivity	Visual Sensitivity
High	A highly valued landscape of particularly distinctive character susceptible to relatively small changes of the type proposed.	Visual receptors obtaining views from: <ul style="list-style-type: none"> ▪ Dwellings and publicly accessible buildings where the changed aspect is an important element in the view and there are no detracting features present; and ▪ Recreational routes and locations where the changed aspect is an important element in the view and there are no detracting features present.
Medium	A reasonably valued landscape with a composition and characteristics tolerant of some degree of change of the type proposed.	Visual receptors obtaining views from: <ul style="list-style-type: none"> ▪ Dwellings and publicly accessible buildings where the changed aspect is a less important element in the view and / or where some detracting features are present; ▪ Recreational routes and locations where the changed aspect is a less important element in the view and / or where some detracting features are present; ▪ Roads and transport routes where the changed aspect is an important element in the view and there are no detracting features present; and ▪ Workplaces where the changed aspect is an important element of the view and there are no detracting features present.
Low	A relatively unimportant landscape which is potentially tolerant of a large degree of change of the type proposed.	Visual receptors obtaining views from:

Sensitivity Rating	Landscape Sensitivity	Visual Sensitivity
		<ul style="list-style-type: none"> Dwellings and publicly accessible buildings where the changed aspect is an unimportant element in the view and / or numerous detracting features are present; Recreational routes and locations where the changed aspect is an unimportant element in the view and / or where numerous detracting features are present; Roads and transport routes where the changed aspect is a less important element in the view and / or where some detracting features are present; and Workplaces where the changed aspect is a less important element in the view and / or where some detracting features are present.

Magnitude of Change

- 11.4.26 Magnitude of change concerns the extent to which the existing landscape character or view would be altered by the Proposed Development. The evaluation of magnitude gives consideration to factors such as the scale or extent of the changes, the extent to which this may alter the landscape characteristics, or composition or focus of the view and the duration and reversibility of these changes. Magnitude of change has been evaluated using a four-point scale, detailed in **Table 11.4**.

Table 11.4: Landscape and Visual Magnitude of Change Criteria

Magnitude Rating	Landscape Magnitude	Visual Magnitude
High	Notable change in landscape characteristics over an extensive area ranging to a very intensive change over a more limited area.	Where the Proposed Development would result in a very noticeable change in the existing view.
Medium	Perceptible change in landscape characteristics over an extensive area ranging to notable change in a localised area.	Where the Proposed Development would result in a noticeable change in the existing view.
Low	Virtually imperceptible change in landscape characteristics over an extensive area or perceptible change in a localised area.	Where the Proposed Development would result in a perceptible change in the existing view.
Negligible	No discernible change in any landscape characteristics or components.	Where the Proposed Development would result in a barely perceptible change in the existing view.

- 11.4.27 In recognition of the differing changes that would occur over time, two ratings for magnitude of change have been included: during the construction of the Proposed Development, and during operation.

Assessment of Effects Significance

11.4.28 Evaluation of the predicted significance of effect has been carried out through the analysis of the anticipated magnitude of change in relation to the landscape or visual sensitivity, taking into account any proposed mitigation measures, and is established using professional judgement. The significance of effect for landscape and visual elements is considered as follows:

- **Landscape Effects:** The assessment takes into account identified effects upon existing landscape receptors and assesses the extent to which these would be lost or modified in the context of their importance in determining the existing baseline character; and
- **Visual Effects:** The assessment takes into account likely changes to the visual composition, including the extent to which new features would distract or screen existing elements in the view or disrupt the scale, structure or focus of the existing view.

11.4.29 Effect significance has been evaluated using professional judgement, and the criteria outlined below in **Table 11.5**.

Table 11.5: Significance Criteria

	Level of Effect	Landscape Effects Criteria	Visual Effects Criteria
<i>Significant</i>	Major	The Proposed Development is at considerable variance with the landform, scale and pattern of the landscape and would be a dominant feature, resulting in considerable reduction in scenic quality and large-scale change to the intrinsic landscape character of the area.	The Proposed Development would become a prominent and very detracting feature and would result in a very noticeable deterioration to an existing highly valued and well composed view.
	Moderate	The Proposed Development is out of scale with the landscape, or inconsistent with the local pattern and landform and may be locally dominant and / or result in a noticeable reduction in scenic quality and a degree of change to the intrinsic landscape character of the area.	The Proposed Development would introduce some detracting features to an existing highly valued view or would be more prominent within a pleasing or less well composed view, resulting in a noticeable deterioration of the quality of view.
<i>Not significant</i>	Minor	The Proposed Development does not quite fit with the scale, landform or local pattern of the landscape and may be locally intrusive but would result in an inappreciable reduction in scenic quality or change to the intrinsic landscape character of the area.	The Proposed Development would form a perceptible but not detracting feature within a pleasing or valued view or would be a prominent feature within a poorly composed view of limited value, resulting in a small deterioration to the existing view.
	Negligible or No Effect	The Proposed Development sits well within the scale, landform and pattern of the landscape and would not result in any discernible reduction in scenic quality or change to the intrinsic landscape character of the area.	The Proposed Development would form a barely perceptible feature within the existing view and would not result in any discernible deterioration to the view.

11.4.30 As for magnitude of change, two ratings for effects significance have been included: during the construction of the Proposed Development (65-month construction period), and during operation, assumed to be 10 years post completion.

11.5 Limitations

- 11.5.1 The prominence of the Proposed Development in the landscape would vary according to the prevailing weather conditions. The assessment has been carried out, as is best practice, by assuming the 'worst case' scenario i.e., on a clear, bright day in winter, when neither foreground deciduous foliage nor haze can interfere with the clarity of the view obtained.
- 11.5.2 The assessment of operational effects has been undertaken after an assumed 10-year period post completion. Assumptions have been made regarding the likely growth of vegetation over this time period based on professional experience, and assuming best practice habitat reinstatement and planting techniques.
- 11.5.3 The visual assessment has been undertaken from public roads and publicly accessible routes. Assumptions have been made as to the nature of rooms (e.g., in residential properties) and importance of views.
- 11.5.4 The limitations of the ZTV are described in paragraph 11.4.5.

11.6 Current Baseline Conditions

Landscape and Visual Context

- 11.6.1 The Proposed Development would be located on the northern shoreline and upper hills to the north of Loch Awe. 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 where the existing Cruachan 1 is located. 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. The existing Cruachan concrete buttress Dam forms a striking feature within the mountain setting to the north of the Pass of Brander, and can be seen from many areas within the wider landscape context. Features of Cruachan 1 are also present on the shore of Loch Awe at the Pass of Brander, but are relatively discrete, being set within trees.

Designated and Protected Landscapes

- 11.6.2 The following designated landscape areas and other areas protected through planning policy fall within the study area, as shown on **Figure 11.2**.

National Context

- Wild Land Area (WLA) 09. Loch Etive Mountains; and
- Ardanaiseig House Inventory Garden and Designed Landscape (GDL).

Regional Context

- North Argyll Area of Panoramic Quality (APQ).

WLA 09. Loch Etive Mountains

- 11.6.3 Wild Land Areas (WLA) have been defined by NatureScot as those areas comprising the greatest and most extensive areas of wild characteristics within Scotland. Although not a designation, these areas are given protection within the Planning System through Scottish Planning Policy (SPP) (Scottish Government, 2014).

- 11.6.4 The presence of wildness is based on the presence and strength of four perceptual attributes identified in NatureScot Policy Statement 'Wildness in Scotland's Countryside' (SNH, 2002) as follows:
- A sense of sanctuary or solitude;
 - Risk or, for some visitors, a sense of awe or anxiety, depending on the individual's emotional response to the setting;
 - Perceptions that the landscape has arresting or inspiring qualities; and
 - Fulfilment from the physical challenge required to penetrate into these places.
- 11.6.5 Because these responses are very much dependant on an individual's perceptions, five physical attributes are identified as considered likely to lead to these perceptual responses being present. These are:
- A high degree of perceived naturalness in the setting, especially in its vegetation cover and wildlife, and in the natural processes affecting the land;
 - The lack of any modern artefacts or structures;
 - Little evidence of contemporary human uses of the land;
 - Landform which is rugged, or otherwise physically challenging; and
 - Remoteness and/or inaccessibility.
- 11.6.6 NatureScot has produced a description of each WLA identifying Key Qualities which are considered to contribute to their value. The Key Qualities of WLA 09 are identified as follows:
- Arresting, steep, high mountains with precipitous rocky tops and ridges that offer panoramic views of elevated tops continuing far into the distance;
 - A series of deep glens carved through the mountains, with arresting side slopes and spectacular geological features that contribute to a strong sense of naturalness; and
 - A high number of visitors that seek different wild land qualities and are able to experience a wide range of remoteness, risk and physical challenge.

Ardanaiseig House GDL

- 11.6.7 Although not a statutory designation, Inventory Gardens and Designed Landscapes (GDLs) comprise a material consideration in any planning decision. These sites comprise those gardens and designed landscapes which have been considered by a panel of experts to be of national importance and are therefore included on the Inventory of Gardens and Designed Landscapes, maintained by Historic Environment Scotland (HES).
- 11.6.8 Ardanaiseig GDL comprises an 18th century lochside estate with formal gardens and terraces around the house and a wider setting of parkland and woodland. It is considered of high horticultural importance for its plant collection of trees and shrubs which is also considered to contribute towards a high level of scenic and artistic interest. The contribution of the woodland and trees to the shoreline of Loch Awe, particularly in terms of views from the A85, is cited as being of value to its scenic interest.

North Argyll APQ

- 11.6.9 Planning Authorities have the ability through the development planning process to designate areas considered to be of regional or local importance. These areas are not considered to be statutory designations but are a material consideration to planning decisions. Within Argyll and Bute, these areas of regional importance are entitled Areas of Panoramic Quality (APQs).
- 11.6.10 The Proposed Development falls within the North Argyll APQ which is an extensive area stretching up to 30 km from Loch Etive Mountains on its western boundary to the boundary of the Loch Lomond and the Trossachs National Park to the east. It includes the north-eastern part of Loch Awe and extends northwards the Glen Kinglass. Virtually all of the study area falls within the western part of the APQ.
- 11.6.11 ABC does not provide any citations or Special Qualities for APQs. However, within the study area, it is considered that the varying landscapes around the shore and islands of Loch Awe and the contrasting high and craggy mountains to the north form an important contribution to the designation. The striking landmark features of the existing Cruachan Dam, Kilchurn Castle and St Conan's Kirk are also considered important in this context.

Other Landscape Assets

- 11.6.12 Although not considered a formal designation, areas of woodland around Loch Awe are included on the Inventory of Ancient and Long-Established Woodland (AWI). These areas of ancient woodland form an important characteristic of the landscape and are contributory to the value of the APQ and GDL.

Landscape Character Baseline

- 11.6.13 NatureScot has undertaken detailed review and classification of various landscape areas and types of Scotland (SNH, 2019 [online]). Four individual Landscape Character Types (LCTs) are identified within the detailed study area as follows:
- LCT 35 – Rugged Mountains;
 - LCT 37 – Upland Glens - Argyll;
 - LCT 40 – Craggy Upland; and
 - LCT 53 – Rocky Coastland.
- 11.6.14 The above LCTs are considered to give a good representation of the landscape character variations within the study area and have therefore been adopted for the LVIA without any modifications. LCTs are illustrated on **Figure 11.3** and described in **Table 11.6 to Table 11.9**:

Table 11.6: LCT 35 – Rugged Mountains: Baseline Description


	
Description	<p>This LCT covers the northern, mountainous part of the study area and extends far beyond the edge of the study area to the north, north-west and east. The LCT is described as an extensive landscape of steep ridges and dramatic, craggy mountains which forms a backdrop to the settled loch shores and coastal landscapes of Argyll and Bute. Gullies and steep, narrow glens divide the mountains and occasional broader, sweeping straths accommodate rivers and lochs, such as Loch Awe. The massive peaks and ridges of the mountains contrast with the smaller scale, landscapes of the glens, straths and loch shore and often form a focus to views from these areas, with Ben Cruachan, the highest of the summits, forming a distinctive profile and landmark. This LCT is largely uninhabited, with only a few scattered properties within some of the more accessible glens, and has an open, exposed and wild character. Landcover consists predominantly of moorland and bog with areas of bare rock faces prominent on the steep mountain faces. Scrubby birch woodland is present within some of the sheltered narrow glens, gullies or rock crevices and coniferous plantation is present around the lower slopes in some areas.</p> <p>The features of Cruachan 1 affect the strength of wild characteristics present within the study area to some degree, with the dam, roads and other associated structures such as an overhead pylon line giving a sense of human interaction within this, southern part of the LCT.</p>
Key Characteristics	<ul style="list-style-type: none"> ▪ Rugged, steep sided mountain ranges with a massive scale; ▪ Diverse landform with gullies, scarp slopes and rocky screes; ▪ Striking exposed rock faces, with scrubby birch-oak woodland in gullies; ▪ Relatively wide glens between mountain ranges; ▪ Fast-flowing burns, waterfalls and small upland lochs are distinctive features; ▪ Extensive conifer forests on some lower slopes; ▪ Inaccessible and relatively uninhabited, with strong wildness qualities; and ▪ Dramatic mountain scenery.
Landscape Value	<p>The northern part of this LCT within the study area, north of Cruachan reservoir, falls within WLA 09. Loch Etive Mountains whilst the whole area is considered to be an important contributory element to the North Argyll APQ. The mountains are valued as a backdrop to lower lying landscapes, a focus of views and as a recreational resource. Landscape value for this LCT is therefore considered to be High.</p>

Table 11.7: LCT 37 – Upland Glens - Argyll: Baseline Description


	
Description	<p>This LCT comprises the flat, valley floors to either end of Loch Awe. Whilst it is identified at both the eastern (Dalmally) and western (Bridge of Awe) ends of the loch, there would be no intervisibility of the Proposed Development from the Bridge of Awe area and therefore the LVIA concentrates on the Dalmally area.</p> <p>This low-lying valley floor provides a sheltered landscape for agriculture and settlement, forming a striking contrast to the surrounding mountains and uplands. There is typically a distinct transition between the virtually flat floor of the glen and the steep containing mountain slopes. The LCT is characterised by a domestic scale farmland of patchwork rectangular fields, divided by hedgerows, stone walls and lines of trees and small blocks of woodland and coniferous forest plantation. A meandering river forms the focus of the glen, fringed by groups of trees, damp meadows and patches of woodland. Around the edge of Loch Awe, a pattern of winding creeks characterises a gradual transition from pasturelands to shingle and the open water of the loch. The glen provides an important communication corridors through the mountains, forming a route for roads and major overhead transmission lines. Linear settlement is strung along the roads and occasionally houses and farms are prominent on the side-slopes of glens. The ruins of Kilchurn Castle, form a prominent visual focus, set on the end of a marshy promontory leading into Loch Awe.</p>
Key Characteristics	<ul style="list-style-type: none"> ▪ Flat glen floor of narrow, linear mountain glens with a sharp break of slope at glen sides; ▪ Long ribbon lochs in lower glen; glacial moraine creates uneven landform with small, rounded lochs on floor of upper glen; ▪ Mudflats and winding creeks at loch heads and at the mouth of the glen; ▪ Meandering river, fringed with groups of trees, contrasts with rectangular pastures drained by straight ditches; ▪ Small blocks of woodland and some conifer plantations; ▪ Linear settlements strung out along lanes at the foot of the steep side slopes; and ▪ Castles and estates are important local landmarks.
Landscape Value	<p>This LCT forms part of the North Argyll APQ. Though it is less distinctive than the surrounding mountain landscapes, it is valued as a communication corridor, setting for settlement and for its agricultural land and woodland which are relatively rare within the local context, and as a setting to Kilchurn Castle. Landscape value is considered to be Medium.</p>

Table 11.8: LCT 40 – Craggy Upland: Baseline Description



	
Description	<p>This LCT covers the upland areas within the study area to the north and south of Loch Awe (south-west of the Pass of Brander) and consists of an irregular upland plateau, with a craggy appearance of rounded knolls, and rocky outcrops, giving a jumbled silhouette with no prominent summits although the rounded knolls form distinctive prominent features. This plateau is clothed in a very large scale mosaic of unenclosed open moorland and extensive forest plantation. On the edges of the plateau, narrow gullies with burns which dissect the moorland, open into broader valleys where a patchwork of broadleaved woodlands, poorly drained farmland and scattered settlement is present. Elsewhere, settlement is very sparse although there are numerous archaeological sites present, including forts or duns occupying many of the rounded knolls. Overall, the landscape has a remote and natural character with the majority being relatively inaccessible. This LCT accommodates a number of wind farms which form prominent features in the wider landscape.</p>
Key Characteristics	<ul style="list-style-type: none"> ▪ Upland moor with irregular, rather amorphous landform; ▪ Rounded knolls, rock outcrops and numerous lochs in low-lying hollows and glens; ▪ Open moorland predominates, but extensive conifer plantations camouflage the landscape pattern in some areas; ▪ Oak-birch woodland on lower slopes; ▪ Stone walls enclose an irregular patchwork of pastures within glens on margins of moorland; ▪ Isolated farmsteads and small villages in sheltered sites within glens; ▪ Numerous archaeological remains, often concentrated on rounded knolls on lower slopes; and ▪ Historic intricate, irregular landscape pattern in glens.
Landscape Value	<p>This LCT forms part of the North Argyll APQ and is valued for its remote qualities and as a setting for archaeological sites and remote settlement. However, it is relatively unexceptional within the context where more dramatic mountain scenery is present nearby. Landscape value for this LCT is therefore considered to be Medium.</p>

Table 11.9: LCT 53 – Rocky Coastland: Baseline Description

	
Description	<p>This LCT covers the settled and wooded shores of Loch Awe. Although this LCT also describes coastal areas, within the study area it is entirely inland. Within the study area, the LCT is characterised by a diverse landscape of woodland, scrub, fields and settlement with an irregular and unpredictable terrain, which forms the transition between the upland moorland landscapes and loch. Fields tend to be scrubby, with tussocky grass and gorse and birch scrub and scattered, stunted oak trees. Riparian woodland fringes the loch shore and areas of managed woodland are common. Isolated farms, groups of cottages and small settlements are linked by winding, roads which include both narrow single track routes and the main A85 within the study area. In some areas, particularly on the northern shore, large estate houses, some now used as hotels, are surrounded by historic policy plantings including exotic conifers rhododendrons and azaleas. Invasive rhododendron also occurs in other areas. This LCT is a focus for recreation, particularly water-based, and open views, often framed by trees are obtained across the waters of Loch Awe featuring the surrounding mountains and uplands.</p>
Key Characteristics	<ul style="list-style-type: none"> ▪ Uneven, hummocky landform with rocky outcrops and narrow glens; ▪ Raised beaches, cliffs and distinctive rounded knolls; ▪ Rocky, indented coastline with offshore islands and small sandy bays; ▪ Relatively small-scale landscape with a diverse mix of colours and textures; ▪ Steep wooded cliffs and hummocky, gorse-covered slopes; ▪ Stone walls provide partial enclosure; ▪ Relatively well-settled, with scattered isolated farm buildings and small villages in sheltered sites; ▪ A wide variety of archaeological sites; and ▪ Complex transitional landscape.
Landscape Value	<p>This LCT provides an important setting to Loch Awe and a valued aspect of the North Argyll APQ. It is valued for its accessibility and scenic qualities. Much of the woodlands around the loch are identified as Ancient Woodland on the AWI whilst the policy landscapes around Ardanaisieig House are identified as a GDL. The landscape value is therefore considered to be High.</p>

Visual Baseline

Interpretation of the ZTV

- 11.6.15 As described in section 11.4, ZTVs were produced for the principal elements of the Proposed Development at the quayside (at the lower reservoir) and upper intake structure (at the upper reservoir). The ZTV (see [Figure 11.1](#)) indicates that potential visibility of these two different areas would be relatively distinct, with only two small areas around Ardanaiseig and Cladich indicating theoretical visibility of both structures.
- 11.6.16 Theoretical visibility of the proposed quayside is shown to be relatively localised within and around the arm of Loch Awe leading to the Pass of Brander. At the mouth of this arm of the loch, potential visibility is also shown to be funnelled across Loch Awe towards the south-eastern shore around Inistrynach, Bovuy and Achlian, and across the upland moorland and forestry area to the south-east up to around 7.5 km from the proposed quayside.
- 11.6.17 Theoretical visibility of the proposed upper intake structure is shown to be largely contained within Coire Cruachan by the ridges and summits of the mountains that surround it. More distant potential visibility is shown across areas to the south of this with patchy areas of ZTV coverage around areas such as Ardanaiseig and Hayfield to the north of the main body of Loch Awe, and more consistent coverage across the loch and the southern shore across areas around Ardbrecknish and Keppochan as well as the hills beyond.
- 11.6.18 Site survey to verify the ZTV suggests that in most cases, woodland and local landform would limit actual visibility of these structures within the areas indicated, particularly around Loch Awe, and the existing Cruachan Dam would reduce visibility of the proposed upper intake structure from the south. The most consistent areas of intervisibility with the Proposed Development would therefore be likely to be within areas where woodland is limited, including views across the open waters of the loch, typically featuring the proposed quayside, and within the upland and mountainous areas, particularly around Coire Cruachan above the existing dam, where the proposed upper intake structure would be located.

Visual Receptors

- 11.6.19 Visual receptors within the study area comprise residents or others present in and around buildings and settlement areas, those using routes (including transport and recreational routes) through the study area, and those obtaining views from outdoor locations where enjoyment of the view is one of principle reasons for being at the location.

Visual Receptors Occupying Settlements and Other Built Development

- 11.6.20 Residential Receptor Locations (RRLs) are described in detail in [Technical Appendix 11.2](#) and their locations are shown on [Figure 11.4](#). These receptor locations can be broadly divided into four areas:
- To the east of Loch Awe;
 - Along the northern shoreline of Loch Awe;
 - To the west of Loch Awe; and
 - Along the southern shoreline of Loch Awe.
- 11.6.21 **RRL1 to RRL6** are located on the valley floor to the east of Loch Awe comprising the village of Dalmally and surrounding scattered properties and farms. Views from this grouping of properties are mostly limited in extent due to the forest and woodland areas which are present across the valley floor and lower valley-sides and stands of trees which often surround properties. Views typically feature a foreground of small fields and woodland, with the profile of surrounding mountains or hills as a backdrop. More open views may be obtained from some properties, where these are slightly

elevated on the valley sides or trees are set in less wooded locations. These include some properties in RRL2 (Stronmilchan), RRL4 (Castles Farm) and RRL5 (Tulich and Duiletter).

- 11.6.22 **RRL7 to RRL11** are comprised of a range of properties along the northern shoreline of Loch Awe with views predominantly orientated to the south across the Loch, occasionally filtered by loch-side woodland. These include the larger settlement of Lochawe, including St Conan's Kirk and the Lochawe Hotel (RRL7 and RRL8), other scattered properties around Innis Chonain, and the Cruachan Power Station Visitor Centre and Administration buildings
- 11.6.23 **RRL12 to RRL17** comprises a range of rural properties to the west of Loch Awe and includes the small settlement areas of Achnacraobh and Kilchrenan (RRL13). Views differ from these properties with those away from the loch, comprising RRL12 to RRL14, and to some extent RRL15 having views more contained by surrounding woodland and topography, with some extending to allow views of the backdrop of surrounding mountains or hills. For properties closer to the shores of Loch Awe views tend to be across the loch but are often heavily filtered by loch-shore woodland. Views are typically south-west or south, down or across Loch Awe from RRL13 (Kilchrenan) and RRL14 (Achnacarron, Larach Bhan and Hayfield) and easterly from RRL15 (Ardanaiseig Hotel and surrounding properties), RRL16 (Tervine Cottages) and RRL17 (Tervine), although RRL13 and RRL14 also have views to the north or north-east across the Pass of Brander and mountains beyond.
- 11.6.24 **RRL18 to RRL23** comprise a range of properties set within woodland to the south of Loch Awe and include the small settlements of Cladich (RRL20) and Portsonachan (RRL22). Views from these properties are typically to the north, north-east or north-west across the loch, but are often filtered by loch-side woodland and trees or garden vegetation. Two properties in this group, Arteatle and Blarchaorain (RRL18) are set in a more forested situation away from the loch.

Visual Receptors Using Routes

- 11.6.25 Routes within the study area are described in detail in **Technical Appendix 11.2** and shown on **Figure 11.4**. These can be classified into two different categories:
- Public transport routes (including public roads and railway lines); and
 - Recreational routes.
- 11.6.26 Public transport routes within the study area which have been included in the visual assessment include the following:
- A roads: **Route R1** (the A85 through Dalmally and to the north of the Pass of Brander) and **Route R2** (the A819 to the south of Loch Awe in the eastern part of the study area). These are fast single carriageway routes used by commuters but also popular with tourists. Loch Awe comprises the focus of views from these routes but views are usually restricted by woodland and roadside trees comprising brief glimpses. Ben Cruachan and surrounding peaks may also be a feature of views, particularly towards the eastern side of the study area when travelling west;
 - B roads: **Route R3** (the B8077, between Dalmally and Drishaig) comprising a narrower single-carriageway and single track route with views across the floor of the Strath of Orchy, sometimes limited by trees; **Route R4** (B845 between Taynuilt and North Port to the north of Loch Awe) comprising a wider singletrack route with views relatively contained by landform, sometimes opening out to allow views across surrounding moorland and fields with a backdrop of surrounding hills; and **Route R5** (the B840 along the southern shore of Loch Awe) with views across Loch Awe and towards Ben Cruachan, glimpsed between loch-side woodland;
 - Minor roads: **Route R6** (minor road between Kilchrenan and Ardanaiseig). Views are often contained by forest but with some more open stretches giving views across surrounding elevated moorland and rough fields and very occasional glimpsed views south towards Loch Awe; and

- Railway: **Route R7** comprises the Oban Branch of the West Highland Railway Line, following a similar alignment to the A85 through the study area with stations at Dalmally, Loch Awe and Falls of Cruachan. Views from the railway line are similarly restricted by surrounding woodland and trees, with glimpsed views towards Loch Awe.
- 11.6.27 Recreational routes considered within the visual assessment include Core Paths, Scottish Hill Tracks (Scottish Rights of Way and Access Society, 2011), and most commonly used mountain ascent routes. These include the following:
- Core Paths: **Route R8** (Core Path C425 – Kilchurn Castle Path), a footpath with Kilchurn Castle forming the focus of views within a wider visual setting of the loch and surrounding mountains and hills; and **Route R9** (Core Path C450 – Duncan Ban McIntyre Monument) a forest track, largely enclosed by surrounding forest with elevated views opening out across felled forestry on the approach to the monument. Two other Core Paths (C171(b) – Kilmore – Loch Nant – Kilchrenan) and C528(b) - Dalmally Circular are peripheral within the study area with no likely views and have therefore not been included;
 - Scottish Hill Tracks: **Route R10** (Scottish Hill Track 138 – Dalmally to Glen Etive), a track and path following Glen Strae within the study area with views largely contained within the glen and forest planting restricting visibility through most of the route within the study area. Another Scottish Hill Track (Scottish Hill Track 108 – Kilchrenan to Kilmore) is peripheral within the study area with no likely visibility and has therefore not been included; and
 - Mountain Routes: **Route R11** (Cruachan Horseshoe) involves an ascent of Ben Cruachan and ridge traverse to surrounding mountains Stob Daimh, Beinn a' Bhuiridh commencing at the Fall of Cruachan Station and via the Cruachan Dam. **Route R12** (Beinn Eunaich and Beinn a Chochuill) comprises an ascent of Beinn Eunach and Beinn a' Chochuill from Castles Farm and via a farm / hydro track up the Allt Mhoille valley. Views from both these routes are elevated and extensive, with views from R12 being focussed across Dalmally and the eastern end of Loch Awe, and those from R13 being extensive across Loch Awe and beyond. The existing Cruachan Dam and reservoir as well as other ancillary features are noticeable in passing and from the elevated parts of this route.

Outdoor Locations

- 11.6.28 The following Outdoor Viewing Locations (OVLs), as shown on **Figure 11.4**, have been considered where the view is considered to be a principal reason for being at the location¹⁵:
- **OVL1** (Kilchurn Castle), with slightly elevated views obtained from the castle structure across Loch Awe and to the surrounding hills and mountains; and
 - **OVL2** (Duncan Ban McIntyre Monument), with elevated and expansive views across Loch Awe and to surrounding mountains.

11.7 Baseline Evolution and Expected Future Baseline

- 11.7.1 The baseline landscape and visual resource of the study area is not anticipated to alter noticeably in future years. Whilst there may be some continued development or ongoing changes to forestry or tree cover, this is not anticipated to lead to any very noticeable change to the wider landscape characteristics of the study area or visual amenity.

¹⁵ Note: Where OVLs comprise cultural heritage features, the visual assessment considered the effect on the visual amenity of the location only, and does not consider the cultural heritage values. This is discussed in Chapter 12: Cultural Heritage)

11.8 Embedded Mitigation

11.8.1 Landscape and visual issues have been a consideration throughout the EIA and design process for the Proposed Development. The following design principles have been adhered to in order to reduce potential landscape and visual effects where possible.

- 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; and
- Minimising the permanent design footprint as far as is possible including the scale of required rock cuttings and requirements for woodland removal, particularly woodland included on the Inventory of Ancient and Long-established Woodland.

11.8.2 Embedded mitigation measures would also include habitat and landform reinstatement which would be integral to the restoration of areas disturbed during construction. The reinstatement of areas disturbed during construction would be fundamental to ensuring that the Proposed Development would be successfully accommodated into the existing landscape. This would be achieved through a combination of natural regeneration in sensitive upland habitat areas (refer to [Appendix 3.1: Construction Environmental Management Plan](#)), seeding where required and planting of appropriate woodland species.

11.8.3 Careful reinstatement of landform would be employed, re-using materials excavated during the construction of the Proposed Development. Landform would be remodelled around new structures ensuring that these tied smoothly into their surroundings and minimising visual extent where possible. This would be supplemented where appropriate with planting or use of rocks and boulders to reflect the pre-construction landscape character.

11.8.4 Around the main permanent structures at the upper and lower control works, native woodland planting is proposed to help soften the appearance of new features and compensate for trees and woodland lost through construction activities as follows:

- At the upper intake: Softening of the appearance of the rock cut areas through mounding of stored topsoils / peat at the base of the cut and planting of upland woodland species (e.g. birch, rowan and willows), supplemented by the encouragement of natural vegetation growth at the base of the cutting and on benches; and
- At the quayside: Softening of the appearance of the new quayside walls with strategic replacement of stored soils on the quayside and planting with native woodland and scrub species reflective of those within the nearby Coille Leitire SSSI. The locations of such areas would be dependent on the operational requirements of the quayside.

11.8.5 Indicative illustration of these measures is provided on [Figure 11.5](#).

11.9 Realistic Worst-Case Parameters for Assessment

11.9.1 The LVIA considers the potential effects of the Proposed Development at two stages in the design: during construction and during operation.

11.9.2 The assessment of construction-based effects assumes that the largest scale of activities in all areas of the development would be taking place concurrently at the time of assessment in order to cover for the worst-case scenario.

11.9.3 The operational assessment takes into account the maximum project parameters identified in [Chapter 3 of this EIA Report](#).

11.9.4 Operational effects are assessed after an assumed time period of 10 years post construction in order to accommodate the anticipated restoration of vegetated areas and establishment of recommended

mitigation planting which would form part of the development, as this is considered to represent a realistic situation for the future operation of the Proposed Development.

- 11.9.5 At both stages of the assessment, the measure of effects assumes the worst-case scenario in terms of maximum visibility – i.e. A clear, bright day in winter when neither cloud nor leaf cover would obscure the view.

11.10 Assessment of Likely Effects

- 11.10.1 This section provides an assessment of the effects that the Proposed Development would have on landscape character and designated and protected landscapes during the construction and operational phases, in accordance with the effects criteria outlined in the **Section 11.4**. The assessment of landscape character is presented first, as this is used to feed into the assessment of effects on designated and protected landscapes.

Assessment of Effects on Landscape Character Types

- 11.10.2 Detailed assessment of the four LCTs falling within the study area, is provided in Table 11.10 to Table 11.13 below:

Table 11.10: LCT 35 – Rugged Mountains: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> ▪ Rugged, steep sided mountain ranges with a massive scale; ▪ Diverse landform with gullies, scarp slopes and rocky screes; ▪ Striking exposed rock faces, with scrubby birch-oak woodland in gullies; ▪ Inaccessible and relatively uninhabited, with strong wildness qualities; and ▪ Dramatic mountain scenery.
Landscape Sensitivity	<p>This is a valued landscape (high landscape value) directly contributory to the APQ designation and within WLA 09. Loch Etive Mountains. Its remote qualities are susceptible to change, but features similar to those proposed around the dam reduce susceptibility within the local context.</p> <p>Overall sensitivity: Medium - High</p>
Potential Effects	<ul style="list-style-type: none"> ▪ Construction activities or new permanent features at the upper intake and reservoir site have potential to alter the perceived scale of the landscape; ▪ Potential changes to terrain associated with construction of the upper intake and shaft may lead to loss of landform features such as gullies, rock faces or woodland; ▪ The appearance of construction activities, access, or new features in the landscape could alter the sense of wildness; and ▪ Construction activities or new features could intrude into established views or appear within the mountain context and reduce sense of drama.
Effects Magnitude	<p><u>During Construction</u></p> <p>There would be a focus of construction activities within this LCT at the upper reservoir area, including construction compound, electrical connection, drilling rigs and concrete batching below the dam, and works to construct the upper intake structure and shaft above the dam. This would include establishment of a rock cutting and platform area to accommodate the upper intake gate hoist. Works to upgrade the haul road to the upper intake and construction traffic on the haul road would also feature within the LCT. All these works would take place within parts of the landscape already affected by existing features, but would add increased activity and movement. The eastern construction compound at Stronmilchan would also feature within the edge of this LCT at the transition with the Upland Glens – Argyll LCT but although this may be seen within the context of the mountains and would add new features and increased activity and movement, it would be more likely to be associated with existing features of the glen floor.</p>

	<p>The noticeable level of change in a localised area is considered to lead to a Medium Magnitude of Change.</p> <p><u>During Operation</u></p> <p>Temporary features such as construction compounds and laydown areas would be restored following completion. The gate hoist above the intake structure and surface features of the shaft with its associated access, would be the only permanent features within this LCT. The ZTV of the intake gate hoist indicates that intervisibility with these structures would be relatively widespread within Coire Cruachan and the surface elements of the shaft would be likely to have a similar visual envelope. However, these features would be relatively small, seen within a context of Cruachan Dam and other existing features such as steel lattice towers which already influence the character of this part of the landscape and so would lead to little obvious change in landscape characteristics. The rock cutting to accommodate the upper intake would also form a permanent change to the landscape fabric but would appear similar to existing bare rock areas and an area of cut which already exists. The encouragement of vegetation growth and targeted native planting would reduce the perceptibility of this over time. Magnitude of change would be Low, as change would be perceptible but very localised.</p>
<p>Effects Significance</p>	<p><u>During Construction</u></p> <p>The presence of construction activities at the upper reservoir area would be noticeable within the localised Coire Cruachan area, though taking place in a part of the LCT where the existing dam and other features of Cruachan 1 and periodic works already affect the character. As such, the qualities of wildness are already comparatively reduced in this area and there are already features present in views of the dramatic landscape, although in the case of the dam, this may be viewed as a positive feature. Nevertheless, the more intensive concentration of activities in this area, particularly the upper intake construction above the dam which would be influential throughout Coire Cruachan, would lead to a greater distraction and focus, and would affect the appearance of the existing dam within the dramatic mountain backdrop. At the eastern construction compound, the works would be noticeable and distracting in the local area but would be seen within a context of other glen activities and more likely in association with the Upland Glens – Argyll LCT.</p> <p>The Medium magnitude of change would typically influence areas where the sensitivity is slightly reduced by existing features and / or activities. This is anticipated to result in a temporary Moderate Adverse (significant) effect during construction which would be <i>localised</i> to the area within Coire Cruachan.</p> <p><u>During Operation</u></p> <p>The permanent features of the Proposed Development within the LCT would be relatively small with a localised influence. Although there would be intervisibility with the upper intake hoist and associated rock cut from the ridges and summits, this would be seen within the context of the existing dam and the hoist structure and cut would be present within an area where some degree of land modification and cut is already present. Therefore, whilst this would be perceptible and would increase the impression of built development within this localised area, it is not anticipated to lead to any very noticeable change in landscape characteristics. It would not lead to any noticeable loss of existing landscape features, would have very limited influence on sense of wildness (given the adjacent presence of the existing dam), and would be unlikely to noticeably affect the sense of drama, either when viewed from the mountains where it would be seen within the existing context of dam and reservoir, or when seen from below, as it would be likely to be concealed by the existing dam and reservoir. Targeted planting of native species and encouragement of other vegetation growth, would assist in softening the appearance of the new rock cutting.</p> <p>The operational effect would Minor Adverse (not significant).</p>

Table 11.11: LCT 37 – Upland Glens – Argyll: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> ▪ Flat glen floor of narrow, linear mountain glens with a sharp break of slope at glen sides; ▪ Diverse character include mudflats and winding creeks, meandering river, fringed with groups of trees, rectangular pastures and small blocks of woodland and conifer plantation; ▪ Pattern of linear settlements strung out along lanes at the foot of the steep side slopes; and ▪ Kilchurn Castle.
Landscape Sensitivity	<p>This is moderately valued (medium landscape value) as a setting for settlement, mountain views and Kilchurn Castle. Although the small scale is sensitive to larger development, its diverse character gives it ability to accommodate some degree of change.</p> <p>Overall sensitivity: Medium</p>
Potential Effects	<ul style="list-style-type: none"> ▪ Construction works or features associated with the eastern construction compound could interrupt the transition of the glen side and patterns of development at the foot of slopes; ▪ Activities associated with the eastern construction compound may alter the balance of diversity of land use; and ▪ Temporary or permanent features could affect the role of Kilchurn Castle as a feature of the landscape.
Effects Magnitude	<p><u>During Construction</u></p> <p>The eastern construction compound would be located on the transition of the LCT with the LCT 35 – Rugged Mountains. This would occupy a slightly sloping or flattish area of moorland to the south-east of Castles Farm and would be an occasionally noticeable feature within around 1 km. However, the diverse and semi-wooded character of the LCT would limit intervisibility with the wider LCT and although larger than other features within the vicinity, the appearance of the construction compound would not be very inconsistent with other existing features such as farm buildings, the nearby substation, and industrial sites around Dalmally.</p> <p>Taking account of the very localised nature of changes, the magnitude of change is considered to be Low.</p> <p><u>During Operation</u></p> <p>The construction compound would be fully restored following completion of construction works. Although some evidence of its presence may initially be perceived, by 10 years post completion, this is not anticipated to be perceptible as any degree of landscape change. Magnitude of change would therefore be Negligible.</p>
Effects Significance	<p><u>During Construction</u></p> <p>The presence of the construction compound on the edge of this LCT would follow a generally consistent pattern of development, situated on the valley floor, and set in the edge of the valley-side. It would therefore be broadly consistent with the existing landscape patterns and character but would be likely to be somewhat larger than other similar features within the area with movement and access in an area of currently minimal activity potential forming a new focus and distraction. However, this would only be evident within a relatively small area and would be temporary. The proposed construction compound would be unlikely to be seen within the context of Kilchurn Castle and would not affect the role of the castle as a landmark. The effect on this LCT during construction is therefore anticipated to be Minor (not significant)</p> <p><u>During Operation</u></p>

	As the proposed construction compound would be restored following the completion of construction and no other features would be within this LCT, after 10 years the landscape effect would be Negligible (not significant).
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Table 11.12 - LCT 40 – Craggy Upland: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> Upland moor with irregular, rather amorphous landform; Rounded knolls, rock outcrops and numerous lochs in low-lying hollows and glens; Open moorland predominates, but extensive conifer plantations camouflage the landscape pattern in some areas; and An irregular patchwork of pastures within glens on margins of moorland.
Landscape Sensitivity	<p>This is a moderately valued landscape (medium landscape value), contributing to the North Argyll APQ. However, its variable character of forest and moorland and amorphous landform are considered to have a relatively low susceptibility to change of the type proposed.</p> <p>Sensitivity is considered to vary between Low and Medium.</p>
Potential Effects	<ul style="list-style-type: none"> Potential for indirect effects of temporary and permanent components of the Proposed Development to affect appreciation of local landscape patterns.
Effects Magnitude	<p>Two areas of LCT40 are present within the study area: in the west, comprising the more upland parts of the Ardanaiseig peninsula and in the south-east.</p> <p><u>During Construction</u></p> <p>In the western area, there would be some temporary intervisibility with construction works at the upper reservoir and the quayside affecting an area to the south of Tervine and west of Ardanaiseig. However, in reality this would be very localised, being unlikely to affect areas with extensive forestry cover. The works may form a new small focus and distraction, within the context of the mountain and loch shore landscapes to the north, and may interrupt the appearance of the Cruachan dam within this context where visible. However, this would be very localised within the LCT and is unlikely to be sufficient to lead to any perceived change in characteristics.</p> <p>In the south-eastern area the ZTV indicates that there would be intermittent intervisibility with the works at the quayside. However, whilst some tree felling or other infrastructure may be occasionally perceptible, at a distance of at least 4.5 km, this would be likely to be barely distinguishable from existing activities on the road.</p> <p>The magnitude of change during construction for this LCT would therefore be Negligible.</p> <p><u>During Operation</u></p> <p>It is likely that there would be no perceptible intervisibility with any permanent features at the upper reservoir during operation. Some very localised intervisibility with the quayside would occur for a small area above Tervine but would be unlikely to alter any of the key characteristics and planting of vegetation would soften the appearance over time. Long term intervisibility is unlikely across the south-western part of the LCT.</p> <p>Magnitude of change during operation would therefore also be Negligible.</p>
Effects Significance	<p>Effects on this LCT during construction and operation would be indirect, extremely localised, and unlikely to lead to any change in key characteristics</p> <p>The effect would therefore be Negligible (not significant), during both construction and operation.</p>

Table 11.13: LCT 53 – Rocky Coastland: Assessment of Effects

Landscape Receptors	<ul style="list-style-type: none"> ▪ Relatively small-scale landscape with a diverse mix of colours and textures; ▪ Shoreline, often difficult to access, and offshore islands colonised with native woodland; ▪ Landmark historical buildings around the loch-shore form focal points; and ▪ Roads and railway line wind through loch-shore woodland giving glimpsed and occasional snapshot views across open water.
Landscape Sensitivity	<p>This is a highly valued landscape (high landscape value) comprising a valued aspect of the North Argyll APQ and accommodating an Inventory Designed Landscape and areas of ancient woodland. However, its diverse and relatively settled character gives some opportunity to accommodate further development.</p> <p>Sensitivity is therefore considered be Medium.</p>
Potential Effects	<ul style="list-style-type: none"> ▪ Construction works or permanent features at the quayside area have potential to overwhelm the existing small-scale patterns of the landscape; ▪ Construction works or permanent features at the quayside or upper reservoir may interrupt existing views of landmark features or open-water views; and ▪ Woodland removal at the quayside area may lead to change in the balance and patterns of the landscape or change experiences of moving through the landscape.
Effects Magnitude	<p><u>During Construction</u></p> <p>All of the works at the quayside would be within this LCT. There would be a focussed area of activity on the loch shore with associated removal of loch-side woodland. This would be very noticeable in the localised area. However, with the wooded characteristics of the surrounding shore area, the extent to which this activity would be intervisible with other parts of the LCT would be relatively limited, mostly affecting parts of the loch shore around Cruachan 1, and the opposite shore between Tervine and Ardanaiseig. There may be limited glimpsed areas of intervisibility of the quayside works from areas around Cladich, Cladich and Achlian. Works at the upper reservoir would also be intervisible with areas of the northern and southern shore to the west of Cladich / Ardanaiseig and may form a focus and interruption of the landmark feature of Cruachan dam within the mountainous setting to the north. This would be a very localised change due to the extent of woodland in these areas and would be small within the context.</p> <p>Due to the very localised, but intensive nature of the changes, the magnitude of change during construction would be Medium.</p> <p><u>During Operation</u></p> <p>During operation, no changes would be likely to be perceived relating to the upper works within the mountainous context. Therefore, potential change would be limited to the permanent quayside and other associated features such as buildings and tunnel portal. This would continue to form a perceptible change within this localised part of the landscape as it would result in a new section or artificial shoreline and built development in this area. However, this would occur within an area where the existing Cruachan 1 power station, Tervine fish farm and the A85 already lead to some similar features and the surrounding wooded character would reduce these changes to the localised context. Woodland planting on the quayside area would help to reduce the perceived level of change over time.</p> <p>Magnitude of change during operation would therefore be Low.</p>
Effects Significance	<p><u>During Construction</u></p> <p>Loss of woodland and a focussed area of activities within this LCT would lead to a localised change in landscape characteristics where a more industrialised character would be created within this small area. Although this would be within a context of the existing Cruachan 1 power station and Tervine fish farm which locally reduce</p>

	<p>sensitivity to industrial type development, the establishment of the quayside and intensive activity surrounding this area would form a greater interruption to the continuity of shoreline vegetation and the rural open water views across the loch. However, the wooded qualities of the neighbouring shoreline areas would ensure that elsewhere, the existing characteristics would remain intact. The appearance of the upper reservoir construction works within views towards the Cruachan Dam from the southern side of the loch, may be distracting within the context and would affect the role of this feature as a landmark. However, this would be outwith the LCT, seen as part of the context and would be unlikely to influence the more immediate, defining characteristics.</p> <p>The effect on this LCT during construction is therefore anticipated to be Minor - Moderate Adverse (not significant). However, it is recognised that, within the localised area to north and south of the arm of Loch Awe leading to the Pass of Brander, the effect would be more pronounced, and a <i>localised Moderate Adverse</i> (significant) effect is anticipated within this area.</p> <p><u>During Operation</u></p> <p>Once construction activities were complete the extent of works would be reduced with only the quayside remaining and with the intensity of heavy movement and construction no longer taking place. The retained quayside would continue to form a large new feature and an artificial section of shoreline, but it is proposed that establishment of some areas of woodland on parts of it would help to soften the more industrial appearance of this area. With this strategic revegetation, following around 10 years, the quayside would, to some extent, reflect the neighbouring areas, such as the existing Cruachan 1 power station and visitor centre and fish farm site on the opposite shore of the loch. This would therefore appear broadly in line with the existing character of the LCT. The operational effect after 10 years, is therefore anticipated to be Minor (not significant).</p>
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Summary of Landscape Effects

- 11.10.3 Anticipated effects to LCTs are summarised in Table 11.14 below. For the purposes of this assessment, effects with a rating of Moderate or greater are considered to be significant. All effects are considered to be adverse.

Table 11.14: Summary of Effects to Landscape Character Types

Local Character Zone	Effect during construction						Effect during operation					
	Negligible	Minor	Minor - Moderate	Moderate	Moderate to Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
LCT 35 – Rugged Mountains				*L				*				
LCT 37 – Upland Glens - Argyll		*					*					
LCT 40 – Craggy Upland	*						*					
LCT 53 – Rocky Coastland			*	*L				*				

L indicates that the effect would be localised to only part of the LCT within the study area.

Summary of Landscape Effects During Construction

- 11.10.4 As indicated by the summary table, during construction temporary significant effects are anticipated within two of the four LCTs: LCT 35 (Rugged Mountains); and LCT 53 – Rocky Coastland. These effects would be localised, affecting the landscape around the key areas of the Proposed Development at the upper reservoir / Cruachan Dam area (LCT 35) and the quayside (LCT 53) and would arise due to the intensity of construction activities occurring within the rural landscape which would form new focus and distraction. In the case of LCT 35 (Rugged Mountains) the significant effect is anticipated to be localised to the Coire Cruachan reservoir area. Although this area is considered to have a slightly reduced sensitivity compared to the LCT as a whole, due to the contribution that it makes to the overall value of the LCT, this is anticipated to result in a localised **Moderate Adverse** (significant) effect. For LCT 53 (Rocky Coastland), the effects would be localised to the area to north and south of the arm of Loch Awe leading to the Pass of Brander where the character is already affected to some extent by the existing Cruachan 1 power station buildings and a fish farm at Tervine. As the effect on the majority of this LCT within the study area would be minimal, a **Moderate Adverse** (significant) effect is anticipated only within this localised area. The contribution of this effect to the LCT within the study area as a whole would be Minor - Moderate (not significant).
- 11.10.5 Of the remaining LCTs a **Minor Adverse** (not significant) effect is anticipated to LCT 37 (Upland Glens – Argyll) where the proposed eastern construction compound would be located. Whilst this site would be very noticeable within the local area, the diverse character of this LCT and the very localised intervisibility with the construction compound are anticipated to result in the effect to landscape character being minimal.
- 11.10.6 The effect on LCT 40 (Craggy Upland) would be indirect and very localised and is anticipated to be **Negligible**.

Summary of Landscape Effects During Operation

- 11.10.7 During the operational phase of the Proposed Development, assumed for this assessment to be 10 years post construction when vegetation recovery would be complete, it is anticipated that all effects would be reduced to levels which would be not significant. The permanent above-ground components of the Proposed Development: the intake structure and, quayside with associated features, would lead to some small, localised changes to the landscape fabric but would be situated in areas where existing features already affect the landscape character and lower the sensitivity to other similar features. Within LCT 35 (Rugged Mountains), the intake structure would be located close to the dam, and, although would form a perceptible new feature, is unlikely to form any increased focus or distraction which would lead to noticeable change in landscape characteristics. In (LCT 53 – Rocky Coastland), the quayside would form a noticeable but very localised feature, within an area where existing similar features at the Tervine fish farm and Cruachan 1 power station already influence the landscape character. The strategic planting of native woodland species would compensate for trees lost and help to re-establish the gap in loch shore vegetation created during the construction phase. The effects to both these areas would therefore be **Minor Adverse** (not significant).
- 11.10.8 The effect on LCT 37 (Upland Glens – Argyll) and LCT 40 (Craggy Upland) would be **Negligible** (not significant) as the eastern construction compound would be restored following completion.

Assessment of Effects on Designated and Protected Landscapes

WLA 09: Loch Etive Mountains

- 11.10.9 As confirmed with NatureScot (see [Table 11.1](#)) no significant effects are anticipated to WLA 09 (Loch Etive Mountains). A full WLA assessment has therefore not be undertaken for this WLA. However, as changes were made to the layout of the Proposed Development following scoping and public consultation, an appraisal of potential effects has been undertaken to confirm that significant effects would be unlikely. This is done by way of a review of the Key Qualities, set out in [Table 11.15](#).

11.10.10 Within the study area, the WLA is represented by LCT 35 (Rugged Mountains). A significant temporary landscape effect during construction has been identified within this LCT, localised to the area within Coire Cruachan. However, only around half of this affected area falls within the WLA and, other than the reservoir, all the permanent features of the Proposed Development are around 1 km from the WLA boundary. Much of the significant effect relates to the construction activities which would take place at the upper intake site and these activities would be evident from parts of Coire Cruachan within the WLA and the Ben Cruachan – Stob Daibh ridge. This would be likely to reduce the sense of wildness experienced in these localised areas to some extent through a reduction in the strength of the wild land physical attributes, “Lack of any modern artefacts or structures,” “A high degree of perceived naturalness in the setting” and “Remoteness and/or inaccessibility,” and in turn, the perceptual response, “A sense of sanctuary or solitude”. However, the baseline sense of wildness is already modified by the presence of existing infrastructure in this area including the Cruachan Dam and steel lattice transmission towers and this would reduce the wild land sensitivity of this part of the WLA to these additional changes. During operation, once activities had ceased and vegetation re-established, the permanent features of the Proposed Development would be located close to the existing features and therefore would be unlikely to lead to any noticeable effect on the strength of wildness of the WLA.

11.10.11 An appraisal of the potential long-term changes to the WLA key qualities is detailed in [Table 11.15](#).

Table 11.15: Potential Effects of the Proposed Development on Key Qualities of WLA 09. Loch Etive Mountains

WLA Key Quality	Potential Effects
Arresting, steep, high mountains with precipitous rocky tops and ridges that offer panoramic views of elevated tops continuing far into the distance.	Elements of the Proposed Development would be seen within the surrounding context of the WLA from the tops and ridges around Coire Cruachan. However, the Proposed Development would be seen within a context of the existing Cruachan Dam and other features including steel lattice transmission towers. Views across the WLA featuring the distant tops are typically to the north and north-west and would be unaffected. Significant effects to the WLA Key Quality are considered unlikely.
A series of deep glens carved through the mountains, with arresting side slopes and spectacular geological features that contribute to a strong sense of naturalness; and	The Proposed Development would not affect any glen areas although it would affect the Coire Cruachan area. However, this corrie is already modified as a result of the existing Cruachan 1 Power Station with constructed features of various sizes and tracks present which reduce wild land sensitivity to further features. Whilst the Proposed Development may reduce the sense of naturalness in the short-term during construction, it is not considered that this wild land attribute would be changed in the longer term. Significant effects to the WLA Key Quality are considered unlikely.
A high number of visitors that seek different wild land qualities and are able to experience a wide range of remoteness, risk and physical challenge.	The ridges and summits around Coire Cruachan on the edge of the WLA are popular with visitors and this in turn leads to some aspects of wildness being reduced, such as remoteness, solitude, and contemporary land use. Whilst the temporary works to construct the Proposed Development may locally reduce some of these aspects further, in the longer term during the operation of the Proposed Development, it is not considered that the experience of wildness in this part of the WLA would be changed for visitors. Significant effects to the WLA Key Quality are considered unlikely.

Ardanaiseig GDL

Effects During Construction

- 11.10.12** The Ardanaisaig GDL is situated within LCT 53 – Rocky Coastland on the southern shoreline of the Pass of Brander arm of Loch Awe, at the transitional position with the main body of the loch. However, although this LCT has a medium sensitivity overall, the particular value of the GDL is considered to give it a locally High sensitivity. The assessment of LCTs (

- 11.10.13 **Table 11.13**) has identified a significant Moderate Adverse effect to this LCT during construction. However, this is largely due to the very intensive nature of change which would occur within a very localised area close to the Proposed Development. The very wooded qualities of the Ardanaisaig GDL would result in very limited perceptible change to this GDL. There would be likely to be some perceptible intervisibility of construction activities at the quayside area with areas of parkland at the north of the GDL and possible disruption within these areas by way of construction noise. However, this is a relatively peripheral part of the GDL, and these changes would not affect any of the artistic or scenic qualities which are cited within the Inventory entry, which particularly relate to the gardens and woodlands. The magnitude of change would therefore be Low, and the effect during construction would be **Minor Adverse** (not significant)

Effects During Operation

- 11.10.14 During operation, there would be unlikely to be any perceptible change to the GDL. The appearance of the permanent quayside structure would be likely to be barely perceptible from areas of parkland due to the enclosure by trees and would be further reduced with strategic planting. This would be unlikely to alter any of the key characteristics or valued aspects of the GDL. The magnitude of change and level off effect would therefore be **Negligible** (not significant).

North Argyll APQ

Effects During Construction

- 11.10.15 All of the LCTS within the study area fall within the North Argyll APQ. The sensitivity and magnitude of change on these LCTs is 248described in **Table 11.10** to **Table 11.13** above. However, LCT 35 (Rugged Mountains) and (LCT 53 – Rocky Coastland) are both considered to be particularly influential in its designation. As described in **Table 11.10** and **Table 11.13** and **paragraph Error! Reference source not found.** temporary significant effects are anticipated to these LCTs during construction. The effects identified would comprise localised effects, particularly within the context of the APQ, but would occur within areas which are considered to be of some merit in relation to the designation, particularly in the case of LCT 35 (Rugged Mountains). It is therefore considered that these landscape effects would lead to a temporary significant effect to the North Argyll APQ during construction. This would be **Moderate Adverse** (significant) and localised, occurring only within Coire Cruachan and the small, separated arm of Loch Awe leading to the Pass of Brander. The effect on the wider APQ as a whole would be **Minor Adverse** (not significant). Given the very localised nature of the effect, it is considered unlikely to affect the role of the Loch Awe area as a gateway. Given the temporary nature of the significant effect, it is not considered that this would affect the integrity of the designation.

Effects During Operation

- 11.10.16 During the operation of the Proposed Development, after 10 years have passed, no significant effects are anticipated to any of the LCTs which fall within the APQ, as described in **Tables 11.10 – 11.13** and **paragraph 11.10.7**. It is therefore considered that there would be no significant effect to the APQ during the operation of the Proposed Development. Although the permanent features of the Proposed Development would form small changes within the APQ and are anticipated to result in Low magnitude, Minor Adverse effects to the LCTs within which they are located, in the context of the APQ they would be very localised, would reflect existing patterns of development and would result in valued aspects of the APQ being retained. The features of the Proposed Development are not anticipated to affect the role of the Cruachan Dam as a feature of recreational views and in the landscape. The overall longer-term magnitude of change would be Negligible and the effect on the APQ would also be **Negligible**. The integrity of the APQ would be retained.

Assessment of Effects on Visual Receptors

- 11.10.17 The detailed assessment of effects on the visual amenity of building-based receptors, route-based receptors, and individuals at outdoor viewing locations, including values for sensitivity and

magnitude of change, is presented in **Technical Appendix 11.2**. Anticipated effects are summarised below with an emphasis on potential significant effects.

Building Based Receptors: Effects During Construction

- 11.10.18 23 building-based receptor locations were included in the visual assessment (see **Figure 11.4**), comprising individual buildings or groups of buildings, and associated outdoor spaces where a view of the Proposed Development would potentially be obtained. The assessment (see **Technical Appendix 11.2**) has identified that the majority of effects to receptors would be not significant. During construction, temporary significant effects were identified for three of these receptor locations with visual receptors in all other locations identified as likely to experience effects which would be not significant, as summarised below:

East of Loch Awe (Receptor Locations RR1 – RR6)

- 11.10.19 A temporary significant effect was identified for visual receptors at Receptor Location RRL4 (Castles Farm) which is located in close proximity to the proposed eastern construction compound. Visual receptors in this location would experience side to oblique views of the construction compound in relatively close proximity including movements of construction traffic and other activities. Although some garden vegetation may filter these views, this is anticipated to result in a **Moderate Adverse** (significant) effect during construction.
- 11.10.20 Effects to all remaining building-based visual receptors within this group would be not significant with only limited views of the construction compound due to the presence of intervening landform and woodland. A **Minor Adverse** (not significant) effect during construction has been identified for Receptor Locations RRL2 (Stronmilchan), RRL5 (Tulich and Duiletter) and RRL6 (Drishraig), and a **Negligible** (not significant) effect has been identified for Receptor Locations RRL1 (Dalmally) and RRL3 (Lower Kinachreachan and Dalmally Golf Club House).

Northern Shoreline of Loch Awe (Receptor Locations RRL7-RRL11)

- 11.10.21 No significant effects were identified for any visual receptors within this receptor group during construction. A **Minor - Moderate** (not significant) effect was identified for Receptor Location RRL9 (Properties on Cruachan Access Road) where views of road upgrading works and construction traffic would be experienced within close proximity but would take place within rear or side / oblique views from properties, whilst the predominant southerly view, elevated over Loch Awe would be unaffected.
- 11.10.22 Potential limited views of these road upgrading works and construction traffic, filtered through trees, may be obtained from other properties at Receptor Locations RRL7 (Lochawe (west) and RRL10 (Innis Chonain and Tigh Cherracher) and are anticipated to result in **Minor Adverse** (not significant) visual effects, whilst the effect on visual receptors at Receptor Location RRL8 (Lochawe (east) would be **Negligible**.
- 11.10.23 A **Minor Adverse** (not significant) effect is also anticipated for visual receptors at Receptor Location RRL11 (Cruachan Visitor Centre and Admin Building) where, although views of the quayside construction would be experienced at close proximity, the role of the receptor is directly related to the operation or interest of the existing Cruachan Pumped Storage Scheme and therefore their visual sensitivity is considered to be very low.

West of Loch Awe (Receptor Locations RRL12-RRL17)

- 11.10.24 Potential significant effects have been identified during construction to views from two Receptor Locations within this group, located at Tervine: **Receptor RRL16** (Tervine Cottages), a group of cottages, slightly elevated above the shore, and **Receptor RRL17** (Tervine) comprised of an estate lodge and fish farm. From these locations, works on the opposite shore of Loch Awe would be noticeable including removal of vegetation which would reveal more open views of traffic on the A85. A potential laydown area adjacent to the existing fish farm would also potentially feature within the main view. From RRL16, these activities would appear within the direct view but foreground vegetation would filter the view to some extent. From RRL17, the works would typically affect the

more filtered side or oblique views from the estate lodge, where the predominant orientation is to the east, up Loch Awe. More direct and unfiltered views would be obtained from the fish farm, but visual receptors in this location are considered to have much lower sensitivity due to the type of activities they would be engaged in and the context of the existing fish farm site. Taking these modifying factors into account, the effect is anticipated to be **Moderate Adverse** (significant).

- 11.10.25 All other effects for this receptor group would be **Negligible**, as views of the proposed construction works are anticipated to be very limited or non-existent due to the screening effects of intervening landform and woodland. Some filtered views of construction works at the upper intake and upper haul road from RRL13 (Barachander, Achnacraobh and Kilchrenan) and RRL14 (North Port to Hayfield) would be very limited and considered likely to be unexceptional within the visual context.

Southern Shoreline of Loch Awe (Receptor Locations RRL18-RRL23)

- 11.10.26 No significant effects were identified for any visual receptors within this receptor group during construction. **Minor Adverse** (not significant) visual effects were identified for visual receptors at Receptor Location RRL19 (Inistrynich, Achlian, Millside and Bovuy) where views of upgrading works and construction traffic on the upper haul road or filtered distant views towards the quayside works would be perceptible from some properties but these features would be small and unlikely to be distracting the view. The visual effect for all other Receptor Locations would be **Negligible**.

Building Based Receptors: Effects During Operation

- 11.10.27 During operation, views from all building-based receptor locations would be not significant, because the levels of activity and footprint of the Proposed Development would be reduced, and proposed reinstatement and mitigation measures would lead to permanent features appearing less noticeable and detracting in views. The detailed assessment of all building-based visual receptor locations during the operational phase is included in **Technical Appendix 11.2**. The operational effect for Receptor Locations where significant effects are anticipated during construction is summarised as follows:

- **Receptor Location RRL4 (Castles Farm):** Following construction, the eastern construction compound would fully be restored, and therefore the operational effect after 10 years when existing vegetation types are assumed to have re-established would be **Negligible**;
 - **Receptor Location RRL16 (Tervine Cottages):** During operation, the permanent quayside structure including any infrastructure located on it, and traffic on the A85 to its rear would continue to be visible within filtered views from these properties. However, these features would be anticipated to be less distracting in the view due to the reduced level of activity compared to the construction phase. The implementation of strategic planting on the quayside surface would help to soften the appearance of these structures over time, and particularly the movement of traffic on the A85, to the extent that this would appear fairly similar to the existing Cruachan administration and tailrace area. The effect after 10 years is therefore anticipated to be **Minor Adverse** (not significant); and
 - **Receptor Location RRL17 (Tervine):** During operation, the permanent quayside structure including any infrastructure located on it, and traffic on the A85 its rear would continue to be visible within side and oblique filtered views from the lodge, and more direct views from the fish farm but with the reduced level of activity compared to the construction phase are considered unlikely to be very distracting in these views, taking into account the unaffected nature of the main easterly view from the lodge and the lower sensitivity of receptors at the fish farm. The implementation of strategic planting on the quayside surface would help to soften the appearance of these structures, and further reduce the visual effect over time. The effect after 10 years is therefore anticipated to be **Minor Adverse** (not significant).
- 11.10.28 With respect to Receptor Locations RRL16 and RRL17, Figure 11.7 (a-d) provides a representative view of how the proposed quayside may appear from the Tervine area but is not indicative of the view from any particular property.

- 11.10.29 Of the remaining building-based receptor locations, Minor Adverse (not significant) effects are anticipated for Receptor Location RRL11 (Cruachan Visitor Centre and Admin Building) where changes to the view would remain perceptible. The visual effect at all other Receptor Locations would be **Negligible** (not significant), because views of permanent features of the Proposed Development are considered unlikely.

Route Based Receptors: Effects During Construction

- 11.10.30 Twelve routes were included in the visual assessment (see Figure 11.4). During construction, significant effects were identified for visual receptors using 4 of these routes (see **Technical Appendix 11.2**), as summarised below:

A Roads

- 11.10.31 Two A roads have been included in the assessment, including the A85 (R1) and A819 (R2). Of these routes, travellers on Route R1 (A85) were identified as potentially receiving a significant visual effect during the construction of the Proposed Development. These receptors would gain immediate views of construction activities at the quayside from an approximate 700 m stretch of this route where they may also be diverted and slowed. However, this would be a short section of the journey overall and tree clearance in this area would also reveal previously unavailable open views across Loch Awe which may in themselves be seen more positively. There would also be limited, glimpsed views of other works from other parts of the route but these would form unremarkable changes to the view. As the works at the quayside would be likely to be very noticeable and detracting, but localised to a short part of the route, the effect on the visual amenity of the route through the study area is assessed as being **Moderate Adverse** (significant).
- 11.10.32 Visual effects for users of Route R1 (A819) would be **Negligible** because there would be only limited glimpsed views from this route.

B Roads

- 11.10.33 Three B roads were included in the assessment, with travellers on one, Route R3 (B8077) being identified as experiencing a potentially significant visual effect during construction. This route passes close to the proposed eastern compound and travellers and recreational users would experience passing views of this feature which would be noticeable within views towards the mountains from around 1 km of the route. The effect is anticipated to be **Moderate Adverse** during the construction period.
- 11.10.34 Travellers on Routes R4 (B845) and R5 (B840) were assessed to have **Negligible** effects during construction due to the limited availability of views which would be brief and glimpsed.

Minor Roads

- 11.10.35 No significant effects were identified to any minor roads in relation to the Proposed Development. The effect on users of Route R6, a single-track road from Kilchrenan to Ardanaiseig was identified as **Negligible** as only glimpsed views of activities at the upper reservoir would be obtained from limited number of locations.

Other Public Transport Routes

- 11.10.36 No significant effect is anticipated for travellers on Route R7 (the Oban Branch Railway Line) during construction. Although views from the railway line are similar to those from the A85, it is anticipated that existing woodland between the railway line and A85 would be retained. Views would therefore be brief and glimpsed through the trees. Although slightly longer-term views may be experienced of construction activity at the quayside if the train is stopped at the Falls of Cruachan station, these views would still be filtered and would comprise a very short segment of the overall journey through the study area. The effect during construction would therefore be **Minor Adverse** (not significant).

Recreational Routes

- 11.10.37 Significant effects during construction were identified for two out of five recreational routes included in the assessment. Route R11 (Cruachan Horseshoe) and Route R12 (Beinn Eunaich and Beinn a Chochuill).
- 11.10.38 From Route R11 (Cruachan Horseshoe), the works at the upper reservoir including construction of the intake structure, shaft and electrical connection, and construction laydown and concrete batching works would be close and prominent when passing. These works would also be perceptible in views from the mountain summits and ridges but would be seen within the context of the existing dam and other features including steel lattice transmission towers, tracks, and the existing substation. From these high-level parts of the route, these activities could be distracting but would be relatively localised in the wide and expansive view from the summits. Other parts of the route would remain unaffected, with works at the quayside being barely perceptible from the first 500m of the route due to filtering and screening by woodland and concealed by landform from all other parts. The effect on the visual amenity of this route as a whole during construction would be **Moderate Adverse** (significant).
- 11.10.39 The eastern construction compound would be located close to Route R12 (Beinn Eunaich and Beinn a' Chochuill) and would therefore be prominent in passing from the initial section of the route towards Castles Farm. It would also be likely to be noticeable in descent from either Stob Maol or the glen of Allt a' Mhoille. The visual effect would be localised to only part of the route as the compound would be either concealed by landform or unlikely to be very perceptible from the upper part of the route and ridge within the wider expansive view. The construction period effect would therefore be Moderate Adverse (significant).
- 11.10.40 The construction phase effect on the three remaining routes included within the assessment is anticipated to be Negligible as views from all these routes of the Proposed Development would be very localised, glimpsed and lead to a barely perceptible change in the view.

Route Based Receptors: Effects During Operation

- 11.10.41 During operation, views from all Routes would be not significant because the reduced level of activity and re-establishment of vegetation and other mitigation measures would reduce the extent of routes where views would be obtained, and permanent features would not be anticipated to form a noticeably detracting feature within views. The detailed assessment of all route-based visual receptors during the operational phase is included in **Technical Appendix 11.2**. The operational effect for Receptor Locations where significant effects are anticipated during construction is summarised as follows:
- **Route R1 (A85):** During operation, the quayside would continue to be visible in brief, passing, views. However, the effect would be reduced over time as proposed mitigation planting established. Some gaps in planting would be likely to remain and buildings on the quay may be briefly visible, but this would be similar to the existing situation, and the open views created over the loch would not necessarily be viewed as adverse. A **Negligible** effect is therefore anticipated after 10 years;
 - **Route R3 (B8077):** This route would only be affected by views of the proposed eastern construction compound. This feature would be removed after construction activities were complete and vegetation restored. The operational effect after 10 years would therefore be **Negligible**;
 - **Route R11 (Cruachan Horseshoe):** During operation, there would be possible passing views of the electrical connection and access to the surge shaft, seen within the context of other existing infrastructure below the dam. There would be views of the upper intake gate hoist structure and surrounding rock cut from areas alongside the reservoir and more distantly, from higher mountain areas where the mouth of the surge shaft may also be perceptible. These features would be seen in the context of the existing dam and other surrounding infrastructure, and existing, though smaller rock cut areas. Mitigation planting and vegetation growth over time, would soften the appearance of the rock cut. In the context of the existing dam and other existing infrastructure, these permanent features would not be noticeably

distracting, and the operational effect after 10 years is therefore anticipated to be **Minor Adverse** (not significant). **Figure 11.8 (a-d)** provides a representative view of how the proposed upper intake structure may appear from part of this route close to the new structure and should be considered a worst-case sequential view; and

- **Route R12 (Beinn Eunaich and Beinn a' Chochuill):** This route would only be affected by views of the proposed eastern construction compound. This feature would be removed after construction activities were complete and vegetation restored. The operational effect after 10 years would therefore be **Negligible**.

11.10.42 The operational effect on the visual amenity of users of all other Routes within the Study Area would be **Negligible** because views of permanent features of the Proposed Development would be limited and typically either distant, or only glimpsed through roadside trees.

Outdoor Viewing Locations: Effects During Construction

11.10.43 Two Outdoor Viewing Receptor Locations (see **Figure 11.4**) were included in the assessment where the importance of the view for visual receptors is recognised: Receptor Locations OLV1 (Kilchurn Castle) and OLV2 (Duncan Ban McIntyre Monument) The effect at both locations was identified as being **Minor Adverse** (not significant) during construction (see **Technical Appendix 11.2**). At both locations, there would be some views of the eastern construction compound area and potentially limited, distant views of road upgrading and construction traffic on the upper access road. These features are not anticipated to be distracting within the view.

Outdoor Viewing Locations: Effects During Operation

11.10.44 The visual effect for both Outdoor Viewing Receptor Locations would be **Negligible** as the main feature visible from these locations, the eastern construction compound would be temporary and would be fully restored on completion of the construction works.

Summary of Visual Effects

11.10.45 A summary of the effects on visual receptors during construction and operation is presented in **Table 11.16**.

Table 11.16: Summary of Visual Effects During Construction and Operation

Receptor Type	Effects During Construction						Effects During Operation					
	Negligible	Minor	Minor – Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor – Moderate	Moderate	Moderate - Major	Major
Buildings / Building Groups	12	7	1	3	-	-	20	3	-	-	-	-
Routes	6	2	-	4	-	-	11	1	-	-	-	-
Outdoor Viewing Locations	-	2	-	-	-	-	2	-	-	-	-	-
Totals	18	11	1	7	-	-	33	4	-	-	-	-

Summary of Visual Effects During Construction

- 11.10.46 The summary table indicates that during construction, some significant visual effects would be expected from the Proposed Development. Moderate Adverse (significant) effects are anticipated for visual receptors at three of twenty-three built properties/property groups, and four out of twelve route-based receptors during the construction phase.
- 11.10.47 The three building-based receptor locations where Moderate Adverse significant effects are anticipated to occur are all located within 1 km of key areas of proposed construction works and therefore the works would appear fairly prominent within the view. At Receptor Location RRL4 (Castles Farm) there would be close views of the eastern construction compound, although these would be from a side or oblique angle and likely to be partially filtered by foreground vegetation. At Receptor Locations RRL16 and RRL17 which include a range of cottages, a lodge and a fish farm, there would be close views of construction works at the proposed quayside to the north across the water of Loch Awe / Pass of Brander. The works would therefore be prominent in the northerly view from these locations. However, the visual effect would be moderated to some extent by either existing trees which would filter the view, the angle of the principal view being to the east, away from the Proposed Development, or in the case of the operational fish farm, the lower sensitivity of the viewer.
- 11.10.48 Similar significant effects are also anticipated for visual receptors using two Routes: R1 (A85) and R3 (B8077) which pass close to these areas of the Proposed Works. Route R1 would pass immediately adjacent to the quayside works with visual receptors also likely to be temporarily diverted and delayed, whilst Route R3 passes close to the location of the proposed eastern construction compound. Views of the Proposed Development from these routes would be relatively localised, but given the proximity to the proposed works, are anticipated to lead to a Moderate Adverse (significant) effect on the visual amenity of the route within the study area overall.
- 11.10.49 Significant effects are also anticipated for two mountain walking routes: Route R11 (Cruachan Horseshoe) and Route R12 (Beinn Eunaich and Beinn a Chochuill). These routes would pass close to key areas of construction in their lower reaches: in the case of R11, the upper intake works; and in the case of R12, the eastern construction compound. There would also be more distant views of these areas of the works from some of the upper parts of the routes. From Route R11, the works would be seen within a context of the existing dam and other associated infrastructural features which already affect this part of the view. This is considered to reduce the sensitivity of the viewer and magnitude of change to some extent. The effect on users of both routes is predicted to be Moderate Adverse (significant).

- 11.10.50 The effect to all other visual receptors within the study area is anticipated to be within the range of Negligible to Minor – Moderate Adverse, and therefore not significant.

Summary of Visual Effects During Operation

- 11.10.51 During the operational phase, these significant effects are all anticipated to reduce to a non-significant level. As can be seen from

- 11.10.52 Table 11.16, due to the very localised visibility of the permanent features of the Proposed Development, operational effects are predicted to be mainly Negligible for the vast majority of building-based receptors, route-based receptors, and receptors at outdoor viewing locations because views of the Proposed Development would be barely perceptible or unremarkable in the view. Minor Adverse effects are anticipated for only two building-based Receptor Locations and one Route.
- 11.10.53 For two property groups at Tervine on the opposite shore of Loch Awe to the proposed quayside area a Minor Adverse (not significant) effect is anticipated in relation to views of the proposed quayside and associated structures over the longer term. These views would be seen partially filtered through foreground trees or obliquely from residential properties and would affect lower sensitivity receptors at the nearby fish farm. Whilst some mitigation planting is anticipated to soften the appearance of the quayside and piled wall supporting the A85 to the rear, these features would remain perceptible in the view forming a modified stretch of Loch Shore which would be somewhat detracting to the view.
- 11.10.54 A Minor Adverse (not significant) effect is also anticipated to R11 (Cruachan Horseshoe) where proposed features at the upper intake would be seen within the context of the existing dam and other infrastructure forming a perceptible but not distracting additional feature in the view.

11.11 Further Mitigation and Enhancement

- 11.11.1 The mitigation measures necessary to offset the potential for significant effects are included under embedded mitigation (see [section 11.9](#)). The assessment of operational effects assumes the implementation of these mitigation measures.

11.12 Residual Effects

- 11.12.1 The assessment of operational effects takes into account the anticipated benefits of the embedded mitigation measures proposed and therefore the operational effects identified should be considered representative of residual effects.

11.13 Monitoring

- 11.13.1 The monitoring of planting proposed as part of the Proposed Development is recommended over the initial establishment period of 5 years to ensure plant survival and establishment.

11.14 Cumulative Effects

- 11.14.1 Cumulative effects are those which occur where the effects of more than one development of a similar type within a particular landscape combine to produce a greater level of effect. In relation to The Proposed Development, there are a number of ways in which cumulative effects may occur:
- During construction, other activities of similar type may increase the perceived presence of this type of activity in the landscape. Such activities may include other major construction projects or forestry felling; and
 - During operation, permanent features of the scheme (such as those at the upper intake site, and quayside) may be seen in association with other, similar features leading to a greater perception of this type of development in the landscape.
- 11.14.2 With the agreement of Argyll and Bute Council, the following developments which are proposed within the vicinity of the study area have been included in the review of potential cumulative effects as shown on [Figure 11.6](#).
- Proposed transmission infrastructure projects on the southern side of Loch Awe, including the Creag Dhubh 132 – 275 kV substation and Creag Dhubh to Dalmally 275 kV Overhead Line;

- The Proposed Balliemeanoch Pumped Storage Scheme, located on the southern shore of Loch Awe; and
- The operational Cruachan Pumped Storage Scheme (operational effects only).

Cumulative Effects During Construction

- 11.14.3 As discussed in this LVIA, the construction of the Proposed Development is anticipated to result in some localised significant landscape and visual effects during construction, typically limited to the areas around the major areas of works at the upper reservoir, quayside and eastern construction compound. The potential for this to lead to significant cumulative effects is outlined below:

Landscape

- 11.14.4 The proposed Creag Dhubh – Dalmally transmission infrastructure would be located within LCT40 (Craggy Upland – Argyll) with most landscape effects likely to be focussed within this LCT where the construction term effect of the Proposed Development has been assessed as Negligible. Whilst some aspects of these works may be perceptible from higher parts of LCT 34 (Steep Ridges and Mountains) to the north of the loch, this is considered likely to appear clearly separate from the more immediate effects of the Proposed Development works at the upper reservoir. Potential intervisibility of these works around the shore of Loch Awe would be likely to be limited to areas at the east of the Loch where perceptibility of the Proposed Development construction would be very limited. There could be some more noticeable intervisibility of construction of grid infrastructure within LCT 37 (Upland Glens – Argyll) but this is also likely to affect different areas, with the wooded qualities of this LCT likely to limit the availability of combined or sequential effects. The potential for any significant cumulative landscape effects with this development during construction is therefore considered unlikely.
- 11.14.5 The Proposed Balliemeanoch Pumped Storage Scheme would be located further to the south with the upper works area around 9.5 km to the south of the Proposed Development within LCT40 (Craggy Upland – Argyll) and the lower works area around 12.25 km to the south-east on the shore of Loch Awe within LCT53 (Rocky Coastland – Argyll). There may be some potential distant intervisibility of the upper works of the Balliemeanoch development with those of the Proposed Development. However, there would already be intervisibility with the existing Cruachan dam and, given the geographical distance between the two developments and their positioning within clearly different landscape areas, it is considered unlikely that this would lead to any significant cumulative effect during construction.
- 11.14.6 Works at the lower reservoir for both developments would be on the shore of Loch Awe giving potential to affect the character of the loch and loch-shore landscapes. However, there would be no intervisibility between these two areas and would be likely to be few areas where shared visibility may be obtained. The two areas of construction would be in very different parts of Loch Awe with a considerable journey required in order to experience any sequential effects. Given the localised situation of potential effects of the Proposed Development lower reservoir / quayside works within the separated arm of the Pass of Brander it is not considered that there would be any significant cumulative effect between these two developments during construction.
- 11.14.7 When giving consideration to all three developments, the geographical disparity of these developments and very localised nature of potential landscape effects relating to the construction of the Proposed Development are considered unlikely to lead to any notable cumulative landscape effects during construction. It is therefore concluded that there would be no significant cumulative landscape effects relating to the construction of the Proposed Development in addition to the two baseline developments considered.

Visual

- 11.14.8 The proposed Creag Dhubh – Dalmally transmission infrastructure would be mostly visible within areas to the south-east of Loch Awe and from the residential and transport routes along the northern shore of Loch Awe at the eastern end. The visual effects of the Proposed Development would be very limited from these areas, being mostly Negligible and occasionally Minor. The more noticeable effects in relation to the Proposed Development in these areas would occur as a result of the proposed eastern construction compound. These effects would be typically localised to visual receptor locations within around 1 km. There would be some potential for construction associated with the transmission infrastructure to also be sequentially visible in views obtained by these visual receptors. However, this would appear as a clearly separate development, within a different part of the view, likely to be filtered or screened and is considered unlikely to result in a very noticeably increased detraction within the view. It is therefore considered unlikely that there would be any increased level of visual effect compared to that of the Proposed Development alone.
- 11.14.9 Potential cumulative effects with the Balliemanoach Pumped Storage Scheme would be relatively limited due to the geographically distant location of this development in relation to the Proposed Development. Potential receptors who may be affected are considered to include Route R11 (Cruachan Horseshoe) where views of both developments may be experienced in combination; and Route R5 along the south-east shore of Loch Awe where there is potential for sequential effects. The assessment of visual receptors has identified a Negligible effect for Route R5 due to limited potential for views of the Proposed Development. No significant cumulative effects would therefore occur. For Route 11 (Cruachan Horseshoe), a Moderate Adverse (significant) effect has been identified during construction from the Proposed Development alone. However, the proposed Balliemanoach development would only be visible from the most elevated parts of this route on the mountain summits and ridges which are over 13 km from the proposed upper reservoir area. Whilst this may be seen in combination with the Proposed Development works, the distant nature of the Balliemanoach works is considered very unlikely to result in these two developments being perceived as associated, and therefore the cumulative effect is not anticipated to be any greater than that for the Proposed Development alone.
- 11.14.10 In view of the localised nature of the potential visual effects of the Proposed Development and the small and contained range of potential visual receptors affected, it is considered unlikely that any notable cumulative visual effects would be experienced in combination with the two other developments, particularly given the geographical distance between these developments which would limit the potential for sequential effects. It is therefore concluded that there would be no significant cumulative visual effects relating to the construction of the Proposed Development in addition to the two baseline developments considered.

Cumulative Effects During Operation

- 11.14.11 The operational effects of the Proposed Development would be less than the anticipated construction phase effects and it is assumed that this would also be the case for the baseline cumulative developments. Therefore, as no significant cumulative landscape and visual effects are anticipated in relation to these developments during construction, it is also considered to be the case that no significant cumulative landscape and visual effects would occur during the operation of the Proposed Development in relation to these developments.
- 11.14.12 As well as the proposed Balliemanoach pumped storage development and Creag Dhubh to Dalmally transmission development, the Proposed Development would also be seen in combination with the existing Cruachan Pumped Storage Scheme. The Proposed Development would extend areas of the existing development leading to a perception of a single, larger development. This may change the perception of the existing pumped storage scheme to some degree. At the lower reservoir, the length of quayside may give the impression of a larger, more industrial development. However, at the upper reservoir it is considered unlikely that the additional features would alter the existing perceptions of a working, managed site.

11.14.13 Overall, it is concluded that there would be no significant cumulative landscape and visual effects during the operation of the Proposed Development.

11.15 Referencing

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- Walk Highlands - <https://www.walkhighlands.co.uk/>.

12 Cultural Heritage

12.1 Introduction

- 12.1.1 This chapter provides an assessment of the likely significant effects on cultural heritage assets associated with the construction and operation of the Proposed Development taking into account relevant national, regional and local policy, guidance and regulations.
- 12.1.2 This chapter describes the methods used to establish the baseline conditions which exist in the vicinity of the Site, the potential direct and indirect effects of the Proposed Development on heritage receptors, the mitigation measures required to prevent, reduce, or offset these effects, and the remaining residual effects associated with the Proposed Development.
- 12.1.3 The Proposed Development has the potential to result in impacts upon cultural heritage assets during construction of the main infrastructure (e.g., tunnels and quayside), which may affect the physical fabric or setting of heritage assets, and operation, which may affect the setting of heritage assets.
- 12.1.4 This chapter has links with **Chapter 11: Landscape and Visual Impacts Assessment**, given the potential for visual effects on the setting of heritage assets.
- 12.1.5 As development parameters for the Proposed Development have been included in order to provide a degree of design flexibility, each topic specific assessment has tested a realistic worst-case scenario, as set out in this chapter, to ensure that the likely significant impacts arising from the Proposed Development have been adequately assessed.
- 12.1.6 This chapter is supported by the following figure(s) and appendices:
 - **Figure 12.1:** Designated Heritage Assets;
 - **Figure 12.2:** Non-Designated Heritage Assets; and
 - **Appendix 12.1:** Cultural Heritage Baseline Desk Based Assessment.

12.2 Policy Context, Legislation, Guidance and Standards

- 12.2.1 Relevant legislation in the current context is provided in:
 - Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997.
- 12.2.2 Relevant national and local planning policy is provided in:
 - Scottish Government (2014) Scotland's Third National Planning Framework (NPF3) – paragraph 3.30;
 - Scottish Government (2021) Our Fourth National Planning Framework (Draft) (NPF4) – Policy 28; and
 - Scottish Government (2014) Scottish Planning Policy (SPP) – paragraphs 135-151.
- 12.2.3 Local planning policy is provided in:
 - Argyll and Bute Local Development Plan – Policies LDP 3, ENV 15, ENV 16(a), ENV 19, ENV 20; and
 - Argyll and Bute Proposed Local Development Plan 2 – Policies 15-21.

12.2.4 A more detailed review of planning policies relating specifically to heritage is provided in **Appendix 12.1**.

12.2.5 The assessment has been conducted with reference to the following guidance:

- Planning Advice Note PAN 2/2011: Planning and Archaeology;
- NatureScot & HES (2018) EIA Handbook. Version 5;
- IEMA (2021) Principles of Cultural Heritage Impact Assessment;
- HES (2020) Managing Change in the Historic Environment: Setting;
- HES (2020) Managing Change in the Historic Environment: Engineering Structures; and
- ClfA (2020) Standard and Guidance for Historic Environment Desk-Based Assessment.

12.3 Consultation

12.3.1 **Table 12.1** below summarises details of consultation, comments and responses received in relation to the Proposed Development.

Table 12.1: Summary of Consultation

Reference	Comment	Response
Scoping Opinion		
Scottish Government Scoping Opinion 29 th October 2021	Ministers agreed with HES and the Planning Authority that the applicant should scope in the Category A listed Ben Cruachan Hydro Electric Scheme, Turbine Hall and adopt the approach recommended by HES and agreed by the Planning Authority in respect of these matters as detailed in their responses.	The potential impact upon the turbine hall has been assessed in Section 12.10 of this Chapter.
Historic Environment Scotland Letter dated 18 th August 2021	Historic Environment Scotland advised that potential impacts upon Ben Cruachan Hydro Electric Scheme Turbine Hall should not be scoped out of the EIA. It was agreed that potential impacts resulting from changes in water levels on Loch Awe might be scoped out.	The potential impact upon the turbine hall has been assessed in Section 12.10 of this Chapter. A summary of the potential impacts and effects arising from changing water levels in Loch Awe upon Scheduled Monuments on Loch Awe is presented in Appendix 7.1 .
Argyll and Bute Council Letter dated 19 th October 2021	Argyll and Bute Council advised that operational effects on the setting of the Category A Listed Building (Cruachan Power Station) should be scoped in to the assessment.	The potential impact upon the setting of the Power Station has been assessed in Section 1.10 of this Chapter. A LVIA has also been undertaken. Visualisations are presented in Appendix 11.1 .
	All elements of the construction, including timescale and phasing, should be clearly set out in order to clarify the potential impacts upon the listed power station.	A full description of the Proposed Development, including construction phasing is presented in Chapter 3 of the EIA Report and construction effects are described in Section 12.10 of this Chapter.

Reference	Comment	Response
West of Scotland Archaeology Service E-mail dated 13 th October 2021	West of Scotland Archaeology Service (WoSAS) advised that they were content with the proposed scope of the EIA.	N/A
Meetings		
Historic Environment Scotland 27 th July 2021	Meeting with Historic Environment Scotland (HES). HES requested information regarding the potential impact of the Proposed Development upon water levels in Loch Awe. It was indicated that temporary effects upon settings as a result of the construction phase were not of concern.	A summary of the potential impacts and effects arising from changing water levels in Loch Awe is presented in Appendix 7.1 . A draft of this note was submitted to HES who subsequently agreed that potential impacts resulting from changes in water levels on Loch Awe might be scoped out.

12.4 Methodology

Study Area

- 12.4.1 The Cultural Heritage study area extends 1km from the application boundary, as described in the Scoping Report, and this buffer size agreed as suitable by the statutory consultees. Given the largely subterranean character of the Proposed Development this is considered sufficient to identify any designated heritage assets which might receive effects upon setting from the scheme and to assess the archaeological potential of the area.

Baseline Data Collection

- 12.4.2 Baseline information has been gathered from the following sources:
- HES databases, including National Record of the Historic Environment (NHRE);
 - West of Scotland Archaeological Service (WoSAS) Historic Environment Records (HER);
 - Maps held by the National Library of Scotland;
 - Scottish Government LiDAR data;
 - Satellite imagery; and
 - Readily available published sources.
- 12.4.3 The above desk-based work has been augmented and verified by walkover surveys and site visits to gather setting baseline data. Aerial photographs held by the National Collection of Aerial Photography (NCAP) have not been consulted for the current study. However, they have been examined for previous studies for the Site and surrounding area and hence form part of the existing baseline data; any features visible will already have been recorded.
- 12.4.4 The baseline is presented in full in **Appendix 12.1**.

Assessment Methodology

- 12.4.5 The impact assessment has been undertaken with reference to EIA Handbook: Appendix 1 – Cultural Heritage Impact Assessment (HES & SNH, 2018) and the assessment of setting impacts has been undertaken with reference to Managing Change in the Historic Environment (HES, 2020).

- 12.4.6 The sensitivity of heritage assets has been determined with reference to their value. In respect of designated assets, value has been determined by their designation. The value of non-designated assets has been determined by reference to local level designation/ categorisation, ie WoSAS' Non-Statutory Register, and relevant designation criteria guided by professional judgement. Guideline sensitivity criteria are set out in **Table 12.2** below.

Table 12.2: Guideline Sensitivity Criteria

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

- 12.4.7 The predicted magnitude of change as a result of the Proposed Development has been considered in terms of the likely change in the cultural significance of the affected heritage assets. The guideline criteria applied are set out in Table 12.3 below.

Table 12.3: 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.

- 12.4.8 The predicted significance of the effect has been 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 12.4 below. As set out in Table 12.5, all effects at 'moderate' or above levels will be considered to be significant in the context of the EIA Regulations.

Table 12.4: Guidelines for Determining Significance

		Magnitude				
		Substantial	Major	Moderate	Minor	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

Table 12.5: Guideline Significance Criteria

	Level of Effect	Criteria
Significant	Substantial	These 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.
	Major	These effects are likely to be important considerations at a local scale and may become key factors in the decision-making process.
	Moderate	These effects, 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.
Not significant	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 or No Effect	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.

Limitations

- 12.4.9 No limitations affecting the baseline data have been identified but it should be noted that the HER is a reflection only of remains discovered to date and are skewed to areas previously developed and to archaeologically visible strata (e.g., shallow sequences), and by its nature is an incomplete record which can guide assessment of potential but not fully predict occurrence of further as yet unknown buried heritage assets.

12.5 Summary of Current Baseline Conditions

Designated Heritage Assets in the Site

- 12.5.1 There are three designated heritage assets within the Site, all are extant listed buildings:
- Ben Cruachan Hydro Electric Scheme, Turbine Hall (LB51688);
 - Ben Cruachan Hydro Electric Scheme, Cruachan Dam (LB51687); and
 - Falls Of Cruachan Railway Viaduct (LB50811).
- 12.5.2 The turbine hall and viaduct are Category A Listed Buildings. The dam is individually Category B, but forms part of a Category A-group with the turbine hall. They are of high sensitivity.
- 12.5.3 Ben Cruachan Hydro Scheme (Cruachan 1) opened in 1965. Its design by James Williamson responded to the challenge of developing a nationally significant power station in an area renowned for scenic beauty with two monumental and pioneering pieces of civil engineering. The turbine hall is concealed deep underground, minimising the visual impact of the scheme, whilst the buttressed dam, sitting back from the entrance to Coire Cruachan, appears almost a part of the landscape, the angle of the buttresses being close to that of the adjacent slopes. All the operational equipment is contained within the dam to negate the need for towers and hence to provide a clean, sweeping line (Fleetwood 2009).
- 12.5.4 The concern for aesthetics was not restricted to the dam. The turbine hall includes a large mural by Elizabeth Faulkner, depicting a mythologised retelling of the history of the area and the coming of hydro power, and careful attention has been paid to the lighting and acoustic design and the overall appearance of the turbines and control equipment. The clean lines of the equipment in the turbine

hall are juxtaposed with bare unfinished rock at its ends. The overall quality of the design reflects the pride in this nationally important project, which played and continues to play an important role in the UK's power supply and helped finance the supply of electricity to remote areas.

- 12.5.5 The design also deployed a highly innovative solution to one of the key brakes on the adoption of pumped hydro. This was the use of reversible turbines, which negated the need for separate pumping equipment which added greatly to the cost of such facilities at the time. In the context of Cruachan 1, this also allowed the pumping/generation element to be substantially more compact, reducing the volume of material that had to be excavated. The four 100MW Francis turbines were world firsts and their success paved the way for the construction of similar schemes elsewhere. These innovative design measures contribute substantively to the power station's historic interest and hence value at a national level. The cultural significance of the turbine hall and dam reside primarily in their historic, technical and architectural interest and hence resides primarily in their fabric. However, a key element of the design of the scheme is the visual relationship of the dam with the surrounding landscape. The architects' success in incorporating a huge structure into the rugged Highland landscape is an exceptional achievement and is of great aesthetic value.
- 12.5.6 The viaduct was constructed in 1880 to carry the Glasgow to Oban railway over the gorge of the Falls of Cruachan. It is listed owing to its being the first viaduct on a British railway to feature arches constructed using mass concrete. The viaduct is surrounded by trees and under current conditions has no presence in the landscape. Its setting is restricted to its immediate surroundings. As a Category A Listed Building it is of national importance and considered to be of high sensitivity.
- 12.5.7 There are no Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Battlefields or Conservation Areas in the Site.

Designated Heritage Assets in the 1km Study Area

- 12.5.8 The following designated heritage assets lie within the study area:
- Scheduled Monuments;
 - Lochawe crannog (SM4194);
 - Kilchurn Castle (SM90179);
 - Castles Farm dun (SM3772);
 - Listed Buildings;
 - St Conan's Church – Category A (LB4700);
 - Loch Awe House – Category C (LB4701).
 - Inventory Designed Landscape; and
 - Ardanaiseig House (GDL00018).
- 12.5.9 Lochawe crannog (SM4194) comprises a tree-covered crannog on Loch Awe. It has not been dated but is likely to be of Medieval or earlier date. It has the appearance of an island. Its cultural significance resides almost entirely as a potential source of archaeological data; this is particularly high as the waterlogged conditions are likely to have preserved organic remains, including artefacts and palaeoenvironmental remains, that do not often survive. As a Scheduled Monument, it is of national importance and is considered to be of high sensitivity.
- 12.5.10 Kilchurn Castle (SM90179) is a Late Medieval Castle occupying a rocky promontory at the north-east end of Loch Awe. The castle is well-preserved and stands to its full original height of four storeys and the late 17th century barrack blocks are identified as some of the earliest purpose-built barracks in Europe. A small area of woodland is adjacent whilst a boggy area of ground lies between the

promontory and the land to the east of the loch. There is no access to the interior of the castle. The castle's cultural significance resides primarily in its architectural and historic interest as a well-preserved example of a Medieval castle with later additions, and archaeological potential and hence in its fabric. Its ruined form has substantial degree of aesthetic value. Its setting makes a substantial contribution to the understanding of its function. The castle clearly occupies a strong location at a strategically important point. It also adds to the castle's aesthetic value, the loch and surrounding rugged Highland landscape complement the ruined castle's romantic appearance. As a Scheduled Monument, it is of national importance and is considered to be of high sensitivity.

- 12.5.11 Castles Farm dun (SM3772) is a fortified homestead occupying low spur surrounded by grazing. It is undated and has seen significant amounts of disturbance. The dun's cultural significance resides primarily in its archaeological potential despite the evident disturbance. The dun is not readily appreciable on the ground. As a Scheduled Monument, it is of national importance and is considered to be of high sensitivity.
- 12.5.12 St Conan's Church (LB4700) is a Category A-listed 19th/20th century church. It was designed by Walter Douglas Campbell, an amateur architect. It is a somewhat unique building incorporating a juxtaposing of numerous styles; fragments from Iona Abbey and a window from St Mary's Parish Church, South Leith, have been incorporated into it. The church stands on the north shore of Loch Awe, and is set back from the road, surrounded by trees. Its design incorporates views out over the loch. The church's cultural significance resides primarily in its architectural interest as an idiosyncratic and potentially unique design with aesthetic value. The church's design and aesthetic value draws upon views south across the loch. As a Category A Listed Building, it is of national importance and is considered to be of high sensitivity.
- 12.5.13 Loch Awe House (LB4701) is a late 19th century house, now a hotel, built in the Scots Baronial style. It stands in its gardens above the northern shore of Loch Awe. It has been built to enjoy views over the loch to the south. The building's cultural significance resides primarily in its architectural interest and hence fabric. Its design draws upon its Highland surroundings and hence views of and from the house contribute to the appreciation of its design. As a Category C Listed Building, it is of local importance and is considered to be of medium sensitivity.
- 12.5.14 Ardanaiseig House IGDL is an 18th century designed landscape located on the south side of Loch Awe. In its southern part is the Category B-listed Ardanaiseig House (LB12182) around which are formal gardens and terraces. Surrounded by parkland and woodland. It comprises mainly woodland, gardens, parkland and architectural features. The gardens contain a notable collection of trees and shrubs and lies in its southern part. The woodland limits outward views somewhat, but the surrounding hills are visible from various locations and the house is placed to enjoy eastward views over the loch. The designed landscape's cultural significance derives from its quality of design, horticultural, architectural, scenic and nature conservation interest. Views to the east and surrounding hills are incorporated into its design and hence contribute to its cultural significance.

Non-Designated Heritage Assets

- 12.5.15 Known non-designated heritage assets in the Site are all Post-Medieval or Modern in date, including:
- 18th century military road (21749 and 21761);
 - Cruachan Reservoir (46108);
 - Tunnels associated with Cruachan Power Station (46104, 46406 and 51863);
 - Charcoal burning platforms (21219);
 - Post-Medieval bank (67517);
 - Clearance cairn (67518);
 - Enclosure (67521);

- Rig and furrow (67515 and 67520);
- Railway halt (44646); and
- Allt Cruachan Footbridge (67511).

12.5.16 The above are all common feature types that are considered to be of local importance, with the exception of the charcoal burning platforms (21219) and the Cruachan tunnels (46104, 46406 and 51863) and reservoir (46108). The charcoal platforms are likely to be associated with the Scheduled Bonawe Ironworks. Owing to this association, they are considered to be of regional importance. Owing to association with the Category B-listed Cruachan dam, which itself forms a part of a Category A group, the reservoir and tunnels are considered to be of regional importance and medium sensitivity.

12.6 Baseline Evolution and Expected Future Baseline

12.6.1 The condition of the heritage assets in the area and hence the baseline situation is considered to be stable. The Listed Buildings within the Site are operational and are well-maintained. This is highly unlikely to change. The non-designated assets are essentially stable, though may be degrading very slowly owing to natural processes. Therefore, no substantial changes in the baseline are expected.

12.7 Embedded Mitigation

12.7.1 Embedded in the design of the Proposed Development are the following mitigation measures:

- The design of the upper intake and landscaping has been informed by the need to preserve the setting of the Category B-listed Cruachan Dam (LB51687);
- Works will be undertaken in accordance with a CEMP that will minimise as far as reasonably practicable the environmental effects of construction including the generation of waste, noise and dust. An outline CEMP is included in [Appendix 3.1](#); and
- Detailed design of the interface between the proposed access tunnel and the Turbine Hall will ensure that the design of the tunnel entrance is in keeping with the existing fabric.

12.7.2 In addition, the CEMP will contain measures to protect the fabric of the Category A-listed Cruachan Turbine Hall (LB51688), including the Faulkner mural and tiled floor, and the Category B-listed dam (LB51687) from accidental damage. Consequently, there is no potential for accidental damage to the fabric of Cruachan 1, including the dam.

12.7.3 At the end of the construction phase, the sites of the construction compounds (see [Chapter 3](#) Proposed Development) will be restored to pre-development condition.

12.7.4 The Proposed Development will not have any likely significant effects on water levels in Loch Awe – as reported in [Appendix 7.1](#) of the EIA Report. Hence, there is no potential for operational impacts upon the waterlogged fabric of the scheduled crannogs on Loch Awe. Any resulting effects have therefore been scoped out. This approach has also been agreed with HES (see Table 12.1).

12.8 Realistic Worst-Case Parameters for Assessment

12.8.1 The maximum project parameters identified in [Chapter 3](#) of this EIA Report have been used as the basis for the assessment (worst case scenario). These maximum dimensions represent the worst-case scenario in terms of potential for physical disturbance and change in setting.

12.8.2 The assessment has also assumed that the internal access tunnel connecting the Proposed Development with Cruachan 1 will connect directly into the turbine hall (LB51688) for Cruachan 1. This is the area of greatest sensitivity, and this therefore represents the worst-case scenario.

However, the final design may be amended to move the connection point outside the turbine hall and therefore further reduce potential impacts.

12.9 Assessment of Likely Effects

Construction

Ben Cruachan Power Station (Cruachan 1)

- 12.9.1 An access tunnel will be built linking the Proposed Development to the existing Cruachan 1 turbine hall (LB51688). This will enter the turbine hall at its south-eastern end. This end of the hall currently comprises a sheer face of exposed bedrock with a visitors' viewing gallery above the operations floor. The access tunnel will enter the existing hall slightly off set from centre. Reflecting the existing tunnel entrance at the north-western end of the turbine hall, the opening will comprise roughly finished bedrock. It will therefore preserve the juxtaposition of the timber and concrete-finished sides of the hall with the rough bedrock.
- 12.9.2 The Proposed Development will result in a legible alteration to the fabric of the turbine hall. This will not compromise the design of the turbine hall, affect its appreciation, or remove or damage any of its anthropogenic elements. It is therefore considered that the Proposed Development will preserve the turbine hall's special architectural and historic interest and will not impact upon its cultural significance. This will result in an effect of minor magnitude.
- 12.9.3 The Turbine Hall is of **high** sensitivity, and it is concluded that the proposed works will cause a direct, permanent, and adverse impact of **minor** magnitude. Overall, this will result in an effect of **minor** significance. This is not significant in EIA terms.
- 12.9.4 During the construction phase, a site compound will be established in the vicinity of the dam. This will comprise site offices and welfare facilities, hard-standing and other infrastructure. In addition, there will be heavy plant movement, excavation and other construction operations occurring in close proximity to the Dam during work relating to the upper intake, this is likely to be experienced by visitors as visually intrusive in the highland setting of the dam, affecting the aesthetic appreciation of views of and from the dam, in particular those of its buttressed front against the backdrop of Ben Cruachan. The relationship between the dam and the landscape adjacent was a key consideration in its design and it is considered that this will represent a change of major magnitude. This will diminish as restoration measures take effect; this is expected to take up to ten years, assuming best practice habitat reinstatement and planting techniques.
- 12.9.5 The dam is of **high** sensitivity, and it is concluded that the proposed works will cause a direct, temporary (long term) adverse impact of **major** magnitude. Overall, this would result in an effect of **major** significance. This is significant in EIA terms.

Falls of Cruachan Railway Viaduct (LB50811)

- 12.9.6 No works are proposed that have potential to affect the physical fabric of the viaduct.
- 12.9.7 Owing to surrounding vegetation there is no potential for views from or of the viaduct to be affected during the construction phase.
- 12.9.8 It is concluded that there will be no construction effects upon the viaduct.

Lochawe Crannog (SM4194)

- 12.9.9 No works are proposed that have potential to affect the physical fabric of the crannog.
- 12.9.10 During the construction phase, there is potential for works on the haul road to be visible from the crannog at a minimum distance of approximately 1km. This will represent a very slight change in the crannog's setting that will not affect its cultural significance or the appreciation thereof. Consequently, it is considered that the Proposed Development will cause a direct temporary (short term) impact of negligible magnitude. The crannog is of high sensitivity, and this is considered to represent an effect of **negligible** significance. This is not significant in EIA terms.

Kilchurn Castle (SM90179)

- 12.9.11 No works are proposed that have potential to affect the physical fabric of the castle.
- 12.9.12 During the construction there is some potential for construction traffic on the lower parts of the haul road to be visible from the vicinity of the castle. From the immediate vicinity of the castle the eastern construction compound will be screened by vegetation, but there is some potential for partially screened oblique views to include the construction compound from the path leading to the castle. This will detract slightly from the aesthetic appreciation of the castle.
- 12.9.13 The castle is of **high** sensitivity, and it is concluded that the proposed works will cause a direct, temporary (short term) adverse impact of minor magnitude. Overall, this would result in an effect of **minor** significance. This is not significant in EIA terms.

Castles Farm Dun (SM3772)

- 12.9.14 No works are proposed that have potential to affect the physical fabric of the dun.
- 12.9.15 During construction, the construction compound and associated traffic will be visible at relatively close range from the dun. These views do not contribute to the cultural significance of the dun and the appearance of the construction compound will not affect the dun's cultural significance. Consequently, it is considered that the Proposed Development will cause a direct temporary (short term) impact of negligible magnitude. The dun is of high sensitivity, and this is considered to represent an effect of negligible significance. This is not significant in EIA terms.

St Conan's Church – Category A (LB4700)

- 12.9.16 No works are proposed that have potential to affect the physical fabric of the church.
- 12.9.17 The wooded surroundings of the church mean that there is no potential for views from the church to be affected. It is concluded that there will be no construction phase impacts upon the church.

Loch Awe House – Category C (LB4701)

- 12.9.18 No works are proposed that have potential to affect the physical fabric of Loch Awe House.
- 12.9.19 No elements of the Proposed Development will be visible from the hotel. There is some potential for the hotel to be seen in combination with either construction traffic on the lower parts of the haul road in relatively long-range views from the vicinity of Kilchurn Castle that make a slight contribution to the aesthetic appreciation of the house's Scots Baronial architecture. This may detract very slightly from the hotel's aesthetic appreciation.
- 12.9.20 The house is of **medium** sensitivity, and it is concluded that the proposed works will cause a direct, temporary (short term) adverse impact of minor magnitude. Overall, this would result in an effect of **minor** significance. This is not significant in EIA terms.

Ardanaiseig House IGDL

- 12.9.21 The quayside and construction operations in this area will potentially be visible from the northern periphery of the designed landscape. It will, however, largely be screened from view even from the northernmost parts of the designed landscape and no elements of the Proposed Development will be visible from the core of the designed landscape, including the vicinity of the house.
- 12.9.22 It is concluded that the operational phase of the Proposed Development will result in a slight change in the setting of the Ardanaiseig House IGDL, which is considered to be of **high** sensitivity. The magnitude of change and significance of effect are therefore considered to be **minor**. This is not significant in EIA terms.

Non-Designated Heritage Assets

- 12.9.23 The upgrading of the existing access track may result in the loss of a small section of a post-medieval bank (67517) that runs parallel to the existing track and forms the northern side of an irregular enclosure.
- 12.9.24 The bank is a very common feature with little archaeological interest, a section has been excavated through it previously and it is unlikely that further information might be recovered. The greater part of the bank lies in excess of 10m from the existing track and hence is unlikely to be impacted. It is concluded that at worst there will be an effect of **moderate** magnitude.
- 12.9.25 The bank is of low sensitivity, and it is concluded that proposed works will cause a permanent adverse effect of **minor** significance. This is not significant in EIA terms.
- 12.9.26 There is potential for hitherto unrecorded archaeological remains to be removed or disturbed in the course of construction. In the western part of the site, the potential for this to occur is considered to be negligible owing to topography and previous ground disturbance. In the eastern part the potential for remains of any period to be present and preserved is considered to be low.
- 12.9.27 The sensitivity of currently unrecorded assets cannot be meaningfully assessed. However, if present within the construction footprint they would probably be removed completely, resulting in the complete loss of their cultural significance. This would potentially result in a permanent substantial adverse impact upon assets of low, medium, or high value resulting in **significant** effect prior to employment of suitable mitigation.

Operation

Ben Cruachan Power Station (Cruchan 1)

- 12.9.28 The upper intake structure and associated cutting will be visible from the walkway along the top of the dam and in combination with the dam from the west side of the reservoir. In addition, very minor upgrades to electrical infrastructure near the dam will be visible. However, these will not be perceived as new infrastructure. There will be no operational impacts upon the turbine hall.
- 12.9.29 The intake location appears to have been modified to some extent at the time of the dam's construction, but the cutting will substantially expand this area. The cutting will be clearly visible as will the intake superstructure (see LVIA visualisation in **Appendix 11.1**). Upon completion the newly exposed rock is likely to contrast strongly with its surroundings, but this will lessen over time due to weathering. The key views of the buttressed front of the dam in the context of Coire Cruachan will be unaffected. Consequently, the designed relationship between dam and the surrounding landscape will remain unchanged. It is considered that the Proposed Development will result in a **minor** magnitude change.
- 12.9.30 The dam is considered to be of **high** sensitivity, and it is concluded that the proposed works will cause a direct, permanent and adverse effect of **minor** significance. This is not significant in EIA terms.

Ardanaiseig House IGD

- 12.9.31 The quayside will potentially be visible from the northern periphery of the designed landscape. It will, however, largely be screened from view even from the northernmost parts of the designed landscape and no elements of the Proposed Development will be visible from the core of the designed landscape, including the vicinity of the house.
- 12.9.32 It is concluded that the operational phase of the Proposed Development will result in a barely perceptible change in the setting of the Ardanaiseig House IGD. This will result in a minor magnitude change. The IGD is of high sensitivity, and it is concluded that the Proposed Development will have a direct, permanent effect of **negligible** significance. This is not significant in EIA terms.

12.10 Further Mitigation and Enhancement

Construction

- 12.10.1 No additional mitigation is proposed in respect of the predicted effects upon the Cruachan Turbine Hall and Dam. The significant effect upon the Dam cannot be mitigated through design, screening or other measures and is an unavoidable consequence of the Proposed Development. The effect relates solely to the construction phase. The negligible effect upon the Turbine Hall results from the construction of an access tunnel linking Cruachan 1 to the Proposed Development which is necessary for operational reasons.
- 12.10.2 There is low potential for the presence of currently unrecorded heritage assets in the eastern part of the site. If present however, impact upon them by works in the eastern part of the site would be substantial and permanent (removal/ destruction). In the absence of mitigation, this may result in significant effects. To address this potential, a programme of archaeological works will be undertaken. This will allow for the physical loss of any assets present to be offset by appropriate recording. The programme of work will realise the archaeological potential of such assets, offsetting their physical loss and reducing the residual effect to **minor** and **not significant**.
- 12.10.3 The first phase of the programme will comprise trial trenching of the lower construction compound site and any associated access tracks. This will determine the need for and form any further work. The programme of work will be undertaken in accordance with a Written Scheme of Investigation (WSI) to be agreed with WoSAS.
- 12.10.4 The potential for the presence of currently unrecorded heritage assets in the western part of the site is negligible owing to topography and previous disturbance. No further work is proposed in this area.

Operation

- 12.10.5 No further mitigation is proposed in respect of operational phase effects.

12.11 Residual Effects

Construction

- 12.11.1 The following residual construction phase effects are predicted:
- Direct, permanent and adverse effect of **minor** significance on the Category A-listed Cruachan Turbine Hall;
 - Direct, temporary (medium term) and adverse effect of **major** significance on the Category B/Group Category A-listed Cruachan Dam;
 - Direct temporary (short term) effect of negligible significance on the scheduled Lochawe crannog;
 - Direct, temporary (short term) adverse effect of **minor** significance upon the scheduled Kilchurn Castle;
 - Direct temporary (short term) effect of **negligible** significance upon the scheduled Castles Farm dun;
 - Direct, temporary (short term) adverse effect of **minor** significance upon the Category C-listed Loch Awe House;
 - Direct temporary (short term) effect of **negligible** significance upon the scheduled Ardanaiseig House IGDL;

- Permanent adverse effect of **minor** significance on a post-medieval bank; and
- Low potential for a permanent adverse effect of **minor** significance upon hitherto unrecorded heritage assets.

Operation

12.11.2 No further mitigation is proposed in respect of the operation phase. The following residual operation phase effects are predicted:

- Direct, permanent, and adverse residual effect of **minor** significance on the Category B/Group Category A-listed Cruachan Dam; and
- Direct, permanent effect of **negligible** significance on the Ardanaiseig House IGDL.

12.12 Monitoring

12.12.1 No monitoring is proposed.

12.13 Cumulative Effects

12.13.1 The potential for cumulative operational effects has been considered in respect of:

- Creag Dhubh to Dalmally 275 kV Overhead Line; and
- Ballimeanoch pumped hydro scheme.

12.13.2 The proposed will run around the north-eastern end of Loch Awe. Given its location and that no operation phase effects are predicted in respect of heritage assets in this area, it is considered that there is no potential for cumulative effects to arise.

12.13.3 The Applicant has been made aware of a proposed 1.5GW pumped storage hydro scheme at Ballimeanoch, approximately 12km south of the Proposed Development. At the time of preparing this EIA Report, the Scoping Report for the Ballimeanoch scheme has been lodged with the ECU.

12.13.4 Given the status of the Ballimeanoch scheme (at Scoping stage) and the fact that the Proposed Development is more advanced in planning terms, there is no statutory requirement for the Applicant to consider the Ballimeanoch scheme as part of the cumulative impact assessment for the Proposed Development. Despite this, it is considered good practice to consider all publicly available information, given the proximity and similarity of the project.

12.13.5 Based on a review of information in the Ballimeanoch Scoping Report, as well as the distance from the Proposed Development, there is likely to be very limited potential for cumulative effects between the two projects, this is based on the following key factors:

- Different construction timescales, so that whilst there is potential for overlap of the construction periods, it is very unlikely that both projects would be undertaking the same construction activities at the same time; and
- The two projects are located over 12km away from each other on opposite sides of Loch Awe, meaning that both projects have different noise heritage receptors. In particular, the development at Ballimeanoch would not have any impact on the setting of Cruachan 1.

12.14 Summary

12.14.1 This chapter has considered the potential effects of the Proposed Development upon cultural heritage assets during its construction and operation phases. It has been carried out in accordance with relevant legislation and national and local policies and guidance, in particular HES' Managing Change in the Historic Environment series and SNH & HES' EIA Handbook.

- 12.14.2 A baseline study comprising desk-based research and site visits has been undertaken to inform the assessment. This has fed into the design of the Proposed Development and informed the development of embedded mitigation measures that will minimise potential effects.
- 12.14.3 The Proposed Development will be linked to the Category A-listed Cruachan Power Station Turbine Hall by way of a tunnel. This will result in the creation of a new entrance to the hall and hence the loss of a small part of its fabric. Control measures will be put in place to protect the fabric of the Turbine Hall and the detailed design will ensure that the entrance is in keeping with the Hall's design.
- 12.14.4 The construction phase will result in a direct temporary significant effect upon the Group Category A-listed Cruachan Dam as a result of a construction compound being sited adjacent to it and construction operations taking place nearby. This temporary effect is inherent to the Proposed Development and cannot be mitigated further.
- 12.14.5 There is low potential for previously unrecorded heritage assets to be affected by the Proposed Development. In the absence of mitigation this could result in a significant effect. This potential will be addressed through a programme of works that will allow for the identification of such assets and, where appropriate, further excavation. This will offset the physical loss of such remains and any residual effect will consequently be not significant.
- 12.14.6 The upgrading of the haul road will remove part of a post-medieval bank, resulting in a permanent adverse effect of minor significance. No mitigation is proposed in respect of this.
- 12.14.7 During the operation phase, the Proposed Development will have a direct, permanent, and adverse effect of **minor** significance upon the Group Category A-listed Cruachan Dam as a result of the appearance of the upper intake in views from the dam. This has been minimised through embedded design and cannot be reduced further.

12.15 References

- Arcus Consultancy Services Ltd 2017, Cruachan Power Station Archaeology and Cultural Heritage Desk Based Assessment (DBA).
- Chartered Institute for Archaeologists Standard & Guidance for historic environment desk-based assessment 2014, updated 2020.
- Fleetwood, D 2009, 'Ben Cruachan's Hidden Giant' in Context (109, 23-4). IHBC. Available at: <http://www.ihbconline.co.uk/context/109/index.html#26/z>.
- Historic Environment Scotland, 2014, Our Place in Time - the Historic Environment Strategy for Scotland.
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- SNH & HES, 2018, Environmental Impact Assessment Handbook.
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- CIEEM, 2018, Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

13 Socioeconomics, Tourism and Recreation

13.1 Introduction

- 13.1.1 This Chapter has been prepared to provide an assessment of the likely significant socio-economic, tourism and recreation of the Proposed Development. It forms part of the Environmental Impact Assessment Report (EIAR) that accompanies the application for consent under section 36 of the Electricity Act 1989 to the Scottish Ministers for the expansion of Cruachan Pumped Storage Hydro Electric generation station.
- 13.1.2 The assessment draws upon relevant conclusions from other technical assessment chapters of this EIAR, particularly regarding likely ‘primary’ environmental or physical effects arise 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. This assessment should therefore be read in conjunction with **Chapter 3 Proposed Development, Chapter 5 Planning Policy, Chapter 9 Transport and Access, Chapter 11 Landscape and Chapter 12 Cultural Heritage**.
- 13.1.3 This chapter is supported by the following figure(s) and appendices:
- **Appendix 13.1** – Detailed Baseline Conditions;
 - **Appendix 13.2** – Policy Context; and
 - **Figure 13.1** – Tourism and Recreation Receptors.

13.2 Policy Context, Legislation, Guidance and Standards

- 13.2.1 The overarching policy framework applicable to this EIAR for the Proposed Development is outlined in **Chapter 5 Policy**. An overview of the policies of specific relevance to this socio-economic, tourism and recreation assessment is provided here. To review the full extent of the policy assessment undertaken to inform this chapter please refer to **Appendix 13.2 – Policy Context**.
- 13.2.2 This assessment has been carried out in accordance with relevant principles and requirements contained within the following policy and guidance documents:
- Argyll and Bute Council (2015) Argyll and Bute Local Development Plan;
 - Argyll and Bute Council (2016) Argyll and Bute Local Development Plan Supplementary Guidance and Supplementary Guidance 2;
 - Argyll and Bute Council (2019) Argyll and Bute Proposed Local Development Plan 2;
 - Scottish Government (2014) National Planning Framework 3;
 - Scottish Government (2021) Draft National Planning Framework 4;
 - Scottish Government (2014) Scottish Planning Policy;
 - Scottish Government (2021) The Scottish Government’s Programme for Government 2021-2022;
 - Scottish Government (2021) Scotland’s Energy Strategy Position Statement;

- Scottish Government (2022) Scotland's National Strategy for Economic Transformation;
- COP26 The Glasgow Climate Pact (2021);
- UK Government (2021) Net Zero Strategy: Build Back Greener;
- UK Government (2020), Energy White Paper: Powering our Net Zero Future;
- UK Government (2022) British energy security strategy; and
- HM Treasury (2020) Green Book Guide.

13.2.3 This policy framework highlights the importance of considering net socio-economic effects, including supply chain effects, in this assessment. The Proposed Development provides an opportunity to contribute to national renewable targets and the critical measures announced at COP26 to meet the challenges of global warming, in addition to the legislative requirements of the Climate Change Act 2008 and the Climate Change (Scotland) Act 2009. The provision of renewable energy infrastructure to support the transition to a low carbon economy, impacts on communities, impacts on tourism and recreation, and the delivery of sustainable development are also of relevance to this assessment.

Guidance and Standards

13.2.4 The assessment of the likely significant socio-economic, tourism and recreation effects of the Proposed Development presented in this chapter has adopted a methodology consistent with HM Treasury's Green Book appraisal guidance. The latest iteration of the Green Book (2020) has been taken account of in the assessment of the labour market effects.

13.3 Consultation

13.3.1 A request for a scoping opinion was submitted to the Scottish Government Energy Consents Unit (ECU) in July 2021, along with a Scoping Report that outlined the proposed scope of a Socio-economic, Tourism and Recreation EIAR chapter.

Table 13.1: Scoping Consultation

Reference	Comment	Response
Argyll and Bute Council		
Scoping Response, 29 th October 2021	Potential impacts on the A85 Trunk Road from diversions are to be considered as it is a vital link road and for the operation of the Argyll and Bute economy.	Impact on the A85 has been assessed in Chapter 9 Transport and Access and Transport Assessment appended to this EIAR. Traffic management measures as embedded mitigation will minimise impact on the A85.
Scoping Response, 29 th October 2021	Tourism and recreational usage of the area are also vital components of the economy of the local area and any potential adverse impacts upon these require to be fully evaluated and mitigation proposed.	This Chapter assesses the impact of the construction and operation of the Proposed Development on tourism and recreation.
Scoping Response, 29 th October 2021	Where there is a pier or breakwater structure that will obstruct access along a foreshore or loch side, a reasonable means of passing by the obstruction should be provided to allow the public to exercise their right	Accessibility to the foreshore and lochside where the proposed quayside would be constructed is currently extremely limited owing to the proximity to the A85 and the steep sided banks of the loch.

Reference	Comment	Response
	of access along the shore, where appropriate.	
Scoping Response, 29 th October 2021	If access to Cruachan Dam or ridge are to be restricted, a wider recreational strategy to compensate for this should form part of the proposed EIA.	Access to Cruachan Dam and ridge will not be restricted.
Scoping Response, 29 th October 2021	The applicant is advised to consult with the Northern Lighthouse Board to determine what would be the proposed affects to safe navigation or recreational boating during site construction	Navigational hazards are not envisaged and construction activities with Loch Awe will be managed through the provision of a construction traffic management plan.

13.4 Methodology

Assessment Scope

13.4.1 The principal aspects of this assessment include:

- Direct, indirect and induced employment / labour market effects during the construction and operational phase of the Proposed Development;
- Direct and indirect effects on relevant business sectors (construction, tourism and energy);
- Direct and indirect effects on local communities resulting from inward investment;
- Direct and indirect effects on tourism;
- Direct and indirect effects on recreation and public access (effects on access are further assessed in **Chapter 9 Transport and Access, Chapter 11 Landscape and Visual and Chapter 12 Cultural Heritage**; and
- Indirect effects resulting from 'secondary' changes in social or economic activities (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).

13.4.2 The above methodology was informed by a baseline and policy review to identify key receptors for assessment. This is provided in **Appendix 13.1** (Detailed Baseline Conditions) and **Appendix 13.2** (Policy Context).

Study Areas

13.4.3 The following Study Areas have been adopted, each focussed upon the geographical area where socio-economic, tourism and recreation effects are likely to occur, and which have the potential to be significant in the context of the EIA Regulations:

- Labour Market Study Area: The Argyll and Bute Local Authority Area forms the labour market assessment area; and
- Tourism and Recreation Study Area: to enable consistency with the significant visual effects concluded with **Chapter 11 – Landscape and Visual**, a study area has been identified of 3.5km from the Proposed Development boundary to the north, east and west and extending on to 6km from the Proposed Development boundary to the south to contain areas south of Loch Awe. This Study Area is considered appropriate as the potential impacts on tourism and

recreation are linked with the visual impacts identified in **Chapter 11 Landscape and Visual** as changes in visual amenity have the potential to impact on visitor attractiveness and visitor experience.

Baseline Data Collection

- 13.4.4 To inform the assessment, a desk-based review of publicly available data was undertaken to establish relevant baseline socio-economic, tourism and recreation conditions at the Proposed Development and across the identified Study Areas.

Socio-economic Indicators:

- Current demographic characteristics, including population size and age structure;
 - Current labour market characteristics, including working age population profile (level of economic activity, occupation and skills profiles) as well as the workplace economy profile (employment by industry and earnings; and
 - Nationally, regionally and locally important tourism assets.
- 13.4.5 A detailed overview of the baseline and policy assessment is provided in **Appendix 13.1** – Detailed Baseline Conditions and **Appendix 13.2** – Policy Context.
- 13.4.6 The following statistical sources have also been used to inform the assessment of likely effects:
- Office for National Statistics (ONS);
 - Scottish Annual Business Statistics (2019);
 - ONS (2020) Job Density;
 - ONS Population Estimates – local authority based by 5-year age band (2019);
 - ONS Annual Population Survey (2019);
 - ONS Business Register and Employment Survey (2019);
 - ONS Annual Survey of Hours and Earnings (2020);
 - Supply, Use and Analytical Input-Output Tables produced by the Scottish Government (1998 to 2018); and
 - GDP Deflators at Market Prices and Money GDP (2022).

Tourism and Recreation

- 13.4.7 A desk-based analysis has been carried out to determine key factors which impact upon tourism trends and key drivers influencing the market such as visitor patterns and trends, occupancy rates and popular visitor attractions have been analysed.
- 13.4.8 A desk-based audit has also been prepared to determine the scale of tourism and recreational activity and related facilities in the study area. The assessment covers key aspects including tourism and recreation facilities; and those facilities and features which act as a focus or attraction for visitors, and leads to expenditure by visitors.
- 13.4.9 The following facilities and attractions have been identified in the study area:
- Outdoor tourist destinations – including castles, monuments and recreational amenities;

- Indoor tourist destinations – including visitor centres and churches;
- Visitor accommodation – including hotels, self-catering, guest houses and bed and breakfasts (B&Bs);
- Hospitality venues – including restaurants and cafes;
- Recreational assets – including Loch Awe and golf courses; and
- Visitor and tourist routes – including core paths, cycle ways and established hill walking routes.

Modelling

- 13.4.10 Relevant quantitative data was analysed to predict gross and net-socioeconomic effects including demographic changes and employment generation from the construction and operation of the Proposed Development. This model applied economic multipliers and additionality assumptions as detailed at **Section 13.5 and Table 13.7 respectively**.

Approach to Socio-economic Assessment

Consideration of Relevant Receptors

- 13.4.11 The assessment of receptor sensitivity has been informed by publicly available information sources. At the time of writing, COVID-19 has resulted in changes to socio-economic conditions, however there is no evidence to indicate the long-term implications of these changes. The assessment of receptor sensitivity is therefore informed by a suite of baseline conditions prior to the onset of the COVID-19 pandemic.
- 13.4.12 From the information sources outlined above, the current baseline conditions of the site and surrounding area were characterised. This led to the identification of relevant sensitive receptors to consider within the assessment, as detailed within **Appendix 13.1 – Detailed Baseline Conditions**. It is important to note that any potential receptor with no or negligible sensitivity to possible socio-economic change(s) arising from the Proposed Development, has no potential to experience likely significant effects (within the context of the EIA Regulations) and have therefore been excluded from this assessment. This ensures the assessment remains proportionate and focused on reporting likely significant effects.
- 13.4.13 For employment effects the availability of labour and skills is critical in accommodating the demands, needs and requirements of the Proposed Development. The sensitivity of the labour market has been defined in relation to:
- The availability of skilled labour in the Study Area relative to national averages;
 - The proportion of employment in relevant sectors (e.g., construction) within the Study Area;
 - The availability of labour (including the unemployed) within the Study Area; and
 - Relevant education provision provided by institutions serving the Study Area.

Sensitivity

- 13.4.14 Plentiful labour and/or skills capacity results in a low sensitivity, whilst limited labour and/or skills capacity results in a high sensitivity. Sensitivity criteria relating to employment are shown in **Table 13.2**.

Table 13.2: Employment 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 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.

Magnitude of Change

- 13.4.15 The magnitude of change from the construction and operation of the Proposed Development on identified socio-economic receptors was determined using the criteria set out in [Table 13.3](#). This assessment has been informed by all publicly available information sources at the time of assessment.

Table 13.3: Magnitude of Change Criteria

Magnitude of Change	Type of Change	Criteria
High	Adverse	Employment changes: 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)). Other socio-economic changes: adverse changes to identified receptors would be observed on an international, national, or regional scale. Changes are likely to be experienced over the long term (i.e., 5+ years).
	Beneficial	Employment changes: the number of jobs created in the Study Area would be 250 or greater. Other socio-economic changes: beneficial changes to identified receptors would be observed on an international, national, or regional scale. Changes are likely to be experienced over the long term (i.e., 5+ years).
Medium	Adverse	Employment changes: the number of jobs lost in the Study Area would be 50 or greater, but fewer than 250. Other socio-economic changes: Noticeable adverse changes, judged to be important at a local scale, to identified receptors. Changes are likely to be experienced over the medium term (i.e., 3-5 years).

Magnitude of Change	Type of Change	Criteria
	Beneficial	<p>Employment changes: the number of jobs created in the Study Area would be 50 or greater, but fewer than 250.</p> <p>Other socio-economic changes: Noticeable beneficial changes, judged to be important at a local scale, to identified receptors. Changes are likely to be experienced over the medium term (i.e., 3-5 years).</p>
Low	Adverse	<p>Employment changes: the number of jobs lost in the Study Area would be greater than 10, but fewer than 50.</p> <p>Other socio-economic changes: small scale adverse changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e., 1-2 years).</p>
	Beneficial	<p>Employment changes: the number of jobs created in the Study Area would be greater than 10, but fewer than 50.</p> <p>Other socio-economic changes: small scale beneficial changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e., 1-2 years).</p>
Negligible	Adverse	<p>Employment changes: the number of jobs lost in the Study Area would be less than 10.</p> <p>Other socio-economic changes: very small-scale adverse changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e., less than 6 months).</p>
	Beneficial	<p>Employment changes: the number of jobs gained in the Study Area would be less than 10.</p> <p>Other socio-economic changes: very small-scale beneficial changes to identified receptors at the local level only. Changes are likely to be experienced over the short term (i.e., less than 6 months).</p>
No Change		No change would be perceptible, either beneficial or adverse.

13.4.16 As detailed in **Table 13.3**, other likely socio-economic changes (including effects on relevant key business sectors) require to be examined qualitatively on a case-by-case basis:

13.4.17 In relation to the construction sector, the key question which underpinned the assessment was: To what extent would the socio-economic activity or outcome generated by the Proposed Development be likely to result in a change in the performance of the sector within the assessed Study Area?

13.5 Approach to Tourism and Recreation

Consideration of Relevant Receptors

- 13.5.1 The assessment of likely tourism and recreation effects was underpinned by the identification of key components of the tourism and recreation business sector with the potential to be affected by the Proposed Development. Notwithstanding the unique characteristics and offering of all individual tourism and recreational assets across the Tourism and Recreation Study Area, receptors of relevance to this assessment can be categorised under seven broad groupings, each with different sensitivity to changes in visitor attractiveness (as detailed in [Appendix 13.1 – Detailed Baseline Conditions](#)):
- Designated walking and other recreational routes;
 - Outdoor tourist destinations;
 - Indoor tourist destinations;
 - Hospitality;
 - Visitor Accommodation;
 - Recreational activities in the open countryside; and
 - Tourists travelling (by road and rail) through the open countryside.
- 13.5.2 At scoping stage, it was considered that indoor tourist destinations would not be likely to experience a significant effect on their visitor attractiveness or tourism potential during construction or operation and it was proposed that they both be scoped out from further consideration. This was due 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 or visual effects arising from the proposed development. This remains the case for the operational phase of the development where indoor tourist destinations have not been assessed. However, it is considered that the indoor tourist destination of Cruachan Visitor Centre and tour of the 'Hollow Mountain', could experience effects during the construction phase and therefore the potential impacts on indoor tourist destinations during construction have been assessed.
- 13.5.3 Effects on recreational routes and recreational activities was proposed to be scoped out of the operational phase assessment however, it is considered that potential impacts on these groupings should be assessed.
- 13.5.4 The visitor attractiveness and tourism potential of each of the remaining (seven) receptor groupings could be affected by environmental or socio-economic changes (i.e., 'primary effects'), including likely effects from the construction or operation of the Proposed Development as assessed in other technical assessment chapters of the EIAR. These seven receptor groupings have therefore been considered in the assessment of the Proposed Development. The relevant individual tourism and recreational assets within the Tourism and Recreation Study Area are listed as part of the description of Detailed Baseline Conditions ([Appendix 13.1](#)).

Sensitivity

- 13.5.5 For tourism and recreation effects, receptor sensitivity was determined with reference to the importance of the receptors likely to be affected and the extent to which any change upon these by the Proposed Development could affect their performance. The sensitivity of relevant receptors was therefore defined on a case-by-case basis as detailed in [Appendix 13.1 - Detailed Baseline Conditions](#). A summary of the sensitivity each receptor group is included in Table 13.4:

Table 13.4 - Receptor Group Sensitivity

Receptor Group	Construction Sensitivity	Operation Sensitivity
Designated walking and recreational routes	Medium	Low
Outdoor tourist destinations	Low	Low
Indoor tourist destinations	Low	Scoped out
Hospitality	Low	Low
Visitor Accommodation	Medium	Medium
Recreational activities in the open countryside	Low	Low
Tourists travelling (by road and rail) through the open countryside	Low	Low

- 13.5.6 In relation to the assessment of 'primary' effects on recreational access during the construction phase of the Proposed Development, the sensitivity of impacted designated walking routes was assigned based on their recognition in policy terms at the national level (e.g. within NPF3 and Draft NPF4) and the level of statutory protection afforded to them (for example under the Land Reform (Scotland) Act 2003). The assessment of wider 'secondary' effects on the identified key components of the tourism and recreation sector was conducted by assigning a sensitivity to each receptor grouping based on both the importance of identified tourism assets within the Tourism and Recreation Study Area and their susceptibility to changes in the visitor attractiveness of such assets ultimately catalysing changes in visitor numbers and tourist expenditure.

Magnitude of Change

- 13.5.7 In relation to the assessment of 'primary' effects on recreational access during the construction phase of the Proposed Development, the magnitude of change is related to direct physical impacts e.g. closures or diversions. The assessment of the magnitude of change due to wider 'secondary' effects on the identified key components of the tourism and recreation sector was conducted by considering the visual impact of the proposals and how that might affect the ability to understand or enjoy the receptor grouping.

Table 13.5: Tourism and Recreation Magnitude of Change Criteria

Magnitude of Change	Criteria
High	The Proposed Development would result in a significant change in visitor numbers and expenditure; or Complete loss or obstruction to a route or recreational resource
Medium	The Proposed Development would result in a notable change in visitor numbers and expenditure; or Partial loss or direct disruption to a route or recreational resource which compromises but does not prevent an activity taking place; or indirect (visual) effects which may compromise visitor attractiveness or experience
Low	The Proposed Development would result in a small change in visitor numbers and expenditure; or Minimal disruption to a route or recreational resource but the ability for an activity to take place is not affected; or indirect (visual) effects which are unlikely to reduce visitor attractiveness or experience

Magnitude of Change	Criteria
Negligible	<p>The Proposed Development is unlikely to affect visitor numbers or expenditure; or</p> <p>Minimal indirect (visual) effects which are very unlikely to affect the visitor attractiveness or experience of recreational resources</p>

13.5.8 This approach captures the elasticity of demand of each receptor grouping, noting its context as a constituent part of the tourism sector and the key question to underpin the identification of receptor sensitivity was therefore: **To what extent would any change in the visitor attractiveness and tourism potential of this component of the tourism and recreation sector (i.e., this receptor grouping) be likely to result in a change in visitor numbers and expenditure?** This socio-economic based sensitivity level differs from user-based landscape, visual, cultural heritage and access sensitivities assigned to individual tourism and recreation related receptors, as identified separately in relevant technical assessment chapters of this EIAR.

13.5.9 In relation to the Tourism Study Area, the sensitivity of the key components of the tourism and visitor economy sector (as detailed in **Table 13.6.1** in **Appendix 13.1 Detailed Baseline conditions**), is reflected in the extent to which change in the visitor attractiveness of the tourism sector and each of its components is likely to influence change in visitor numbers and expenditure. For individual receptors, sensitivity in socio-economic terms therefore differs from the criteria applied in landscape, visual, cultural heritage, access, and other assessments. Rather, it reflects tourists choosing to visit an area (or not) and how the local/regional sector may react to a change in visitor numbers/spend. The type and level of ‘primary’ environmental or socio-economic changes generated by the Proposed Development which could catalyse ‘secondary’ changes in visitor attractiveness and tourism potential (and thus visitor numbers and visitor expenditure) was then examined. In doing so, the key question which underpinned the assessment was: **Taking account of the proposed embedded mitigation to what extent would the proposed change in landscape character, visual amenity, heritage setting and/or physical access (as assessed in relevant chapters of this EIAR) be likely to result in a change in the visitor attractiveness and tourism potential of existing tourism receptors, in terms of visitor numbers and expenditure?**

13.5.10 In relation to ‘primary’ effects on Recreation and Public access (Part of the Tourism and Visitor Economy) study area, the key question which underpinned the assessment was: **Taking account of proposed embedded mitigation, to what extent would the Proposed Development necessitate changes in public access arrangements and/or infringe upon statutory or policy protections afforded to designated routes?”**

Significance of Effects

13.5.11 In line with standard EIA practice, a matrix-based approach was adopted to consider the sensitivity of identified receptors in tandem with the likely magnitude of change from the Proposed Development. This method allowed the level and significance in EIA terms of all predicted socio-economic, tourism and recreation effects to be determined. The EIA significance matrix adopted in this assessment is detailed in **Table 13.6**.

Table 13.6: Significance Matrix of Effects

Sensitivity	Magnitude of change			
	High	Moderate	Low	Negligible
High	Major	Moderate	Minor	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Moderate	Minor	Negligible	Negligible

- 13.5.12 For the purposes of this assessment, major and moderate effects are considered significant in the context of the EIA Regulations. Significance of effects assessed as low or negligible magnitude of change which, depending on receptor sensitivity, would not be perceptible.

Table 13.7: Significance Criteria

	Level of Effect	Criteria
Significant	Major	These effects are likely to be important considerations at a local scale and may become key factors in the decision-making process.
	Moderate	These effects, 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.
Not significant	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 or No Effect	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.

Approach to Cumulative Impact Assessment

- 13.5.13 The EIA Regulations require assessment of the likely significant cumulative effects of the Proposed Development and other approved developments, at construction and operational stages.

13.6 Limitations and Assumptions

- 13.6.1 The following limitations and assumptions have been adopted in this assessment:

COVID-19

- 13.6.2 The baseline conditions presented within this assessment utilise data collected prior to the global disruption as a result of the ongoing COVID-19 pandemic. At the time of writing, COVID-19 has resulted in changes to socio-economic conditions, however, there is no evidence to indicate the long-term implications of these changes. The baseline data presented remains representative and appropriate to inform a robust and proportionate assessment of the Proposed Development

Capital Expenditure

- 13.6.3 Construction costs for the Proposed Development including associated infrastructure was provided by the Applicant in June 2021 to an estimated value in excess of £500 million. Of that figure, £100 million is for the manufacture of the pump turbine components which will be carried out overseas. The remaining construction cost will be spent in the UK.

Gross Employment

- 13.6.4 Argyll & Bute Council Area (Argyll & Bute) has been defined as the Study Area for the Proposed Development. Gross and net employment, GVA and turnover have been calculated with this Study Area in mind.

- 13.6.5 Given Cruachan 1's long-established operation, it is likely that operational and maintenance efficiencies can be made across both facilities. Drax has an existing operation and maintenance (O&M) contingent of 30 personnel at Cruachan 1.

Net Employment

- 13.6.6 To assess the scale of net additional jobs likely to be generated or supported by the Proposed Development, additionality factors based on the characteristics of the Labour Market Study Area, were applied to predicted gross employment. Appropriate economic appraisal guidance and professional judgement based on similar economic impact assessment have been used to estimate values for:
- **Deadweight:** What would happen in the absence of the Proposed Development;
 - **Leakage:** The proportion of employment opportunities accessed by people living outside the study area;
 - **Displacement:** The proportion of Proposed Development benefit accounted for by a reduction in benefit elsewhere;
 - **Substitution:** When a firm substitutes one activity for another to take advantage of public sector assistances; and
 - **Multipliers:** To estimate further economic activity associated with additional income and supplier purchases.
- 13.6.7 The additionality factors adopted in this assessment are detailed under at **Table 13.8**.

13.7 Current Baseline Conditions

- 13.7.1 This section sets out a series of short summaries of the relevant baseline conditions to inform this socio-economic, tourism and recreation assessment. **Appendix 13.1** presents the detailed baseline conditions which are summarised below:

The Site

- 13.7.2 The Proposed Development will be located on land around and to the east of the existing Cruachan pumped storage hydro (Cruachan 1) on the northern banks of Loch Awe in Argyll and Bute. The site extends up the hillside of Ben Cruachan and sites between the village of Dalmally to the east and Taynuilt to the west. Running between Loch Awe and the hillside are the A85 and the West Highland railway line which connects Glasgow and Oban. The A85 provides the principal road access from central Scotland to Oban on the west coast.

The Surrounding Area

Settlement Profile

- 13.7.3 Economic activity rates in Argyll and Bute are slightly higher than the Scottish average (77.2% compared with 76.8% in 2020). The area also has lower levels of unemployment (2.1% compared with 4.3% in 2020).
- 13.7.4 1,900 people are employed in construction in Argyll and Bute, some 6.8% of the labour force (a similar proportion to Scotland as a whole). Of these, 500 worked in civil engineering and 800 in specialised construction.

Labour Market

- 13.7.5 In 2019, the Argyll & Bute study Area was estimated to have a population of 85,870¹⁶. Overall, the Study Area has a lower percentage share of working age population (at 59.1% compared to 64.0% of Scottish average) and a higher percentage share of pensionable age (at 25.9% compared to the Scottish average of 19.1%).¹⁷
- 13.7.6 Table 13.8 below presents key metrics of economic activity across the Labour Market Study Area, including economic activity rate which measures the percentage of the population (employed and unemployed) who are active or potentially active members of the labour market.

Table 13.8: Key Economic Activity Metrics

	Economic Activity (16 – 64 years)	Employment Rate (16 – 64 years)	Median Full Time Gross Annual Pay
Labour Market Study Area (Argyll and Bute Local Authority Area)	77.2%	81.1%	£27,836
Scotland	76.8%	74.6%	£30,004

Source: 2019 ONS data, derived from Nomis.

- 13.7.7 Declining population statistics, especially in working age population in the Argyll & Bute Study Area has raised the economic activity rate and employment rate above the Scottish average (at 77.2% and 81.1% accordingly compared to 76.5% and 74.6% of the country's average. At the same time median full-time pay is lower at £27,836, compared to £30,004 on average in Scotland. 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).
- 13.7.8 Job density indicates the available of jobs per resident (16-64 years). Although there is less than one job per resident in the Argyll & Bute Study Area (0.9), this is above the national comparator for Scotland (0.8).¹⁸

Key Business Sector: Construction Sector

- 13.7.9 The construction sector in the Labour Market Study Area supports some 1,900 jobs representing 6.8% of total jobs in the study area. This compares to the national average of 7.1% of people working in construction.
- 13.7.10 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. It is therefore likely a substantial proportion of construction employment will need to be sourced elsewhere. This is not unusual for large and complex projects delivered in sparsely populated areas.

¹⁶ NRS (2021) Argyll and Bute Council Area Profile. Available at:
<https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/argyll-and-bute-council-profile.html>

¹⁷ ONS (2022) 2011 Census. Available at: Population and migration - Office for National Statistics (ons.gov.uk)

¹⁸ Nomis (2022). Labour Market Profile - Argyll And Bute. Available at :
<https://www.nomisweb.co.uk/reports/lmp/la/1946157408/report.aspx?town=argyll>

Tourism and Recreation

- 13.7.11 This section sets out a series of summaries of the baseline conditions for assessment. Please refer to **Appendix 13.1** – Detailed Baseline Condition for details.

Economic Importance of Tourism

- 13.7.12 At national level, the tourism sector is recognised by the Scottish Government as an important part of the Scottish economy supporting a range of business activity and employment opportunities¹⁹. Of all overnight visits to Scotland in 2019²⁰, approximately 80% were made by UK residents (comprising 14.1 million trips), while the remaining 20% of overnight visits were from international visitors (comprising 3.5 million trips). Whilst only 20% of trips in 2019 were made by international visitors, their expenditure totalled £2.5 billion, or 43% of total overnight spend in Scotland²¹.
- 13.7.13 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. Tourism is a key sector and a growing industry in Argyll and Bute. In 2019, Argyll and the Isles witnessed notable growth in overnight tourism. Both domestic and international visitors increased in numbers which resulted in even bigger rises in nights and expenditure. Between 2017 and 2019, overnight trips to Argyll and the Isles were just under a million per year on average, a 15% increase from 2016-2018²².
- 13.7.14 Argyll and Bute has the highest share of tourism businesses when compared to any other area in Scotland. Tourism businesses make up 13% of businesses in Argyll and Bute compared to a national average of 8%²³.
- 13.7.15 Between 2011 and 2019 Argyll and the Isles experienced increases in visitor days, visitor numbers and direct expenditure and the economic impact of tourism in Argyll and the Isles increased by 25.8%²⁴.

Characteristics and Assets

Indoor Tourist Destinations

- 13.7.16 In Argyll and the Isles, the most popular free indoor tourist destinations in terms of visitor numbers in 2019 was Oban War and Peace Museum (33,310), The top paid-for attractions were Inveraray Castle (125,462), Iona Abbey and St Columba Centre (63,884), Oban Distillery and Visitor Centre (57,031), Benmore Botanic Garden (53,318) and Mount Stuart (42,809)²⁵. None of these attractions are within the tourism and recreation study area.

¹⁹ Scottish Government (2022). Scotland's National Strategy for Economic Transformation. Available at: <https://www.gov.scot/publications/scotlands-national-strategy-economic-transformation/documents/>

²⁰ At the time of writing, COVID-19 has resulted in changes to socio-economic conditions, however there is no evidence to suggest the long-term implications of such changes. The assessment of receptor sensitivity is therefore informed by a suite of baseline conditions prior to the onset of the COVID-19 pandemic.

²¹ Visit Scotland: Insight Department: Key Facts on Tourism in Scotland (2019) <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/key-facts-on-tourism-in-scotland-2019.pdf>

²² Visit Scotland: Insight Department: Argyll and the Isles Factsheet 2019 <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/regional-factsheets/argyll-and-the-isles-factsheet-2019.pdf>

²³ Wild About Argyll, Wild About Tourism: Argyll & The Isles Tourism Co-Operative Ltd Report 2020 https://www.wildaboutargyll.co.uk/media/4811/waa_wildabouttourism.pdf

²⁴ IBID

²⁵ Visit Scotland: Insight Department: Argyll and the Isles Factsheet 2019 <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/regional-factsheets/argyll-and-the-isles-factsheet-2019.pdf>

- 13.7.17 Within the Study Area, Drax's Hollow Mountain visitor centre at the Cruachan pumped storage hydro power station is a popular indoor tourist destination. The visitor centre attracts approximately 50,000²⁶ visitors a year and in 2019 was ranked among the top 2%²⁷ of Visit Scotland's quality assurance scheme with high scores for friendliness and hospitality.
- 13.7.18 St Conan's Kirk in the village of Loch Awe is another indoor tourist destination in the Tourism and Recreation Study Area. It is a Category A listed building and a landmark which attracts visitors to the village of Loch Awe. It is accessed from the A85 and benefits from impressive views towards Loch Awe.

Outdoor Tourist Destinations

- 13.7.19 In Argyll and the Isles, the most popular free outdoor destinations attractions in terms of visitor numbers in 2019 were Argyll Forest Park (151,538), Staffa National Nature Reserve (107,725), Iona (29,808) and Aros Park (19,710). The top paid for outdoor destination was Benmore Botanic Garden (53,318)²⁸.
- 13.7.20 There are few outdoor tourist destinations in the Tourism and Recreation Study Area. The area is characterised by large expanses of open, undeveloped, and sparsely populated countryside. Outdoor tourist destinations to note are Kilchurn Castle on the banks of Loch Awe, the Duncan Ban MacIntyre Monument and Cruachan Dam.

Hospitality

- 13.7.21 Visit Scotland report that between 2016-18 going for a meal in a restaurant, café, hotel, or pub was the most popular activity undertaken as part of a day trip to Argyll and the Isles with an average of 700,000 people doing this as part of their visit. The majority of hospitality venues in the tourism and recreation study are bars and restaurants which are located within hotels. Dalmally, Taynuilt and Loch Awe are the largest settlements, and each have a number of hospitality venues located within them. The remaining venues are dispersed across the study area and are typically located close to roads and the shores of Loch Awe.

Visitor Accommodation

- 13.7.22 Visitor Statistics published by Visit Scotland indicate a rise in international tourism to Argyll and the Isles in 2019, particularly in terms of bednights and expenditure. Figures suggest international travellers spent nearly 700,000 nights and £90 million in Argyll and the Isles driven by a big increase in holiday travel, stay and spend in the region. As a result of the growth, Argyll and the Isles accounted for 4.3% of all international trips and 3.5% of the total overseas spend in Scotland in 2019. The strong performance of tourism in Argyll and the Isles in 2019 was also observed among domestic visitors. British residents undertook more than a million overnight trips to the region which marked a 41% increase from 2018. Bednights rose by nearly a half to 4.2 million, while tourism expenditure grew by two-thirds to reach £240 million. The average length of stay in 2019 for domestic visitors was up 5% on 2018.

Recreational Activities in the Open Countryside

- 13.7.23 Owing to the remote, rural nature of the Study Area tourist activities often utilise the scenic and landscape value of the area and are centred around outdoor activities. Hill walking is a popular activity in Scotland and three Munros (Scottish mountain at least 3000 feet high) Ben Cruachan, Beinn Eunaich and Beinn Chochuill are within the Study Area. The route for completing Ben Cruachan, known as the 'Cruachan Horseshoe', intersects the Proposed Development site at various points. Loch Awe provides a variety of opportunities for water-based activities including fishing,

²⁶ Drax (2019) https://www.drax.com/press_release/cruachan-visitor-centre-wins-5-star-award-from-visitscotland/

²⁷ Ibid

²⁸ Visit Scotland: Insight Department: Argyll and the Isles Factsheet 2019
<https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/regional-factsheets/argyll-and-the-isles-factsheet-2019.pdf>

kayaking and paddle boarding and there are a number of launch points within the Study Area providing access to the loch.

Tourists Travelling (by Road & Rail) Through the Open Countryside

- 13.7.24 Travelling to, from or between tourist destinations, recreational activities, or hospitality / accommodation itself forms part of the overall tourism experience. Tourists may select particular accommodation or destinations based on their accessibility (amongst other factors), and any unexpected disruption to journeys may detract from their enjoyment of their experience. Key routes of note include:

- A85;
- A819;
- B8077; and
- Oban Branch Railway Line (Glasgow – Oban).

Designated Walking and Other Recreational Routes

- 13.7.25 The Study Area includes a range of designated and non-designated routes used by residents and visitors. All core paths and promoted recreational routes within the Tourism and Recreation Study Area have been identified (**Figure 13.1**). The following are of relevance to the assessment:

Hillwalking Routes

- Cruachan Horseshoe;
- Falls of Cruachan to Cruachan Dam; and
- Beinn Eunaich and Beinn a'Chochuill.

Scottish Hill Tracks

- 138 – Dalmally to Glen Etive.

Core Paths

- No. 300 (b) Kilchrenan to Taynuilt;
- No. 425 Kilchurn Castle Path;
- No. 528 (b) Dalmally Circular;
- No. 171 (b) Kilmore - Loch Nant to Kilchrenan;
- No. 173 (e) Ford to Annat Via;
- Loch Avich and Inverinan; and
- No. 450 Duncan Ban MacIntyre Monument.

Cycle Routes

- The Caledonia Way Cycle Route.

13.8 Baseline Evolution and Expected Future Baseline

The Site

- 13.8.1 In the absence of the Proposed Development it is likely that the site would remain undeveloped. ,

The Surrounding Area

- 13.8.2 In the absence of the Proposed Development, operational uses and economic activities in the Labour Market and Visitor Economy Study Areas are expected to remain broadly unchanged.

13.9 Summary of Receptor Sensitivity

- 13.9.1 As discussed in Section 13.4 – Methodology, the visitor attractiveness and tourism potential of each of the seven receptor groupings could be affected by environmental or socio-economic changes (i.e. ‘primary effects’)

13.10 Embedded Mitigation

- 13.10.1 Design features and embedded mitigation measures have been incorporated into the design and construction of the Proposed Development to avoid, prevent, or minimise significant adverse environmental effects and to enhance beneficial effects. Embedded mitigation measures of relevance are set out below.

Design Principles

- 13.10.2 The following design principles have been adhered to:
- The location of the majority of the Proposed Development is underground;
 - Considered positioning of permanent, above-ground features to minimise impact on the landscape and optimise the opportunity for additional mitigation measures; and
 - Minimising the permanent design footprint as far as possible including the scale of required rock cuttings and requirements for woodland removal, particularly woodland included on the Inventory of Ancient and Long-established Woodland.

Construction Traffic Management Plan (CTMP)

- 13.10.3 As detailed in **Chapter 9 Transport**, prior to any construction taking place a Construction Traffic Management Plan will be prepared and implemented. This will include control measures including robustly enforced traffic management measures to control traffic movements to protect the environment and the amenity and safety of local residents, businesses and the general public.
- 13.10.4 The construction sequence and traffic management related to the construction of the main access tunnel will be managed to minimise impacts on vulnerable road users and minimise disruption to vehicles on the A85. A temporary signalised pedestrian crossing on the A85 will be provided near the location of the Falls of Cruachan Railway Station during the construction of the main access tunnel portal. Further details of the traffic management measures, and pedestrian crossing have been included within the Transport Assessment appended to this EIAR.

Construction Environment Management Plan (CEMP)

- 13.10.5 A draft CEMP accompanies the Section 36 application for the Proposed Development. The CEMP sets out the broad principles and procedures to govern the construction phase of the Proposed Development and the measures identified within the CEMP seek to ensure that effects on the

environment are minimised as far as practicable during the construction phase. The CEMP outlines a series of general best practice principles which should be adhered to including a register of environmental impacts, the production of risk assessments and method statements, the adherence to Site Environmental Standards, dealing with public relations, the monitoring and measurement of construction activities and the roles and responsibilities of key site staff. Of relevance to this assessment, the CEMP will include measures and procedures to manage public access and amenity effects during construction, including to existing residential development and open and community space.

Public Access

- 13.10.6 Measures will be included to ensure public access is maintained throughout construction and operation of the Proposed Development. This will include:
- Relocation of parking at Falls of Cruachan to visitor centre during works related to the temporary diversion of the A85;
 - Maintenance of access at all times to the established walking routes albeit with localised diversions if necessary; and
 - Construction of a new permanent path diversion to the east of the dam to take people safely round the new works in construction and operations phases.

Realistic Worst-Case Parameters for Assessment

- 13.10.7 The Socio-economic, Tourism and Recreation assessment considers the potential effects of the Proposed Development at two stages in the design: construction and operation.
- 13.10.8 The assessment of construction-based effects assumes that the largest of activities in all areas of the development would be taking place concurrently at the time of the assessment to create the worst case scenario.
- 13.10.9 The operational assessment takes into account the maximum project parameters identified in **Chapter 3** of this EIAR.

13.11 Assessment of Likely Effects

Construction Phase

Capital Expenditure

- 13.11.1 Based on the capital cost estimate provided by the Application in June 2021 the construction of the Proposed Development is expected to require a UK capital expenditure of £450 million. This will give rise to employment and associated expenditure in the economy (direct, indirect, and induced) as detailed below.
- 13.11.2 Construction of the Proposed Development is expected to extend across a 6-year programme of works to achieve operation of the first unit. Further details are given in **Chapter 3 Proposed Development**.

Gross Construction Employment

- 13.11.3 Gross construction employment can be estimated by dividing the capital expenditure figure (£450 million) by the annual average turnover required to support an employee in the construction sector.
- 13.11.4 Analysis of the Annual Business Survey (ONS, 2019) and the Business Register and Employment Survey (ONS, 2019) suggests that a turnover of £116,526 per annum is required on average to support a single construction employee in Argyll and Bute in 2019 (SABS, 2019). Applying the GDP

price deflator²⁹ to uprate this the 2021/22 prices³⁰ suggests that a turnover of £126,152 per annum is required on average to support a single construction employee in Argyll and Bute in 2021/22.

- 13.11.5 The construction of the Proposed Development is therefore estimated to support a total 3567 gross Person Years of Employment (PYE) ³¹ over the 6-year construction period across the study area. This equates to 357 Full Time Equivalent (FTE)'s ³² over the 6-year construction programme across the study area.

Net Construction Employment

- 13.11.6 Only a proportion of total construction employment will occur within the Labour Market Study Area due to mobility of labour, competition from externally located construction firms and supply chain impacts. To take account of these factors, the additionality assumptions detailed in Table 13.9 have been used to convert the estimated gross construction employment from the Proposed Development within the Argyll and Bute area.

Table 13.9: Construction Additionality Assumptions

Factor	Argyll and Bute Study Area		Scotland	
	Value	Rationale	Value	Rationale
Deadweight	0%	In absence of the Proposed Development, the Proposed Development Area would remain as land used for rural activities.	0%	In absence of the Proposed Development, the Proposed Development Area would remain as land used for rural activities.
Leakage	66%	It is assumed that a proportion of employment opportunities will be realised by firms within the Study Area. Construction in the Study Area accounts for some 1,900 jobs, representing 6.8% of the total jobs in the labour market of this Study Area. The relative mobility of the construction sector, however, indicates a large proportion of employment opportunities, particularly skilled workers may be realised by firms external to the Study Area, while skilled workers may be found from within the Study Area	33%	The extended geographical area that is included in this Study Area is expected to result in a lower leakage rate across it. Labour force and businesses located in a longer distance than the Council's borders are expected to contribute to the leakage additionality in a minor way.
Displacement	50%	A high level of displacement is expected to arise within the Argyll & Bute Study Area,	33%	A lower level of displacement is expected to arise within the Study Area of Scotland, concerning mostly skilled

²⁹ The GDP price deflator measures the changes in prices for all of the goods and services produced in an economy

³⁰ GDP Deflator used: 1.082606845. Note that Scottish Annual Business Survey 2022 reports 1,900 people working in construction in Argyll & Bute with a sector turnover of £221m

³¹ The PYE number effectively describes how many people you would need to take on if you wanted to get the project build in one year

³² The full time equivalent figure describes the total number of people who would, on average, be working on the site at any particular point in time during the construction phase

Factor	Argyll and Bute Study Area		Scotland	
	Value	Rationale	Value	Rationale
		especially among unskilled workers.		workers who are willing to relocate from a different Council Area.
Substitution	0%	There are no known public sector incentives that would influence substitution activity at this time	0%	There are no known public sector incentives that would influence substitution activity at this time
Multiplier	1.09	Sectoral Type II multipliers from Scottish Government Input-Output Tables have been applied and adjustment in line with the above leakage assumptions.	1.75	Sectoral Type II multipliers from Scottish Government Input-Output Tables have been applied and adjustment in line with the above leakage assumptions.

- 13.11.7 Based on the additionality assumptions, the 3,567 gross temporary construction jobs created by the Proposed Development are expected to support approximately 664 net temporary construction jobs across the 6-year construction period within the Labour Market Study Area. This represents 34.9% of existing construction jobs (664 jobs) within the study area.
- 13.11.8 Indirect local benefits will arise from the construction phase including use of hotels, Bed and Breakfasts and other accommodation, hire of local equipment and plant, temporary employment of local work force and potential contracting of local sub-contractors.
- 13.11.9 In accordance with the methodology detailed in [Section 13.4](#), the net construction employment associated with the Proposed Development within the Argyll & Bute Study Area will result in a High magnitude of change on the Labour Market receptor (a medium sensitivity receptor as per 3), resulting in a **Short-Term Major Beneficial effect**.

Local Economic Development

- 13.11.10 In addition to generating employment (direct and indirect) and impacting on key business sectors, the location, scale, and nature of the Proposed Development means there is also the potential for wider economic development effects in the local area.
- 13.11.11 During the construction phase there will be opportunity for the provision of work experience and apprenticeships and the applicant has already engaged with local schools and colleges and Highland and Islands Enterprise with regard to training and apprenticeship programmes to maximise local employment opportunities.
- 13.11.12 Gross Added Value (GVA) generated through the construction phase of the Proposed Development will act as a stimulus to the wider construction sector and induce multiplier effects. The Scottish Government publishes regular updates to the Type II Output, Income, Employment and GVA Multipliers. The most recent update was in 2018. According to these, the creation of 664 net temporary construction jobs within the Labour Market Study Area is anticipated to generate some £41,439,143 Net GVA over the 6-year construction period.
- 13.11.13 In accordance with the methodology detailed in [Section 13.4](#), this GVA associated with the Proposed Development within the local area will result in High magnitude of change to the local economy (Medium sensitivity as per Table 13.2) resulting in a Major Beneficial effect.

Key Business Sector

Construction Sector

- 13.11.14 The key sector likely to experience socio-economic effects from the Proposed Development during the construction phase is the construction sector. The effects on the construction sector have been reviewed and analysed in Section 13.11.3 to 13.11.9 above resulting in a conclusion of **Short-Term Major Beneficial effect**.

Tourism and Visitor Economy Sector

Construction Phase

- 13.11.15 In accordance with the methodology detailed in **section 13.4, Table 13-10** below provides a proportionate assessment of likely construction phase effects on each assessed receptor grouping of the tourism and recreation sector from the Proposed Development. This assessment considers likely 'secondary' effects on the sector as a whole rather than assessing 'primary' effects on individual tourism assets. This assessment makes reference to individual identified receptors and associated likely primary environmental effects where relevant, but it applies equally to other receptors of the same grouping. The assessment takes account of likely effects associated with the construction phase of the development.

Table 13-10: Assessment of Construction Phase Effects on Tourism and Recreation Sector

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
Designated walking and recreational routes	Medium	Low	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> ▪ Cruachan Horseshoe; ▪ Falls of Cruachan to Cruachan Dam using path; ▪ Cruachan Dam via dam access road; ▪ Beinn Eunaich and Beinn a Chochuill; ▪ There will be direct impact to a small section of the Cruachan Horseshoe route. This will be at the south east corner of the Cruachan Reservoir where the new upper control works and intake will be constructed. During construction, a localised diversion will be put in place which will allow people to safely complete and access this walking route; and ▪ Primary impacts on the Falls of Cruachan to Cruachan Dam walk route are also predicted. The impact on this route results from the relocation of the informal parking in the lay-by on the A85 at the start point of this route. Alternative parking will be provided for the duration of the closure of the lay-by and impact is therefore predicted to be minimal. Impact is also predicted on the Cruachan Dam via the dam access road walking route as works to widen the road will be taking place on this route, however, access management measures will be in place to maintain access such as a temporary diversion or waiting areas. <p>‘Secondary’ Effects on Visitor Attractiveness and Tourism Experience.</p> <p>Table 13.6.1 presented in Appendix 13.1 provides a detailed list of tourism assets within this receptor grouping.</p> <p>Chapter 11 Landscape and Visual has identified significant effects during construction for two out of five recreational routes. The Cruachan Horseshoe and Beinn Eunaich and Beinn a Chochuill. Visibility of the works at the upper reservoir would be highly visible when passed as part of the Cruachan Horseshoe and would</p>	Minor (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>be perceptible in views from the mountain summits and ridges. From the high level parts of the route the construction activities at the upper reservoir could be distracting but would be relatively localised in the wide expansive view from summits. Other parts of the route would remain unaffected with works at the quayside barely perceptible from the first 500m of the route due to filtering and screening by woodland and concealed by landform from all other parts.</p> <p>The eastern compound would be located close to the Beinn Eunaich and Beinn a'Chochuill route and would therefore be prominent in passing from the initial section of the route. The visual effect is localised to this part of the route as the compound would likely be either concealed by landform or unlikely to be very perceptible from the upper part of the route and ridge within the wider expanse view.</p> <p>Three further recreational routes have been assessed in the Landscape and Visual chapter:</p> <ul style="list-style-type: none"> ▪ Core Path 425: Kilchurn Path; ▪ Core Path 450 Duncan Ban MacIntyre Monument; and ▪ Scottish Hill Track 138: Dalmally to Glen Etive. <p>The construction phase effect on these is deemed to be negligible as views would be very localised, glimpsed and lead to a barely perceptible change in view.</p> <p>A further five recreational routes have been identified in the tourism and recreation study area:</p> <ul style="list-style-type: none"> ▪ Core Path 300 (b) Kilchrenan to Taynuilt; ▪ Core Path 528 (b) Dalmally Circular; ▪ Core Path 171 (b) Kilmore – Loch Nant – Kilchrenan; ▪ Core Path 173 (e) Ford to Annat via Loch Avich and Inverinan; and ▪ The Caledonia Way Cycle Route. <p>There will be no direct impact on these routes as they will remain unchanged and construction activity will not be visible from them. As no changes are predicted it is considered that the visitor</p>	

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>attractiveness and tourism potential of these routes will not be affected.</p> <p>Irrespective of temporary and localised changes in visual amenity, all recreational routes will continue to remain open and fulfil their purpose of providing countryside access. The temporary and intermittent visual effects alone will not inhibit access or greatly alter the recreational experiential value of these routes.</p> <p>On this basis and taking account of all 'primary' environmental effects, the construction phase is likely to result in a Temporary Low Magnitude of Change to visitor attractiveness and tourism potential of designated walking and recreational routes.</p> <p>Having regard to the medium sensitivity of this receptor grouping, the construction of the Proposed Development is likely to result in a Minor adverse effect (not significant).</p>	
Outdoor tourist destinations	Low	Low	<p>'Primary' Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects predicted. <p>The Cruachan Dam is the only outdoor tourist destination within the proposed area of works. The dam will remain visible will the same level of accessibility as existing and therefore no significant effects are predicted. The other two outdoor tourist destination receptors are remote from the proposed area of works and visibility of the works from these receptors is predicted to be limited and distant and not distracting.</p> <p>'Secondary' Effects on Visitor Attractiveness.</p> <p>Table 13.6.1 presented in Appendix 13.1 provides a detailed list of tourism assets within this receptor grouping.</p> <p>Chapter 12 Cultural Heritage predicts that there will be a direct, temporary (medium term) and adverse impact of major magnitude on Cruachan Dam. This is an outdoor tourist destination in the</p>	Negligible (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>study area. The Cultural Heritage assessment has come to this conclusion by taking account of the impact of site compound at the upper reservoir and excavation works, heavy plant machinery and other construction operations occurring within close proximity of the dam.</p> <p>In terms of recreational impact, visitors will continue to be able to walk to and view the dam.</p> <p>Chapter 11 Landscape and Visual assessment impact on two outdoor tourist destinations, Kilchurn Castle and the Duncan Ban MacIntyre Monument, the effect on both is identified as minor adverse (not significant). At both destinations there would be some views of the eastern construction compound area and potentially limited and distant views of road upgrading and construction traffic on the upper access road but these are not considered to be distracting within the view. With regards to visitor attractiveness and tourism potential it is not considered that construction will have any impact.</p> <p>Of the other outdoor destinations identified it is considered unlikely that the construction will impact on their operation or attractiveness. Continuity of access to the identified attractions will be maintained and the destinations will continue to provide the same tourism offering.</p> <p>Temporary and intermittent visual effects are not likely to detract from the purpose of the visits to specific outdoor tourist destinations and do not alter the recreational or experiential value. On this basis, the construction phase is considered likely to have a Low Magnitude of Change on this receptor grouping. Having regard to the low sensitivity of this receptor grouping, the construction of the Proposed Development is likely to result in a Negligible Adverse effect.</p>	

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
Indoor Tourist Destinations	Low	Low	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects are predicted. <p>The Cruachan Visitor Centre will remain open to visitors throughout the construction phase. However, during different stages of the construction phase the tour of the power station may require to be altered. These changes would be temporary in nature and managed by the developer.</p> <p>No direct impacts will be experienced at St Conan’s Kirk. The Kirk is accessed from the A85 and there are no construction impacts which will affect this</p> <p>‘Secondary’ Environmental Effects on Visitor Attractiveness and Tourism Experience:</p> <p>Construction works and activities may be visible in filtered views from outdoor areas around the visitor centre, however as the focus of the visitor centre is on the Cruachan power station including the method of its construction, this next phase in the history of the power station will be of interest to visitors and likely to result in minor beneficial effects</p> <p>The frontage of St. Conan’s Kirk faces south with views to Loch Awe and these will not be impacted by the proposed development. It is therefore predicted that the visitor attractiveness and tourism potential of St Conan’s Kirk will not be affected by the construction phase of the Proposed Development.</p> <p>On this basis, the construction phase is considered likely to result in a Temporary low Magnitude of Change to visitor attractiveness and tourism potential of Indoor Tourist Destinations. Having regard to the low sensitivity of this receptor grouping the</p>	Negligible

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			construction of the Proposed Development is likely to result in a Negligible Effect (Not Significant) .	
Hospitality	Low	Low	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects are predicted. <p>None of the identified hospitality receptors are within the proposed area of works and access to the receptors is not predicted to be affected by the construction of the Proposed Development. Therefore, there are no predicted changes to visitor attractiveness and no significant direct effects are predicted.</p> <p>‘Secondary’ Environmental Effects on Visitor Attractiveness and Tourism Experience:</p> <p>Table 13.6.1 presented in Appendix 13.1 provides a detailed list of receptors within this receptor grouping. Indirect local benefits will arise from the construction phase, including the potential use of hospitality services by the construction workforce.</p> <p>No change is anticipated to effect hospitality businesses during the construction phase as the primary draw and general functionality of such establishments will not be impeded by the construction of the Proposed Development. There is no decline in tourist trade anticipated during the construction phase.</p> <p>Indirect local benefits will arise from the construction phase from the potential use of hospitality services by the construction workforce.</p> <p>On this basis the construction phase is considered likely to result in a temporary Low Magnitude of Change to visitor attractiveness</p>	Negligible effect (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			and tourism potential which results in Negligible Effect (Not Significant).	
Visitor accommodation	Medium	High	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> Potential for significant effects predicted. <p>In the absence of firm proposals for the accommodation of the construction workforce, significant adverse effects could arise on the visitor accommodation sector. This would result from accommodation being block booked for extended periods of time (high magnitude of change) and therefore being unavailable to the tourism sector during the construction period. This would be a major (significant) adverse effect.</p> <p>The impact on visitor accommodation is set in the context of it being a constituent part of the tourism sector. If visitor accommodation is block booked, for up to 6 years in this instance, it becomes unavailable to the tourism sector and the magnitude of change in visitor attractiveness and tourism potential is therefore high as the benefits don’t accrue to the other local businesses that serve the tourists staying in the hotels and guest houses. These accommodation providers would no longer be serving the tourism sector, instead they will play a role in serving the construction sector.</p> <p>Conversely, the use of visitor accommodation on an ad-hoc basis for visiting executives, engineers and specialist advisors, would have a moderate beneficial effect, but this would only accrue if the accommodation options are not exhausted by use for construction workers. In the absence of firm proposals for construction worker accommodation this effect will not be realised and therefore the potential effect remains major and adverse</p>	Major adverse effect (significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>'Secondary' Environmental Effects on Visitor Attractiveness and Tourism Experience</p> <p>Table 13.6.1. presented in Appendix 13.1 provides a detailed list of tourism assets within this receptor grouping.</p> <p>No secondary effects are likely to be experienced by accommodation providers in the area.</p>	
Recreational activities in the open countryside	Low	Low	<p>'Primary' Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects predicted. <p>The construction of the Proposed Development will not affect the identified receptors in the recreational activities in the open countryside grouping. Access to all receptors will not be interrupted by the Proposed Development during the construction phase and none of the receptors are within the proposed area of works.</p> <p>'Secondary' Environmental Effects on Visitor Attractiveness and Tourism Experience</p> <p>Table 13.6.1 in Appendix 13.1 provides a detailed list of receptors within this receptor grouping. Irrespective of likely temporary changes in visual amenity there will be no impact on recreational assets within the study area in terms of visitor attractiveness or experiential value. Access will be maintained to and from recreational activities in the open countryside.</p> <p>Chapter 11 Landscape and Visual reports that during construction in LCT 53 there would be loss of woodland and a focussed area of activities on the loch shore would lead to a localised change in landscape where a more industrialised character would be created. The establishment of the quayside and intensive activity surrounding this area would form a greater interruption to the</p>	Negligible (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>continuity of shoreline vegetation and the rural open water views across the loch. The appearance of the upper reservoir construction works within views towards Cruachan Dam from the southern side of the loch may be distracting within the context and would affect the role of this feature as a landmark. Chapter 11 Landscape and Visual concludes that during construction effect on this LCT 53 is anticipated to be Minor to Adverse (not significant) but it is recognised that within the localised area to north and south arm of Loch Awe leading to the Pass of Brander, the effect would be more pronounced and <i>localised</i> Moderate (significant) effect is anticipated within this area.</p> <p>Chapter 11 Landscape and Visual reports that all LCTs fall within the North Argyll APQ with LCT 35 and LCT 53 considered to be particularly influential within the APQ designation. Temporary significant effects are anticipated to these LCTs particularly within the context of the APQ. It is therefore considered that these landscape effects would lead to a temporary significant effect to the North Argyll APQ during construction.</p> <p>It is not considered that the effects identified in Chapter 11 would affect the visitor attractiveness of the identified receptors as they are localised and temporary.</p> <p>On this basis, the construction phase is likely to have a Low Magnitude of Change on this receptor grouping therefore resulting in a Negligible Effect (not significant).</p>	
Tourists (travelling by road and rail) through the open countryside	Low	Low	<p>‘Primary’ Environmental Effects on Tourism Assets:</p>	Negligible (not significant)

			<ul style="list-style-type: none"> ▪ A85; ▪ B8077; and ▪ Oban Branch Railway Line. <p>A short section of the A85 will be temporarily diverted into an existing lay-by and vehicle movements will be controlled by traffic lights. This diversion will take place for a limited period during the winter months which is the low season for the tourism sector, and it is predicted that the temporary diversion and traffic management in place will not have a significant effect on visitor attractiveness and tourism experience. This effect is distinct from that which will be experienced by road users and is assessed in the transport chapter of this EIA.</p> <p>The construction compound is directly accessed from the B077 but as this road is predominantly used for local access no impacts on visitor attractiveness or experience are predicted.</p> <p>The Oban Branch Railway line will not be directly impacted by the proposals.</p> <p>‘Secondary’ Environmental Effects on Visitor Attractiveness and Tourism Experience:</p> <p>Table 13.6.1 included in Appendix 13.1 provides a detailed list of receptors within this receptor grouping.</p> <p>Chapter 11 Landscape and Visual identifies significant effects on two roads within the study area, the A85 and B8077. It is identified that travellers on the A85 would potentially receive a significant visual effect during construction with immediate views of construction activities at the quayside where traffic will be slowed and diverted for a period of the works. There will also be views of the construction compound east of Lochawe village from the A85. It is acknowledged that the changes in these views are localised and make up a short part of an overall journey on the A85. Tree</p>	
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Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>clearance in the area would create previously unavailable open views of Loch Awe which could be seen as a positive change. Views from the Oban Branch Railway Line are considered to be similar to those from the A85 but it is anticipated that the woodland between the railway line and A85 will be retained and therefore any views would be brief and glimpsed through trees. Any views of the construction works from the railway line and would comprise a short section of the overall journey through the study area. The overall visual effect on the Oban Branch Railway line is therefore not significant in EIA terms.</p> <p>Taking the above into consideration, visibility of construction activities could momentarily affect the experience of tourists travelling through the open countryside, but this would be insufficient to materially affect the overall tourism experience and thus the attractiveness of the area as a tourist destination.</p> <p>On this basis, the construction phase is likely to have a Temporary Low Magnitude of Change on this receptor grouping therefore resulting in a Negligible (not significant).</p>	

Summary of Construction Phase Effect on Tourism and Recreation Sector

- 13.11.16 Table 13.11 provides a summary of the assessed construction phase effects on the visitor attractiveness and tourism potential of each key component of the tourism and recreation sector (i.e., each receptor grouping). The assessment has been undertaken on a sectoral basis across the Tourism and Recreation Study Area (i.e., the identified 7 relevant components of the tourism sector), rather than focusing on individual tourism assets.

Table 13.11: Construction Summary – Tourism and Visitor Sector

Receptor Group	Significance of Effect
Designated walking and recreational routes	Minor (not significant)
Outdoor tourist destinations	Negligible
Indoor tourist destinations	Negligible
Hospitality	Negligible
Visitor Accommodation	Major Adverse effect (significant)
Recreational activities in the open countryside	Negligible
Tourists (travelling by road or rail) through the open countryside	Negligible

Operational Phase

Labour Market Effects

- 13.11.17 The operation and maintenance impact of the Proposed Development has been estimated throughout the 25-year lifespan of the Proposed Development.
- 13.11.18 On this basis, it is estimated that the operation and maintenance of the Proposed Development could generate support some £7 million GVA. In Argyll & Bute, it is estimated the project could support up to five³³ net operational FTE jobs in total and £3.6m GVA.
- 13.11.19 In accordance with the methodology detailed in Section 13.4.15 the operational employment associated with the Proposed Development within the Study Area will result in a negligible magnitude of change on the Labour Market Sector receptor (a Low sensitivity receptor as per Table 13.3), resulting in a Negligible effect.

Gross Employment

- 13.11.20 The Applicant notes that a total of 5 full time staff would be required annually to support the operation of the Proposed Development over the 25-year operational period. This equates to 1 Full Time Equivalent (FTE)s over the 25-year operational programme across the study area.

³³ Figure supplied by Drax

Net Additional Employment

Table 13.12: Operational Additionality Assumptions

Factor	Argyll and Bute Study Area		Scotland Study Area	
	Value	Rationale	Value	Rationale
Deadweight	75%	In absence of the expansion project and given that Cruachan 1 already employs 30 operational staff, the O&M sector of the Study Area would be impacted by a maximum of 25%.	0%	In absence of the Proposed Development, the O&M sector of Scotland would remain unchanged.
Displacement	40%	A low level of displacement is expected to arise within Argyll & Bute, especially concerning the market share of high skilled specialised workers that will attempt to find work in the area around the Proposed Development.	10%	A low level of displacement is expected to arise within the Study Area of Scotland. Few workers from the socio-economic study area are expected to relocate from a different Council Area, mainly management staff
Leakage	33%	Most benefits created during the operational phase of the Proposed Development will go to individuals, organisations or businesses living or operating within the Study Area.	10%	Little of the benefits created during the operational phase of the Proposed Development will go to individuals, organisations or businesses living or operating in Scotland, having no international benefits.
Substitution	0%	There are no known public sector incentives that would influence substitution activity at this time	0%	There are no known public sector incentives that would influence substitution activity at this time
Multiplier	1.46	Sectoral Type II multipliers from Scottish Government Input-Output Tables have been applied and adjustment in line with the above assumptions	1.79	Sectoral Type II multipliers from Scottish Government Input-Output Tables have been applied and adjustment in line with the above assumptions

- 13.11.21 Based on the additionality assumptions, the 5 gross operations and maintenance jobs created by the Proposed Development are expected to support approximately 1 net temporary operational job across the 25-year period.
- 13.11.22 Gross Value Added (GVA) is a measure of the value of goods and services produced in an area. The GVA per head in the 'Operational and Maintenance' industry in the Study Area is £55,628, compared to £69,188 in Scotland. It is estimated that the Proposed Development will create £3.6m net additional Gross Value Added impact in Argyll & Bute and £7m additional Gross Value Added impact in Scotland.
- 13.11.23 The operation of the Proposed Development would result in a Negligible Beneficial magnitude of change on the Key Business Sector of Construction (High sensitivity receptor) resulting in a **Minor Permanent Beneficial effect**.

Local Economic Development

- 13.11.24 In addition to generating employment (direct and indirect) and impacting on the operation and maintenance sector, the location, scale, and nature of the Proposed Development means there is also the potential for wider economic development effects in the local area.

- 13.11.25 Once completed, the Proposed Development will require operational and maintenance staff for its safe and effective day-to-day running. Drax has an existing operation and maintenance (O&M) contingent of 30 personnel at Cruachan 1. It is estimated a further 5 FTE positions will be required to handle the operations and maintenance of Cruachan 2. These permanent new jobs will generate nearly £4 million as an economic benefit to the local economy (in net present value (NPV)3 GVA) over 25 years.
- 13.11.26 Drax is the first UK energy company to announce an initiative to improve employability for a million people by 2025. Through its 'Mobilising a Million' initiative, Drax will connect with one million people by 2025 to improve skills, education, employability, and opportunity. The Proposed Development will provide opportunity for Drax to provide more opportunities in Argyll and Bute.
- 13.11.27 Drax has a long running apprenticeship scheme which is part of its commitment to developing new talent as well as upskilling the workforce across the communities where it operates, including Argyll and Bute. The craft apprenticeship scheme, which operates at Cruachan, gives new recruits to Drax the opportunity to gain skills and expertise by working alongside highly qualified engineers. An expanded Cruachan power station will allow Drax to continue and expand this scheme giving apprentices a chance to development core skills and prepare for future careers. These unique opportunities provided by Drax can boost economic development across Argyll and Bute.
- 13.11.28 It is proposed that the Applicant will organise *Meet the Supplier* days to match local companies with opportunities during the construction phase.

Tourism, Recreation and Visitor Economy Sector

13.11.29 Table 13.13 provides a proportionate assessment of likely effects on each tourism and recreation sector receptor grouping during the operational phase of Cruachan 2.

Table 13.13: Assessment of Operational Phase Effects on Tourism and Recreation Sector

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
Designated walking and recreational routes	Medium	Low	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> ■ Cruachan Horseshoe; ■ Falls of Cruachan to Cruachan Dam; ■ Cruachan Dam via Dam Access Road; ■ The undesignated but well used ‘Cruachan Horseshoe’ will be permanently diverted, and this will have a direct impact on the route. The proposed works require a short section of the route adjacent to the eastern end of the Dam to be divert around the new upper intake and control works. This will result in a formalised, upgraded route around the works compared with the current informal, unsurfaced route, a minor beneficial change; ■ The informal parking in the lay-by on the A85 which is used by walkers completing the Falls of Cruachan to Cruachan Dam walk will be permanently changed by the works. The lay-by parking provision will be upgraded following completion of the lower control works, resulting in a minor beneficial change mainly as a result of improved safety; ■ The works to strengthen and widen sections of the dam access road will improve this route for those 	Minor beneficial (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>who use it recreationally to reach Cruachan Dam on foot and bike; and</p> <ul style="list-style-type: none"> The direct impacts to these three routes are predicted to be beneficial changes and overall will enhance the visitor attractiveness and tourism potential of each. <p>‘Secondary’ Effects on Visitor Attractiveness and Tourism Experience.</p> <p>Table 13.6.1 presented in Appendix 13.1 provides a detailed list of tourism assets within this receptor grouping.</p> <p>As detailed in Chapter 11 Landscape and Visual views from recreational routes would not be significant. Passing views of the substation would be possible from the Cruachan Horseshoe but these would be seen within the context of other existing infrastructure below the dam. Views of the upper intake structure and surrounding rock cut may be perceptible from areas alongside the reservoir and more distantly from the higher mountain areas where the surge shaft could also be visible. Mitigation planting and vegetation growth over time would soften the appearance of the rock cut. Chapter 11 Landscape and Visual concludes that in the context of the existing dam and infrastructure the permanent features of Cruachan 2 would not be noticeably distracting and the operational effect after 10 years is anticipated to be not significant. Whilst the development will be visible from the following routes, there will be no direct impacts experienced by users of the routes:</p>	

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<ul style="list-style-type: none"> Core Path 300 (b) Kilchrenan to Taynuilt; Core Path 528 (b) Dalmally Circular; Core Path 171 (b) Kilmore – Loch Nant – Kilchrenan; Core Path 173 (e) Ford to Annat via Loch Avich and Inverinan; Core Path 425: Kilchurn Path ; Core Path 450 Duncan Ban MacIntyre Monument; Scottish Hill Track 138: Dalmally to Glen Etive; and The Caledonia Way Cycle Route. <p>In summary, the recreational purpose of designated routes will be largely unaffected and there is no conclusive evidence to suggest changes in visual amenity would materially alter the experiential value of using of using affected recreational routes, when considered in the context of the existing dam and power station complex.</p> <p>On this basis the operation of the Proposed Development is likely to result in a Low beneficial Magnitude of Change to visitor attractiveness and tourism potential of designated walking and recreational routes. Overall, the effect on designated walking and recreational routes is minor beneficial as all routes will remain accessible throughout the operation of the proposed development with some routes and access to routes being upgraded.</p>	
Outdoor tourist destinations	Low	Low	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects predicted. 	Negligible (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>Once in operation, the Proposed Development will have little to no effect on the identified outdoor tourist destination receptors.</p> <p>The Cruachan Dam is the only receptor from which the Proposed Development will be visible, and it is not predicted that views of the new upper controls works would affect the overall visitor experience of those viewing the dam, since they are intrinsically linked to the operation of the dam and power station. The dam will remain visible and unaltered will have the same level of accessibility as existing and therefore no significant effects are predicted.</p> <p>Visibility of the works from the other two outdoor tourist destinations receptors is predicted to be limited and distant and not distracting. Access to both will be unaffected by the operation of the Proposed Development and overall visitor attractiveness will not be altered and no significant effects are anticipated.</p> <p>‘Secondary’ Effects on Visitor Attractiveness. Table 13.6.1 presented in Appendix 13.1 provides a detailed list of tourism assets within this receptor grouping.</p> <p>Chapter 12 Cultural Heritage has considered the impact from the Proposed Development on Cruachan Dam. Impacts on the setting and key views of the dam are predicted to come from the upper intake structure and associated rock cutting which will be visible from along the top of the dam and from the west side of the reservoir. It is acknowledged that the landscaping and</p>	

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>planting planned will soften the appearance of the cutting within the landscape. Despite this, the cutting will be clearly visible along with the intake structure, but this will lessen over time due to the effects of weathering and the planting. The key views of the buttressed front of the dam in the context of Coire Cruachan will be unaffected and the designed relationship between the dam and the surrounding landscape will remain unchanged.</p> <p>In terms of recreational impact, visitors will continue to be able to walk to and view the dam as a tourist destination, therefore Cruachan Dam will continue to provide the same tourism offering.</p> <p>Table 13.6.1 in Appendix 13.1 provides a detailed list of outdoor visitor attractions in the study area.</p> <p>Chapter 12 Landscape and Visual assessed impact on two outdoor tourist destinations, Kilchurn Castle and the Duncan Ban MacIntyre Monument. The effect on both is identified as negligible as the main feature visible at both, the eastern construction compound will be temporary and the land accommodating it will be fully restored on completion of the construction works.</p> <p>Of the other outdoor destinations identified, it is unlikely that the operation of the Proposed Development will impact on their operation or attractiveness. Continuity of access to the identified attractions will be maintained and the destinations will continue to provide the same tourism offering.</p> <p>Visual effects of the new proposals when set in the context of the existing power station complex will not detract from the purpose or enjoyment of visits to</p>	

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			specific outdoor tourist destinations and do not alter the recreational or experiential value. On this basis, the operation of the Proposed Development is considered likely to have a Low Magnitude of Change on this receptor grouping. Having regard to the low sensitivity of this receptor grouping, the construction of the Proposed Development is likely to result in a Negligible effect .	
Hospitality	Low	No Change	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects are predicted. <p>The operation of the Proposed Development is not predicted to have any significant effects on any of the identified hospitality receptors. During operation, the Proposed Development will not affect the general functionality of the hospitality venues.</p> <p>‘Secondary’ Environmental Effects on Visitor Attractiveness and Tourism Experience:</p> <p>Table 13.6.1 presented in Appendix 13.1 provides a detailed list of receptors within this receptor grouping. As the main draw to hospitality establishments is their food, drink and entertainment offering, and this will be unaffected by the Proposed Development (rather than visual amenity per se or localised changes to landscape character), the Proposed Development will have no discernible effect on this receptor grouping. On this basis the operation of the Proposed Development is not likely to generate a discernible magnitude of change on this receptor grouping, resulting in no perceptible adverse effect (‘No Change’).</p>	No Change (not significant)
Visitor accommodation	Medium	Negligible	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects predicted. 	Negligible (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>The operation of the Proposed Development will have no direct impact on attractiveness of the visitor accommodation receptors identified and negligible change is predicted in overall visitor numbers and associated expenditure.</p> <p>‘Secondary’ Environmental Effects on Visitor Attractiveness and Tourism Experience:</p> <p>The primary draw and functioning of visitor accommodation will not be affected by the operation of the Proposed Development. Indirect local benefits may arise from the operational phase, including the use of hotels, B&Bs and other accommodation by visitors to the Proposed Development i.e. Drax staff and/or contractors whose primary place of work is not the Proposed Development. This change is expected to be negligible however in the context of the existing power station complex.</p> <p>On this basis the operational phase is considered likely to result in a Negligible Magnitude of Change resulting in a Negligible Effect (not significant).</p>	
Recreational activities in the open countryside	Low	Negligible	<p>‘Primary’ Environmental Effects on Tourism Assets:</p> <ul style="list-style-type: none"> No likely significant effects predicted. <p>Once in operation, the Proposed Development will have no direct impact on the receptors identified in the recreational activities in the open countryside grouping. All receptors will remain accessible and visitor attractiveness is not predicted to be affected by the Proposed Development.</p> <p>‘Secondary’ Environmental Effects on Visitor Attractiveness and Tourism Experience</p>	Negligible (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			Table 13.6.1 in Appendix 13.1 provides a detailed list of receptors within this receptor grouping. Irrespective of likely changes in visual amenity there will be no impact on recreational assets within the study area in terms of visitor attractiveness or experiential value. On this basis, the operation phase is likely to have a Negligible Magnitude of Change on this receptor grouping therefore resulting in a Negligible Effect (not significant) .	
Tourists travelling (by road and rail) through the open countryside	Low	Negligible	<p>‘Primary’ Environmental Effects on Tourism Assets</p> <ul style="list-style-type: none"> No likely significant effects predicted. <p>The operation of the Proposed Development is not predicted to have any primary effects on the receptors identified in the tourists travelling (by road and rail) through the open countryside. The operation of the Proposed Development is not predicted to disrupt journeys that would affect the experience of travelling through the open countryside and changes to visitor attractiveness and overall tourism numbers and expenditure are not anticipated.</p> <p>‘Secondary’ Environmental Effects on Visitor Attractiveness and Tourism Experience:</p> <p>Table 13.6.1 included in Appendix 13.1 provides a detailed list of receptors within this receptor grouping. Chapter 11 Landscape and Visual identifies effects on two roads within the study area, the A85 and B8077. During operation, the effects on views from the A85 and B8077 are not anticipated to be significant. During operation, the quayside and new lower control works will likely be visible in brief, passing views. Over time, the effect on views will be reduced as proposed</p>	Negligible (not significant)

Receptor Group	Sensitivity	Magnitude of Change – Visitor Attractiveness and Tourism Potential	Assessment Rationale	Significance of Effect
			<p>mitigation becomes more and more established. It is likely that some gaps in planting will remain and views to buildings and the quayside will be possible, but this will be similar to the existing situation.</p> <p>The B8077 would only be affected by views of the eastern construction compound which will no longer be present in the operational phase of the development and accordingly the operational effect on this road is anticipated to be negligible.</p> <p>Views from the Oban Branch Railway Line are considered to be similar to those from the A85, but it is anticipated that the woodland between the railway line and A85 will be retained and therefore any views will be brief and glimpsed through trees on a short section of the overall journey through the study area.</p> <p>On this basis, the operation phase of the Proposed Development is not likely to have a discernible effect on this receptor grouping. The predicted Negligible Magnitude of Change results in the level of effect on this receptor grouping being assessed as Negligible effect.</p>	

Summary of Operational Phase Effect on Tourism and Recreation Sector

- 13.11.30 Table 13.14 provides a summary of the assessed operational phase effects on the visitor attractiveness and tourism potential of each key component of the tourism and recreation sector (i.e., each receptor grouping). The assessment has been undertaken on a sectoral basis across the Tourism and Recreation Study Area (i.e., the identified 6 relevant components of the tourism sector), rather than focusing only on individual tourism assets.

Table 13.134: Operational Summary – Tourism and Visitor Sector

Receptor Group	Significance of Effect
Designated walking and recreational routes	Minor beneficial (not significant)
Outdoor tourist destinations	Negligible
Hospitality	No Change
Visitor accommodation	Negligible
Recreational activities in the open countryside	Negligible
Tourists (travelling by road and rail) in the open countryside	Negligible

- 13.11.31 Table 13.14 above confirms that no relevant receptor grouping of the tourism and recreation sector is likely to experience operational phase effects which could be considered significant in the context of EIA Regulations. As all receptor groupings make important contributions to the tourism and recreation sector as a whole, the sector is likely to experience a Long- Term Minor beneficial effect from the operation of the Proposed Development as a whole. This is not significant in the context of the EIA Regulations.

13.12 Further Mitigation and Enhancement

Construction

- 13.12.1 Given the size of the construction workforce, without additional mitigation there is potential for the visitor accommodation sector to experience major adverse impacts. As an alternative to using visitor accommodation, the contractor may elect to provide suitable accommodation for housing the construction workforce. This would be delivered separately and is not part of this proposal.

Operation

- 13.12.2 No further mitigation or enhancement measures are required.

13.13 Residual Effects

- 13.13.1 The likely residual effects from construction and operation of the Proposed Development are identified in Tables 13.15 and 13.16.

Table 13.15: Summary of Residual Effects (Construction)

Potential Effect	Duration	Receptor Sensitivity	Residual Magnitude of Change	Assessment of Residual Effect	Residual EIA Significance
Labour Market					
Net Construction Employment	Temporary	Medium	High	Short Term, Major Beneficial	Significant
Net Construction GVA	Temporary	Medium	High	Short Term, Major Beneficial	Significant
Tourism and Visitor Economy					
Designated walking and recreational routes	Temporary	Medium	Low	Minor adverse effect	Not significant
Outdoor tourist destinations	Temporary	Low	Negligible	Negligible	Not significant
Indoor tourist destinations	Temporary	Low	Low	Negligible	Not significant
Hospitality	Temporary	Low	Moderate	Minor beneficial	Not significant
Visitor Accommodation	Temporary	Medium	Low	Minor beneficial	Not significant
Recreational Activities in the open countryside	Temporary	Low	Negligible	Negligible	Not Significant
Tourists travelling (by road and rail) through the open countryside	Temporary	Low	Low	Negligible	Not Significant

Table 13.146: Summary of Residual Effects (Operation)

Potential Effect	Duration	Receptor Sensitivity	Residual Magnitude of Change	Assessment of Residual Effect	Residual EIA Significance
Labour Market					
Key Business Sector –	Permanent	High	Negligible	Long Term, Minor Beneficial	Long Term, Minor Beneficial

Potential Effect	Duration	Receptor Sensitivity	Residual Magnitude of Change	Assessment of Residual Effect	Residual EIA Significance
Tourism and Recreation					
Tourism and Visitor Economy					
Designated walking and recreational routes	Operational Lifetime	Med	Low	Minor beneficial	Not significant
Outdoor tourist destinations	Operational Lifetime	Low	Low	Negligible	Not significant
Hospitality	Operational Lifetime	Low	No Change	No Change	Not significant
Visitor Accommodation	Operational Lifetime	Low	Negligible	Negligible	Not significant
Recreational Activities in the open countryside	Operational Lifetime	Low	Negligible	Negligible	Not significant
Tourists travelling (by road and rail) through the open countryside	Operational Lifetime	Low	Negligible	Negligible	Not significant

13.14 Monitoring

13.14.1 In the absence of any likely significant effects, it is considered that no monitoring is required.

13.15 Cumulative Effects

13.15.1 This section assesses the likely significant adverse residual effects in relation to Socioeconomics, Tourism and Recreation.

13.15.2 Cumulative effects are those which occur where the effects of more than one development of a similar type within a particular landscape combine to produce a greater level of effect. In relation to the Proposed Development there are a number of ways in which cumulative effects may occur:

- During construction other activities of similar type may increase the perceived presence of this type of activity in the landscape. Such activities may include other major construction projects or forestry felling; and
- During operation permanent features of the scheme (such as those at the upper control intake site and quayside) may be seen in association with other similar features leading to a greater perception of this type of development in the landscape.

- 13.15.3 With the agreement of Argyll and Bute Council the following developments which are proposed within the vicinity of the Study Areas have been included:
- The proposed Balliemeanoch Pumped Storage Scheme, located on the southern shore of Loch Awe;
 - Proposed transmission infrastructure on the southern side of Loch Awe, including Creag Dhubh 132 – 275 kV substation and Creag Dhubh to Dalmally 275 kV Overhead Line; and
 - The operational Cruachan Pumped Storage Hydro Scheme (operational effects only).
- 13.15.4 It is difficult to assess the effects of the Balliemeanoch Pumped Storage Scheme during construction and operation as no details about the proposal are available. Based on the limited information available and the conclusions drawn in **Chapter 11 Landscape and Visual** it is considered unlikely that the proposed Balliemeanoch Pumped Storage development would lead to any significant effect during construction and operation.
- 13.15.5 **Chapter 11 Landscape and Visual** has concluded that the potential for any significant cumulative landscape or visual effects with the proposed Creag Dhubh – Dalmally transmission infrastructure is considered unlikely. Some aspects of the works for this development could be perceptible from higher parts of the Steep Ridges and Mountains LCT to the north of Loch Awe but it is considered this would appear as clearly separate from the more immediate effects of the Proposed Development works at the upper reservoir. The potential intervisibility of these works around the shore of Loch Awe would be likely to be limited where the perceptibility of the Proposed Development construction would be very limited. There is potential for some more noticeable intervisibility of construction grid infrastructure within the Upland Glens LCT, but this is also likely to affect different areas and the wooded quality of the LCT is likely to limit the availability of combined or sequential effects.
- 13.15.6 As a result of the localised nature of the potential visual effects of the Proposed Development and the small and contained range of potential visual receptors affected, as set out in **Chapter 11 Landscape and Visual**, it is considered unlikely that any notable cumulative effects would be experienced in combination with the other two developments. The geographical distance between these developments and the Proposed Development limits the potential for sequential effects. **Chapter 11 Landscape and Visual** concludes that there would be no significant cumulative effects relating to the construction of the Proposed Development in addition to the two baseline developments.
- 13.15.7 Along with the Balliemeanoch pumped storage development and the Creag Dhubh – Dalmally transmission development the Proposed Development would also be seen in combination with the existing Cruachan Pumped Storage Hydro scheme. It is considered that once operational the Proposed Development and the existing scheme would be viewed as a single development and while this may change the perceptions of the existing scheme at the lower and upper reservoirs it is considered unlikely that the additional features would significantly alter the existing perceptions of a working, managed site.
- 13.15.8 On this basis it is considered there would be no new or different likely cumulative effects on the tourism and recreation sector from the Proposed Development in combination with the cumulative sites.

13.16 Referencing

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14 Waste Management

14.1 Introduction

- 14.1.1 This chapter provides an assessment of the likely significant effects of the Proposed Development with respect to the management of waste (excavation arisings) taking into account relevant national, regional and local policy, guidance and regulations.
- 14.1.2 The chapter describes the methods used to establish the baseline conditions which exist in the vicinity of the Site, the potential direct and indirect effects of the Proposed Development arising from waste generation, the mitigation measures required to prevent, reduce, or offset these effects, and the remaining residual effects associated with the Proposed Development.
- 14.1.3 The Proposed Development has the potential to generate approximately 2.3M tonnes of excavation arisings during the Proposed Development, associated with construction of below ground infrastructure including the underground waterway system, and powerhouse cavern, access tunnels and ventilation/cable shaft. As such, excavation arisings may have potential for environmental impacts associated with arising production, storage, processing, transport and ultimate on or off-site end-uses during the construction phase of the Proposed Development.
- 14.1.4 Operation of the Proposed Development is not anticipated to produce significant quantities of waste above what is already produced routinely by Cruachan 1. Decommissioning of the Proposed Development would not produce significant volumes of excavation arisings. Therefore, these elements are not considered in detail in this chapter.
- 14.1.5 This Chapter also has links with other topic Chapters including:
- **Chapter 6 (Ground Conditions):** which describes the existing (baseline) geological conditions of which excavation arisings will comprise; and
 - **Chapter 9 (Transport and Access):** which describes the transport strategy for the Proposed Development, including that associated with removal of excavation arisings.
- 14.1.6 Although further detail regarding prevailing legislation, policy and guidance is outlined in subsequent sections, it is considered helpful to define the term ‘Waste’ from the outset. Prevailing Scottish legislation regarding waste continues to be derived from European Union (EU) Directive 2008/98/EC on waste, otherwise known as “The Waste Framework Directive” (WFD). The WFD introduces the Waste Hierarchy and defines the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. It explains when waste is a by-product and when it ceases to be waste and becomes a secondary raw material (i.e. end-of-waste criteria).
- 14.1.7 Article 3(1) of the WFD defines “waste” as: “any substance or object which the holder discards or intends or is required to discard”. However, defining whether a substance or object is a waste, or not can in itself be complex as the meaning of ‘discard’ is subject to interpretation by case law (**SEPA, 2006** and **DEFRA, 2021**). In certain scenarios material may never be a waste in the first place, for instance, if uncontaminated excavated materials are reused on their site of origin or cease to be a waste if certain reuse criteria are met.
- 14.1.8 For the purpose of this chapter and to ensure that the ‘worst case’ is considered, the following assumptions are made from the outset:
- That all surplus excavation arisings, in the context of the Proposed Development as a whole, are considered to be a waste; and

- That 100% of the residual excavation arisings (i.e., excavation risings not reused within the Proposed Development) will be removed from the Proposed Development by road (i.e. in east and west directions on the A85).

14.2 Policy Context, Legislation, Guidance and Standards

14.2.1 Table 14.1 below outlines the key planning policy and legislation that is specifically relevant to waste management in Scotland. A fuller review of Policy, legislation, and guidance applicable to the wider project can be found in **Chapter 5**.

Table 14.1: Policy Overview

	Legislation / Policy / Guidance	Key Consideration
	Town and Country Planning (Scotland) Act 1997	Provisions for town and country planning and the development and use of land in Scotland.
National (Scotland)	Scottish Planning Policy (SPP), (2020)	The planning system should: <ul style="list-style-type: none"> ▪ 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 (Paragraph 176)
	Scotland's Zero Waste Plan (2010)	The 2010 Zero Waste Plan for Scotland (ZWPS) includes targets for waste management across Scotland including recycling and diversion from landfill. The ZWPS identifies a range of "area for action" including setting 'Strategic Direction'. The Strategic Direction is aligned with the key principles of the Waste Hierarchy with specific focus on prevention and principles of the circular economy (i.e., material recourse for economic and social benefit).
	Ambition - Opportunity – Place, Scotland's Third National Planning Framework, (June 2014)	Recognises that waste is a resource and an opportunity, rather than a burden (Paragraph 4.8)
	Control of Pollution (Amendment) Act 1989	Requires carriers of controlled waste to register with SEPA and outlines the penalties (including seizure and disposal) for vehicles shown to have been used for illegal waste disposal.

	Legislation / Policy / Guidance	Key Consideration
	Environmental Protection Act (1990)	The Environmental Protection Act (EPA) defines the fundamental structure and authority for waste management in England, Wales & Scotland. The EPA also imposes a 'Waste Duty of Care' on any person who imports, produces, carries, keeps, treats, or disposes of controlled waste. Furthermore, the EPA also established the contaminated land regime under Part 2A of the EPA.
	Controlled Waste Regulations 1992	These regulations classify household, industrial and commercial waste for waste management licensing purposes.
	Environment Act 1995	This Act confirms SEPA as the regulators for aspects including contaminated land, control of pollution and enhancement of the environment.
	The Pollution Prevention and Control (Scotland) 2000 (as amended and Pollution Prevention and Control (Scotland) Regulations 2012	Replaces Part I of the Environmental Protection Act 1990 and Regulations made under it. Some activities that were previously authorised by the SEPA under the Air Pollution Control now be regulated under the Pollution Prevention and Control regime. Sets out a system to control pollution from any installation or mobile plant.
	Special Waste Regulations (1996)	These regulations are the principal piece of legislation covering special (hazardous) waste in Scotland. It sets out procedures to be followed when disposing of, carrying, and receiving special waste in Scotland. It provides a definition of 'special waste' in Scotland and states the requirement of Special Waste Consignment Notes. Amended by: <ul style="list-style-type: none"> ▪ Special Waste (Amendment) Regulations 1996; ▪ Special Waste (Amendment) Regulations 1997; and ▪ Special Waste Amendment (Scotland) Regulations 2004.
	Landfill (Scotland) Regulations 2003	Classifies landfill in Scotland and determines the permits required to create and operate a landfill site, and operation requirements. Permitting of landfills is implemented through the PPC regime.
	Waste Information (Scotland) Regulations 2010	Requires businesses to provide waste data returns to SEPA upon request
	Waste Management Licensing (Scotland) Regulations 2011 (as amended	Regulations that consolidate the Waste Management Licensing Regulations 1994 and all subsequent amendments.
	The Environmental Protection (Duty of Care) (Scotland) Regulations 2014	Provides further detail regarding Duty of Care in Scotland and sets out the requirements for transfer notes in Scotland

	Legislation / Policy / Guidance	Key Consideration
	The Landfill Tax (Scotland) Act 2014	Provides the framework for Scottish Landfill Tax (SLfT)
	Managing Waste, online resources, (2021)	Includes ambitious targets for reducing and recycling waste aligned with Scotland's Zero Waste Policy.
Local	Argyll and Bute Draft Waste Strategy, (2020)	Sets targets for reducing and recycling waste aligned with Scotland's Zero Waste Policy.
	Argyll & Bute Local Development Plan, (2015)	Recognises the importance of maximising resources and reducing consumption (Policy LDP 10)
	Argyll & Bute (emerging) Local Development Plan 2 (LDP2)	Although not an exhaustive list, LDP2 identifies the following statements/principles relevant to this Chapter: <ul style="list-style-type: none"> ▪ Paragraph 3.37 (Climate Change and Principles of Sustainable Development) clearly links consumption of natural resources and waste generation with climate change; ▪ Paragraph 3.43 identifies that climate change targets may be achieved by a number of measures, including: "Safeguarding our existing waste sites; and reducing waste at every opportunity"; ▪ Policy LDP2 04(d) also emphasises the importance of waste minimisation; and ▪ Section 7.0 (Sustainable Communities) provides emerging policy relating to waste related development and waste management which cites key policies presented in the National Zero Waste Plan for Scotland. Proposed policy in this regard is presented in the LDP2 as Policy 63.

14.3 Consultation

- 14.3.1 Initial consultation with key stakeholders has been undertaken through submission of the EIA Scoping Report
- 14.3.2 With respect to this chapter, the EIA Scoping Opinion included comments from a number of consultees including: the Scottish Environment Protection Agency (SEPA); and Argyll and Bute Council (ABC) which included additional comments from ABC's Marine and Coastal Development Policy Officer. Table 14.2 below provides details of the scoping comments received from these stakeholders.

Table 14.2: Consultation Responses (Waste)

Consultee	Comments	Response
SEPA	Table 5-1 of the Scoping Report indicates waste management is to be scoped out of the assessment. Instead, spoil arisings generated during the construction phase will be managed through the development and implementation of an Outline Waste	This chapter replaces the OWMP (but includes all information proposed to be included in the OWMP as set out in sections 7.7.7 – 7.7.12 of the EIA Scoping Report) and assesses the

Consultee	Comments	Response
	Management Plan (OWMP). This is to be presented as an appendix to the Ground Conditions Chapter of the EIAR. It is reported this will be a desk study and include consultation with parties which may be able to reuse the arisings (e.g., infrastructure developers, quarry and waste management operators). We support the preparation of the OWMP and the intended contents as set out in Section 7.7.7 – 7.7.12. However, it is not clear why it is not proposed to assess environmental effects of waste or to define the significance of waste impacts within the assessment itself.	potential likely significant environmental effects of waste.
	Section 16.3 reports bulk wastes generated during construction will comprise an estimated 1.2 million tonnes of spoil from tunnelling and excavation (likely to take the form of inert rock ‘chippings’). This is a significant volume of material. Onward use could lead to significant environmental effects, and it is therefore fundamental that a use is identified at the earliest possible stage (i.e. prior to construction).	As reported in this chapter (section 14.4), approximately one fifth of the material will be re-used on Site in the creation of the quayside structure in Loch Awe and for concrete production used in tunnel lining. Discussions are ongoing with local and national stakeholders to identify market end-uses for the remaining four fifths of the material. At present, a viable local option has been identified. Any re-use will seek to achieve the most preferable outcomes in terms of the Waste Hierarchy and Circular Economy. The Applicant has committed to not disposing of any of the arisings as waste in landfill.
	It is our expectation the EIA includes an assessment of the amount of spoil that will be generated, which should be demonstrated to be minimised as much as possible. This should also be accompanied by detailed proposals either for justifiable re-use onsite (e.g., production of suitable concrete aggregates) or use or disposal elsewhere. This should include:	As reported in this chapter (section 14.4), approximately one fifth of the material will be re-used on Site in creation of the quayside structure in Loch Awe and for concrete production used in tunnel lining. Discussions are ongoing with local and national stakeholders to identify market end-uses for the remaining four fifths of the material. At present, a viable local option has been identified. Any re-use will seek to achieve the most preferable outcomes in terms of the Waste Hierarchy and Circular Economy. Drax has committed to not disposing of

Consultee	Comments	Response
	<ul style="list-style-type: none"> ▪ Appropriate maps showing reuse proposals (volume and depth); ▪ Maps storage arrangements (including details of the heights and dimensions of each store, how long the material will be stored for etc) and associated temporary and permanent infrastructure; and ▪ If planned, details of how the material will be processed and suitability of the material any proposed use on site. 	<p>any of the arisings as waste in landfill.</p> <p>The primary re-use (the. quayside structure) is shown on Figure 3.1. It has a depth of approximately 12m a width of approximately 30m and a length of 510. It will require approximately 162,500 tonnes of spoil, 21,700 tonnes which will be imported to form the initial tunnel access and 140,800 tonnes will be from excavation arisings of spoil.</p> <p>Approximately 15,000 tonnes of spoil will be stored on the quayside structure at any one time, (prior to removal by road). The material would be stored under a canopy structure, enclosed on three sides which would prevent runoff and windblown silt from entering Loch Awe. The structure is shown on Figure 3.1.</p>
	<p>Given the volumes it is not appropriate that this is deferred to the construction phase of the development. There needs to be a clear idea of how and where the material will be used. It is our view this should be assessed in the EIA. Our clear preference is for the materials to be put to local beneficial use (e.g., SG/Transport Scotland funded infrastructure projects).</p>	<p>Discussions are ongoing with local and national stakeholders to identify market end-uses for the remaining four fifths of the material. At present, a viable local option has been identified. Any re-use will seek to achieve the most preferable outcomes in terms of the Waste Hierarchy and Circular Economy. The Applicant has committed to not disposing of any of the arisings as waste in landfill.</p>
	<p>Any waste materials will need to be removed from the site and disposed of to a suitably licenced facility or made use of via a suitable waste management exemption. We understand that there may be significant transportation issues with removal of any of the material from the site so, although not an issue directly within our remit, we recommend that the assessment includes information on transport implications.</p>	<p>The Applicant has committed to not disposing of any of the arisings as waste in landfill.</p> <p>A full assessment has been undertaken of the potential impacts of transporting the spoil away from the Proposed Development, which is presented in Chapter 9 of the EIA Report.</p>

Consultee	Comments	Response
Argyll and Bute Council	It is considered by the Planning Authority to be premature at this time to scope out effects from waste management: There is little detail on what scale of waste material will require to be mitigated, how it will be stored, how it will be transported and to where and for what purpose. In the absence of greater clarity on such fundamental matters, the Planning Authority does not consider that the scoping out of waste matters is appropriate, nor to have details of this as a conditional matter on any consent that may be granted	<p>This chapter replaces the OWMP originally proposed (but includes all information proposed to be included in the OWMP as set out in sections 7.7.7 – 7.7.12 of the EIA Scoping Report) and assesses the potential likely significant environmental effects of waste.</p> <p>A quantitative assessment of waste volumes to be produced and transported off-site has been undertaken and summarised in section 14.4 of this Chapter.</p> <p>Approximately 15,000 tonnes of spoil will be stored on the quayside structure at any one time, (prior to removal by road).</p> <p>A full assessment has been undertaken of the potential impacts of transporting the spoil away from the Proposed Development, which is presented in Chapter 9 of the EIA Report.</p>
Argyll and Bute Council - Marine and Coastal Development Policy Officer	Under Table 5-1: Technical Scope, it is stated that Waste Management is proposed to be scoped out. If Waste Management is scoped out, I would have concerns at this early stage. A full Site Waste Management Plan (SWMP), with appropriate mitigation measures should be included within the EIA as a supporting document;	<p>This chapter replaces the OWMP originally proposed (but includes all information proposed to be included in the OWMP as set out in sections 7.7.7 – 7.7.12 of the EIA Scoping Report) and assesses the potential likely significant environmental effects of waste.</p> <p>It is proposed that a full Site Waste Management Plan (SWMP) would be more appropriate as a Condition to planning and once design and contracting elements of the Proposed Development are confirmed.</p>

14.3.3 Further to receipt of the EIA Scoping Opinion waste matters have been considered further by the project team. An EIA 'Gatecheck' report was prepared by Stantec on behalf of the Applicant and submitted to the Scottish Government in February 2022 (**Drax, 2022**).

14.3.4 Section 2.3 of the 'Gatecheck' report provided detail of Design Evolution, within which Table 2.1 detailed, with respect to excavation arisings, that:

"It is intended that spoil will be dealt with primarily in three ways: Reused on site including for quay reclamation; where appropriate, provided to local quarry operator(s) for subsequent re-use in the local market, and/or taken off site for use in the wider construction market. However, for assessment

purposes the EIA will assume a worst case that 100% of spoil is transported by road both to the east and west on the A85."

14.3.5 Table 3.11 of the 'Gatecheck' report provided a summary of EIA Scoping comments supplemented by initial responses from the applicant.

14.3.6 The 'Gatecheck' report was circulated to consultees by the Scottish ECU on 9 March 2022, seeking comments by 20 March 2022. At the time of writing, SEPA has responded by email dated 10 March 2022 advising:

"Thanks for consulting us on the Cruachan Expansion Project – EIA Gatecheck Report (dated 15 February 2022). We have reviewed the report and welcome the approach proposed to address our EIA scoping advice (dated 25 August 2021) as set out in the tables in Section 3.3. We specifically welcome that waste (excavation arisings) will now be considered as part of EIAR within a dedicated chapter. We have no further comments on the proposed assessment at this stage but would welcome the opportunity to comment on draft assessments/ EIA chapters prior to formal consultation if feasible. Otherwise, we will consider our position when formally consulted."

14.4 Methodology

Study Area

14.4.1 Based on a worst-case assumption that 100% of the residual spoil arisings will be transported by road the study area is strongly influenced by transport, geographical, socio-economic factors and commercial factors which are difficult to define at this stage of the project.

14.4.2 Due to their mass and relatively low commercial value (compared to other wastes) bulk excavation arisings typically do not tend to travel significant distances by road between the point of production and end-use sites or schemes. For much of the UK travel distances may typically be less than 20 miles as any further and transport costs could potentially outweigh the value of the material. However, it is recognised that as the Proposed Development is located in a relatively remote setting material may travel modestly further if certainty of re-use can be established.

14.4.3 The Study Area is therefore likely to be subject to further evolution in later project and contracting stages. Notwithstanding the driving principles of the Waste Hierarchy (**Section 1.1.4**), which gives preference to material reuse and/or recovery over disposal, there are clear commercial and sustainability benefits for the materials to be used in as close proximity to the Proposed Development as possible and/or in an order of preference based on the principles of the Waste Hierarchy. Although a viable local option for storage and re-use has been identified (within 5 miles of the Proposed Development) this will be confirmed as the Proposed Development evolves.

14.4.4 Section 9.4 of **Chapter 9 (Traffic and Transport)** of the EIA Report has assumed all residual spoil will be transported by road on the A85.

Baseline Data Collection

14.4.5 Defining suitable end-use options for excavation arisings, with particular regard to the significant quantity to be generated by the Proposed Development, requires alignment with the construction programme and can only be refined at later project stages. This chapter provides an assessment of the "worst case" scenario for the Proposed Development

14.4.6 This chapter is heavily linked to **Chapter 6 (Ground Conditions)** and **Chapter 9 (Transport and Access)**. The definition of baselines for those Chapters are presented in sections 6.4 and 8.4, respectively.

Assessment Criteria

- 14.4.7 Management of the excavated spoil arisings will be in accordance with national and local policy and core principals of the circular economy, focussing on reducing the potential environmental impact. Best practice approaches will be aligned with the Waste Hierarchy with focus on reducing, reusing, and recovering materials with minimal associated environmental impacts. Table 14.3 provides a guideline for the magnitude of effect associated with each option, while the predicted significance of effect will be determined based on the guidelines provided in Table 14.4.

Table 14.3: Magnitude of Effect

Approach (Based on the Waste Hierarchy)	Overview	Magnitude of Effect
Prevention	<p>Waste prevention can be achieved through two primary means:</p> <ul style="list-style-type: none"> Reduction/minimisation in quantities of arisings produced in the first place (designing out); or Ensuring that arisings can be defined as non waste (e.g. virgin aggregate) and therefore waste regulation may not apply. 	Negligible/No Effect (no waste is produced and/or quantities are minimised)
Preparing for Reuse / Recycling	<p>This may include:</p> <ul style="list-style-type: none"> Material preparation for on or off-site reuse either as a waste or non-waste. 	Minor subject to appropriate consents from waste regulators
Recovery Reuse (on or off site)	<p>This may include reuse of material either on or off site under either:</p> <ul style="list-style-type: none"> A recovery (i.e., non disposal) Waste Management Licence (WML) regulated by SEPA; or Under SEPA approved non-waste protocols (the material may remain a waste until fully recovered) 	Minor subject to appropriate consents from waste regulators. Impacts on the Site itself are likely negligible if all material is used off site. It is assumed that any receiving sites will have appropriate planning and waste regulatory consents/exemptions (from SEPA) already in place. Material would not have been subject to disposal or landfilling.
Disposal (off site)	<p>Disposal has a specific meaning under the WFD and associated Scottish Law and SEPA guidance. In this instance disposal means permanent disposal to land</p>	Minor subject to appropriate consents from waste regulators. Impacts on the Site itself are likely negligible if all material is disposed of site. It is assumed that any receiving sites will have appropriate planning and waste regulatory

Approach (Based on the Waste Hierarchy)	Overview	Magnitude of Effect
		consents/exemptions (from SEPA) already in place. However, disposal would be less sustainable for the Proposed Development as a whole as material would be considered to have been disposed of by landfill.

Table 14.4: Significance Criteria

	Level of Effect	Criteria
Significant	Substantial	These 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 borough scale site or feature may also enter this category.
	Major	These effects are likely to be important considerations at a local scale and may become key factors in the decision-making process.
	Moderate	These effects, 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.
Not Significant	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 or No Effect	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.

Assessment Parameters

14.4.8 The following parameters have been used in this assessment. They have been based on detailed calculations of quantities of spoil generated as well as a thorough understanding of the composition of spoil from the Proposed Development, undertaken as part of the ongoing design process. They have been informed by a thorough understanding of the engineering required to construct a project of this magnitude, in terms of tunnel lengths and volumes, excavation required for the upper intake structure, and power cavern excavation. 3D modelling has also been undertaken to fully characterise volumes of spoil generation, which have also been informed by direct engineering expertise in construction of similar projects in the UK and overseas. The key assessment parameters are as follows:

- The construction of the Proposed Development is anticipated to generate up to 2.30 million tonnes of excavated rock arisings over the 5.5 -year construction period (2024-mid of 2029). An average of 1,600 tonnes per day with peak generation of c. 3,000 tonnes per day. The Excavation Arisings will be in the form of rock 'chippings' ranging from boulders to fines produced by drill and blast techniques;

- This will be largely made up from:
- Upper Intake: 332,254 tonnes;
- Lower Works (underground excavations including tunnel and powerhouse cavern arisings 1,799,360 tonnes;
- Approximately one fifth of this material (0.45Mt) will be re-used on Site, as previously described in section 14.4. Therefore, there will be a residual volume of 1.85 Mt of spoil which will be re-used off-site;
- The primary re-use for spoil will be the quayside structure in Loch Awe, which is shown on **Figure 3.1**. It has a depth of approximately 12 m, width of 30m and a length of 510m. It will require approximately 162,500 tonnes of spoil, 21,700 tonnes which will be imported to form the initial tunnel access and 140,800 tonnes will be from excavation arisings; and
- During construction, approximately 15,000 tonnes spoil will be stored on the quayside structure at any one time, prior to removal by road. The material would be stored under a canopy structure, enclosed on three sides which would prevent runoff and windblown silt from entering Loch Awe. The structure is shown on **Figure 3.1**.

Limitations

- 14.4.9 At present additional studies are required to fully establish the nature of the likely waste arisings and market conditions for end uses. This chapter therefore presents overarching principles which will be adopted during further project planning and contracting stages prior to commencement of the Proposed Development.

14.5 Current Baseline Conditions

- 14.5.1 This chapter is heavily linked to **Chapter 6 (Ground Conditions)** and **Chapter 9 (Transport and Access)**. The current baseline conditions relating to the geological profile of the Site and likely make up of the spoil arisings are presented in section 6.5 of the EIA Report. The current baseline conditions in respect of transport and access, and the capacity of the existing road network to handle all of the residual spoil from the Proposed Development is presented in section 9.5 of the EIA Report.
- 14.5.2 Initial work undertaken by the Applicant has concluded that there are several potential options for re-use and or storage of excavated material, including within the site and at local and or national storage locations or for large, planned infrastructure projects.
- 14.5.3 The published BGS geological mapping indicates that the Proposed Development is located on the contact between the Dalradian Group of metasediments known as Ardrishaig Phyllite Formation of Neoproterozoic age to the southwest, and the late Devonian Quarry Intrusion to the northeast which is part of the Eive Pluton. This contact is observed at the Site in surface outcrops and within existing underground workings within Cruachan 1 as a change from a Phyllite to a Quartz-Diorite across a contact zone where apparent xenoliths of the country rock (phyllites) were present within the Quartz-Diorite (visible in the walls of the access tunnel).
- 14.5.4 The Quartz-Diorite excavated material may be suitable to produce concrete aggregate for on-site batching to produce concrete and also to produce aggregates for on-site access road construction and selected fill (subject to meeting quality and specification requirements). The Phyllite rocks are likely to be suitable for use as general fill either on or off site. For instance, for general infill material within the proposed quayside structure.

- 14.5.5 Baseline traffic flows for the TA have been determined using automatic traffic count (ATC) data from Transport Scotland's National Traffic Data System (NTDS) platform and ATC surveys undertaken as part of the 'Baseline Traffic and Access Report', produced by Arcus Consultancy Services Ltd in 2017.
- 14.5.6 It is evident from the traffic data that there is a very strong seasonal pattern in traffic flows with the summer months having significantly higher traffic flows compared to the winter months. Traffic flows tend to be at their lowest in January, after which point, they rise gradually during the remainder of the winter months. This is followed by a steeper rise from March/ April up until the peak month of August. There is a subsequent steady fall in traffic flows between August and January.
- 14.5.7 the traffic flows across all traffic counts are representative of a rural and low-traffic location and the peak hour flows are significantly lower than the typical link capacities for the road types. The A85 is a rural route and as such saturation levels for traffic lanes of this type are generally considered to be in excess of 1500 passenger car units / hour before congestion is anticipated. The peak hourly flows are substantially within that flow range.

14.6 Baseline Evolution and Expected Future Baseline

- 14.6.1 In respect of waste management, the geological profile of the Site and the spoil composition will not change over time.
- 14.6.2 In order to determine how the identified baseline for transport could change in the future assessment year of 2026 (considered to be the peak construction year in terms of traffic flows) in **Chapter 9 – Transport and Access**, traffic growth has been factored into future year assessments.
- 14.6.3 Background traffic growth, associated with housing and employment growth, between 2021 – 2026 has been determined based on the National Road Traffic Forecast (NRTF) growth factors. The NRTF 'Low' growth factor has been used, resulting in a growth factor of 1.027 between 2021 – 2026. This factor was subsequently applied to the baseline traffic flows.
- 14.6.4 Over time the baseline will evolve in terms of availability and suitability of other construction projects or sites in the local and national area to accept spoil arisings. This is why the Applicant is continually engaging with the market to assess these opportunities and commit to the most appropriate option based on e.g. construction timings and volumes required.

14.7 Embedded Mitigation

- 14.7.1 A set of standard measures, will be employed for the management of waste and are listed below; more detailed measures are set out the following sections relating to Duty of Care and the Storage of Waste:
- The consumption of materials and production of waste shall be minimised through good design procedures and procurement practice;
 - Opportunities for reusing, recycling or recovery of waste will be considered as an alternative to disposal to landfill which should be a last resort;
 - Material will be stored for short periods on site within the dedicated canopy structure on the quayside which will prevent wind blown silt and runoff from entering waterbodies. It is estimated that approximately 15,000 tonnes would be stored at any one time;
 - All waste will be managed by a nominated Technically Competent Manager i.e. the manager will be technically competent to manage the permitted activity, as defined by the Chartered Institution of Wastes Management/Waste Management Industry Training and Advisory Board's (CIWM/WAMITAB) Operator Competence Scheme (**CIWM, 2022**);

- All waste management contractors carrying waste shall be authorised to do so (i.e under prevailing Duty of Care) and all sites that receive the waste shall be authorised to do so (i.e. under prevailing WML requirements);
- A sample of waste management routes will be subject to an annual audit to confirm that waste is being managed correctly;
- Management of all waste will be accompanied by the relevant statutory transfer documentation that adequately describes the waste, the documentation will be retained and be readily accessible;
- Quantities of waste generated will be recorded and monitored, records will be kept for a minimum of three years;
- All employees and contractors involved with the handling and managing of waste will have the relevant training and be assessed as competent and training records retained;
- All employees and contractors will have a Duty of Care (Section 1.5.6) when controlling the carriage and disposal of waste to ensure it is handled in a responsible manner; and
- Site Waste Management Plans (SWMP) and Materials Management Plans (MMP) will be produced where appropriate.

Duty of Care

- 14.7.2 All wastes produced by the Applicant and its contractors are governed by waste management legislation. The producer of the waste is the holder of the waste generated by an activity. Duty of Care is a legal process designed to control the carriage and disposal of waste to ensure it is handled in a responsible manner from “cradle to grave”. In line with the Duty of Care requirements, waste produced will be:
- Transferred only to an Authorised Person accompanied by a Waste Transfer Note or Hazardous Waste/Special Waste Consignment Note; and
 - Not able to escape from anyone's control on site or in transit.
- 14.7.3 An Authorised Person is a Registered Waste Carrier, broker and/or the manager of a legitimate waste management facility, e.g., a waste disposal site.
- 14.7.4 If a third party employed by the Applicant or one of its contractors, arranges waste transfer/reuse/disposal, and is not the waste producer, the Registered Waste Carrier, or the manager of a receiving site, then that third party shall be a Registered Waste Broker.
- 14.7.5 Waste shall not be allowed to leave site unless Duty of Care checks are successfully completed.
- 14.7.6 Where a contractor is employed to undertake work that produces waste, it is the contractor's responsibility as producer of the waste to carry out the Duty of Care checks outlined above (including ensuring waste is only transferred to Registered Waste Carriers, or Registered Waste Brokers, and that Waste Management Licences are held for waste disposal sites or proof of exemptions from licensing is provided).
- 14.7.7 However, the Applicant retain a Duty to ensure that waste is managed in a responsible manner; the member of staff employing the contractor shall ensure the contractor has a system of works to ensure that adequate Duty of Care checks are being undertaken and shall carry out periodic checks to ensure the contractor is using only Authorised Persons.
- 14.7.8 The contractor shall provide evidence of Duty of Care checks that have been undertaken on request.

Waste Classification

- 14.7.9 All waste will be classified in accordance with prevailing legislation and principles and procedures defined in core waste classification technical guidance 'WM3', published by SEPA, Natural Resources Wales and Environment Agency (2021).
- 14.7.10 Appendix A to the WM3 guidance sets out a waste classification system, also referred to as LoW (List of Waste) or EWC (European Waste Catalogue) setting out codes the classification for hazardous and non-hazardous waste.

Site Waste Management Plan (SWMP)

- 14.7.11 Although not legally required, SWMPs can help reduce the amount of waste and its management in the most sustainable manner. It is assumed that appropriate SWMPs shall be produced by the Principal Contractors for the Proposed Development.
- 14.7.12 SWMPs manage and reduce the amount of waste produced by construction projects through a simple process of identification of wastes, input to the design process, and the continued measurement and management of wastes to achieve the most sustainable level in the waste hierarchy.
- 14.7.13 A SWMP will be produced by each of the Principal Contractors appointed for specific phases of the Proposed Development. They will provide the following information in SWMPs (which will build on information contained within this chapter and other chapters of the EIA Report:
- **A description of the construction works (for the Proposed Development)** – A description of the key construction activities is presented in **Chapter 3** of the EIA Report. The key assessment parameters and quantities of spoil generated by construction of the Proposed Development are presented in section 14.4 of this Chapter. They have been based on worst case assumptions and experience of developing other similar projects in the UK and overseas. Quantities of spoil generated, stored securely at any one time and the residual quantities to be transported off site for re-use are therefore well understood;
 - **Measures to increase reuse of any aggregates generated and maximise use of secondary or recycled aggregate;** - the Proposed Development has sought to maximise the re-use of material as far as reasonably practicable. Approximately one fifth of the material (0.45Mt) will be re-used on site in construction of the quayside structure in Loch Awe and for concrete production used mainly for lining of the tunnels;
 - Demonstration of how the consumption of raw materials and generation of waste shall be minimised, through sound design and good practice in sustainable procurement and construction methods i.e., encourage the re-use of recycled or secondary resources and aggregates;
 - Where waste is generated, show measures taken to reduce, re-use and recycle waste within the development or off-site, including the provision of on-site separation and treatment facilities (using fixed or mobile plants where appropriate) to minimise disposal via landfill; - The Applicant is having ongoing discussions with several parties to re-use spoil on other sites. The Applicant has committed to not disposing of any spoil by landfill or other licensed disposal sites; and
 - Demonstrate how waste laydown/ stockpile areas have been designed to allow effective sorting and storing of recyclables and recycling and composting of waste and facilitate waste collection; - Approximately 15,000t of spoil could be securely stored in an enclosed canopy structure on the quayside at any one time to allow appropriate sorting (if required) and onward transportation.

- 14.7.14 The SWMPs would be reviewed regularly, (as a minimum, every six months) and updated as necessary following these reviews, to give a current position on how the work is progressing against the waste estimates contained in the plan, this would include recording details of:
- Types and quantities of waste produced and a comparison of the estimated quantities of each waste type against the actual quantities of each waste type;
 - An explanation of any deviation;
 - The identity of the person removing the waste (including waste carrier's registration number);
 - All waste fate documentation e.g., transfer and consignment notes, marked with the time and date of collection;
 - Details of the final destination of waste, a description of the waste type and the EWC if appropriate;
 - Quantitative and qualitative estimate of site waste produced during construction;
 - Requirements for reporting under the Hazardous Waste Regulations (if any); and
 - An estimation of the cost savings that have been achieved by completing and implementing the SWMPs.

Communications and Training

- 14.7.15 In order to ensure the principles, standards and requirements outlined in this Chapter are delivered, the Principal Contractor(s) would develop and implement comprehensive communications and training programmes for all relevant staff, to include the following:
- Understanding the different sources, types and nature of wastes and materials likely to be generated during the Proposed Project;
 - The legal responsibilities for waste and its impact on the Proposed Project;
 - The requirements of the SWMP and MMP (if applicable) and CEMP;
 - How to conduct basic waste audits to identify, estimate and report quantities of waste;
 - How to produce a SWMP (and, if appropriate MMP);
 - The roles and responsibilities of waste regulators and licensed carriers; and
 - The roles and responsibilities of site personnel in the management of waste.

14.8 Realistic Worst-Case Parameters for Assessment

- 14.8.1 As per the assessment parameters listed in section 14.4, the assessment has assumed a worst-case scenario of:
- Maximum likely spoil generation of 2.3Mt. This estimate is considered to be a realistic maximum and has been based on detailed calculations of excavation dimensions and density of material, and informed by extensive experience from similar pumped storage hydro developments in the UK and overseas. The total volume includes approximately 10% overbreak, alongside conservative assumptions to provide a truly worst case;

- Approximately one fifth (0.45Mt) of this spoil can be re-used on site in the construction of the quayside structure in Loch Awe and concrete lining of tunnels;
- All residual spoil (approximately 1.8Mt) will be transported by road away from the site to be stored and re-used at appropriate local or national construction projects / quarries;
- It is likely that some of the spoil is Potentially Acid Generating (PAG) rock; and
- The Applicant has committed to not disposing of spoil arisings to landfill or other disposal facilities.

14.9 Assessment of Likely Effects

Construction

14.9.1 The only potential effects arising from the volume of excavation arisings expected to be generated during the construction of the Proposed Development include:

- Potential pollution (windblown silt and runoff) entering Loch Awe from material which is temporarily stored on the quayside structure;
- Handling of spoil within the Site;
- Impacts on the road network arising from transport of the spoil off-site; and
- Not being able to find a suitable re-use for the spoil.

14.9.2 In addition, the outcomes of the PAG rock assessment has identified that there is a risk that the excavated rock arisings could potentially leach acidic leachate and mobile metals based on assessment of the rock formation of Cruachan 1. Further detailed investigation is required to mitigate the impact of ARD.

14.9.3 The anticipated environmental effects arising from these elements are described in detail in Chapters 6 (Ground Conditions), 7 (Hydrology) and 9 (Transport and Access). However, these have been summarised here below for ease of reference:

Ground Conditions

Construction Effects

14.9.4 The Proposed Development will inevitably entail some disturbance of peat deposits, however the embedded mitigation measures, such as the design of the proposed development to avoid construction on areas of peat will be utilised. Therefore, there is anticipated to be a moderate adverse effect on a receptor of medium sensitivity, resulting in a moderate significance of effect without further mitigation.

14.9.5 Most of the groundwork will involve tunnelling through the bedrock and contact with shallow superficial deposits and groundwater (where contamination is most likely to be present) will be very limited. Exposure to soils will likely be short term.

14.9.6 Once the embedded mitigation has been implemented, the construction phase of the proposed development is likely to have a direct Minor magnitude of impact and therefore a Negligible effect on construction workers.

14.9.7 There is potential for contamination of the groundwater during the construction phase of the project due to fuels/oils stored on site or in construction plant, where excavations are undertaken, and where material is stockpiled on site.

- 14.9.8 Once the embedded mitigation has been taken into account, there is anticipated to be a Minor Adverse magnitude of impact (high sensitivity receptor) and therefore a Minor Adverse effect overall.

Operational Effects

- 14.9.9 Once the development has been constructed, the risk to onsite current and future users as well as the built environment is considered to be Negligible.

Further Mitigation and Residual Effects

- 14.9.10 Given the potential for peat deposits to be present on site, a Peat Management Plan (PMP) has been prepared and is included as **Appendix 6.2**. This has been prepared to set out measures proposed to manage the peat habitat at the site, firstly to avoid the peat habitats during construction where possible, and secondly, where this is not possible, that peat is handled effectively with minimal loss of carbon to the atmosphere. The PMP is based on site specific information available at the time of writing, with the final PMP to be subject to discussion and approval by SEPA prior to implementation.
- 14.9.11 With implementation of the PMP, residual effects on peat deposits will be negligible.

Hydrology

- 14.9.12 The sensitivity of Loch Awe and River Orchy is considered to be **medium** and for River Awe is considered to be **high**. The magnitude of change following embedded mitigation is **negligible**. The potential for mobilisation by wind and rainfall-runoff of stockpiled material associated with the temporary storage of excavated spoil and rock on the new quayside area will be mitigated by the temporary canopy structure as described in **Chapter 3** and shown on **Figure 3.1**. Therefore, there is likely to be a medium term, temporary, adverse effect of **negligible significance (not significant)**.

Transport

- 14.9.13 In terms of driver delay, drivers on the A85 in the immediate locality of Cruachan 1 would be subject to an average delay of 38 seconds, resulting in a **Small** magnitude of impact in terms of driver delay. This, in combination with the overall 'medium' sensitivity for drivers on L1: A85 (Cruachan Power Station), results in a temporary direct effect of **Minor Adverse** significance, which is considered to be **Not Significant**. It should be noted that outside of the highway peak hours, traffic flows would be lower and therefore delays would be slightly reduced.
- 14.9.14 The effect is due to the temporary traffic management on the A85 as part of the construction of the main access tunnel portal. Driver delay is only likely to be an issue requiring mitigation where junctions are operating at, close to or beyond capacity. Based on the assessment of the traffic management measures during construction period, the operation of the A85 would perform comfortably within capacity and no further mitigation would be required.
- 14.9.15 In terms of pedestrian fear and intimidation, pedestrians on the A85 in the immediate locality of Cruachan 1 and on the A82 south of Tyndrum (receptors of medium sensitivity) would be subject to a slight impact temporary direct effect of **Minor Adverse** significance, which is **Not Significant**, due to the minor increase in traffic flows along the A85 during the construction period.
- 14.9.16 The assessment of all other transport effects results in a **Negligible** significance of effect across the study area.
- 14.9.17 In terms of both pedestrian delay and pedestrian amenity impacts during the construction of the main access tunnel portal, a signalised pedestrian crossing would be provided at the western end of the shuttle working arrangement, as part of the traffic management, to minimise potential impacts on vulnerable road users and to provide a safe and direct crossing point near the pedestrian desire line between the existing Cruachan Power Station administrative buildings/ visitor centre and the railway station. As such, there would be a temporary **Small Beneficial** magnitude of impact in terms of pedestrian delay and pedestrian amenity during the construction of the main access tunnel portal.

This, in combination with the 'medium' sensitivity for pedestrians on L1: A85 (Cruachan Power Station), results in a temporary direct effect of **Minor Beneficial** significance, which is **Not Significant**.

- 14.9.18 On the basis of the assessments in **Chapter 9: Transport and Access**, it is considered that the Proposed Development will not result in any significant transport effects.

Market Conditions

- 14.9.19 Should a large amount of similar material enter the market at any one time, there is the potential for supply outstripping demand and for the market to become 'saturated leaving no viable uses for the material.
- 14.9.20 Although there is a significant volume of spoil to be transported for re-use off-site, the Applicant has already had positive discussions with a number of parties, including local businesses who do not see any barriers to taking the spoil. Additionally, the quantity of spoil generated by the proposed development is comparable to what is often required on large nationally significant construction projects such as roads, ports or other large infrastructure and many such projects are currently ongoing in Scotland or are planned to coincide with the construction of the Proposed Development. Therefore, as per the criteria in Table 14.3, this is likely to have a **minor** magnitude of effect.

Operation

- 14.9.21 All spoil generated from excavations is anticipated to be dealt with during the construction phase and therefore there would be no operation effects from generation of excavated materials.
- 14.9.22 Although there would be small quantities of waste produced during operation from e.g., general office waste, this would be insignificant in addition to similar wastes generated at Cruachan 1 and would be removed by a licensed contractor. Therefore, no likely significant effects from waste generation during operation are anticipated.

14.10 Further Mitigation and Enhancement

- 14.10.1 Further market assessment is required to identify and investigate local market options in particular the opportunities for Excavation Arisings to either be re-used onsite or within nearby strategic developments.
- 14.10.2 The measures set out in the preceding 'embedded mitigation' section (14.7) will be adopted at all future stages of the project.
- It is recommended that the underground excavation works will require a preliminary ARD management plan which would be prepared and implemented by the main Civils Contractor who will be responsible for the excavation works;
 - The ARD management plan should include additional advanced ARD testing and Acid-Based Accounting (ABA) and geological mapping to better define the likely environmental hazard and risk;
 - The ARD management plan should consider how PAG materials are tested and segregated during the drilling and blasting and other methods of rock excavation both underground and at surface within the site;
 - The ARD management plan should also define appropriate waste sites and temporary storage and transportation of materials identified as PAG aligned with the appropriate legislation and international guidance; and
 - It is recommended that the underground excavation works may require a preliminary ARD management plan which will be further developed by the contractor responsible for the

excavation works. This plan should include additional advanced ARD testing and Acid-Based Accounting (ABA) and geological mapping to better define the likely environmental hazard and risk. Testing will likely comprise detailed ARD leach tests and X-Ray Diffraction (XRD) and X-Ray Fluorescence (XRF) analysis of recovered rock core, drill cutting and hand specimen samples to define the mineral percentages within the Proposed Development excavation rock spoil. In particular sections of the proposed underground excavations in the vicinity of the geological contact zone and fault/shear zones should be given careful consideration.

14.11 Residual Effects

- 14.11.1 Following best practice guidance on waste management which will be outlined in the CEMP and OWMP, will enable the Excavation Arisings to fulfil the majority of its primary functions and therefore the significance will be moderate-minor (see Table 1-3 for the outlining criteria).

14.12 Monitoring

- 14.12.1 The quantity and composition of the excavated arisings will be continuously monitored throughout the construction phases of the Proposed Development as a requirement of the OWMP.

14.13 Cumulative Effects

- 14.13.1 The Applicant has been made aware of a proposed 1.5GW pumped storage hydro scheme at Balliemeanoch, approximately 12km south of the Cruachan Expansion Project, which is the only development considered to have potential cumulative effects with the Proposed Development in terms of waste generation. At the time of preparing this EIA Report, the Scoping Report for the Balliemeanoch scheme has been lodged with the ECU.
- 14.13.2 Given the status of the Balliemeanoch scheme (at Scoping stage) and the fact that the Proposed Development is more advanced in planning terms, there is no statutory requirement for the Applicant to consider the Balliemeanoch scheme as part of the cumulative impact assessment for the Proposed Development. Despite this, it is considered good practice to consider all publicly available information, given the proximity and similarity of the project.
- 14.13.3 Based on a review of information in the Balliemeanoch Scoping Report, as well as the distance from the Cruachan Expansion Project, there is likely to be very limited potential for cumulative effects between the two projects, this is based on the following key factors:
- Different construction timescales, whilst there is potential for overlap of the construction periods, it is very unlikely that both projects would be undertaking the same construction activities at the same time, thus peaks in spoil excavation and movement would be at different times; and
 - The Balliemeanoch scheme would not generate an excess of spoil, and may even require a net import of spoil, primarily to create a new dam / impoundment.
- 14.13.4 It is therefore considered that there would be no cumulative effects between the two schemes.

14.14 Referencing

- **CIWM, 2022.** Operator Competence.
[https://ciwmquals.co.uk/competence/#:~:text=The%20CIWM%20\(WAMITAB\)%20Operator%20Competence,the%20Environmental%20Permitting%20\(England%20and.](https://ciwmquals.co.uk/competence/#:~:text=The%20CIWM%20(WAMITAB)%20Operator%20Competence,the%20Environmental%20Permitting%20(England%20and.)
- **DEFRA, 2021.** Guidance. Definition of waste: 2018 Waste Framework Directive amendments. Updated 31 August 2021 (<https://www.gov.uk/government/publications/legal-definition-of-waste-guidance/definition-of-waste-2018-waste-framework-directive-amendments>).

- **DEFRA, 2021.** Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3 (1st Edition v1.2.GB), October 2021.
<https://www.gov.uk/government/publications/waste-classification-technical-guidance>.
- **Drax, 2021.** Cruachan Expansion Project: Environmental Impact Assessment Scoping Report, 30 June 2021.
- **Drax, 2022.** Cruachan Expansion Project – EIA Gatecheck Report, Version 1.0 February 2022.
- **Scottish Government, 2021.** The Scottish Government Energy Consents Unit: Scoping Opinion on behalf of Scottish Ministers under The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, 29 October 2021.
- **SEPA, 2006.** Guidance for SEPA staff. Is it a waste, understanding the definition of waste. SEPA internal guidance WML-G-DEF-01, 4 August 2006.
- **Stantec, 2021a.** Technical Note: Cruachan Expansion Project: Management of Excavation Arisings. 330201245TN01, August 2021.
- **Stantec, 2021b.** Project Memo: Cruachan 2 – Spoil Composition, 26 August 2021.
- **Stantec, 2022.** Cruachan 2 – Potential Acid Generating Geology Site Visit – Report. 331201086/01/TM/PAG, 16 February 2022.

15 Climate Change

15.1 Introduction

- 15.1.1 This chapter provides an assessment of the likely significant effects of the Proposed Development on climate change taking into account relevant national, regional and local policy, guidance and regulations.
- 15.1.2 The chapter describes the methods used to establish the baseline environmental sound conditions which exist in the vicinity of the Site, the potential direct and indirect effects of the Proposed Development arising from noise and vibration, the mitigation measures required to prevent, reduce, or offset these effects, and the remaining residual noise and vibration effects associated with the Proposed Development.
- 15.1.3 The Intergovernmental Panel for Climate Change's (IPCC) 6th Assessment Report (AR6) provides the scientific consensus that links the impact of unabated greenhouse gas emissions (GHG) from human activities to global climate change. The Climate Change Committee (CCC) identifies that GHG emissions from the power sector comprise 15% of the UK's total emissions. Gas plants contribute to 70% of these power emissions, providing 40% of the total electricity generated. Coal accounts for 23% of emissions, but only 5% of electricity generated (CCC, 2020). In order to reduce emissions in line with the UK's legally binding carbon budgets, clean energy generation must displace fossil fuel contributions to the electricity supply.
- 15.1.4 The Proposed Development comprises an expansion of the existing Cruachan pumped storage electricity generating station. It therefore has the potential to impact GHG emissions associated with the electricity sector at a national scale as a result of its connection to and use of the National Electricity Transmission System.
- 15.1.5 The Proposed Development also has the potential to contribute to atmospheric GHG concentrations through construction such as the combustion of fossil fuels from construction plant and equipment and operation such as emissions associated with electricity usage on site. This chapter presents a qualitative assessment of the Proposed Development's impacts on climate change by its potential to emit GHGs as well as its potential to deliver significant benefits in relation to reducing GHG emissions associated with the electricity grid.
- 15.1.6 This chapter has links with other topic chapters including Chapter 6 Ground Conditions, Chapter 7 Hydrology, Chapter 8 Ecology, Chapter 9 Transport, Chapter 11 Landscape, and Chapter 14 Waste Management. The impacts and mitigation measures set out in these chapters can influence GHG emissions associated with the Proposed Development. For example, the measures to control traffic and reduce private car trips set out in Chapter 9 will reduce GHG emissions associated with transport.
- 15.1.7 This chapter is supported by the following appendix:
- **Appendix 15.1:** Climate Change Policy and Guidance.

15.2 Policy Context, Legislation, Guidance and Standards

- 15.2.1 In addition to the relevant legislation and policy consideration outlined in **Chapter 5 –Planning Policy**, the assessment has been undertaken in accordance with subject specific legislation and best practice guidance, including the following. Further details are provided in **Appendix 15.1**.
- The Paris Agreement, 2015;
 - Carbon Budget Orders 2009, 2011 and 2016;

- Climate Change (Scotland) Act 2009;
- Climate Change (Emissions Reduction Targets) (Scotland) Act 2019;
- Climate Change Plan 2018-2032 (2018, updated 2020);
- Regulation 4(2)(c) of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Argyll and Bute Local Development Plan (2015) Policy LPD 10;
- Environmental Impact Assessment (EIA) Guidance on assessing greenhouse gas emission and significance (IEMA, 2022);
- World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) Greenhouse Gas Protocol guidance (WBCSD and WRI, 2004);
- International Hydropower Association (IHA) Hydropower Sustainability Guidelines (IHA, 2020); and
- Argyll and Bute Local Development Plan Supplementary Guidance (2016) Sustainability Checklist.

15.3 Consultation

15.3.1 The EIA Scoping Report identified the proposed scope and approach of the climate change chapter.

15.3.2 **Table 15.1** summarises details of consultation, comments and responses received in relation to the climate change for the Proposed Development.

Table 15.1: Summary of Consultation

Name of Consultee	Comment	Response (Ensure Ref Included)
Scoping Opinion		
RSPB Scotland	This proposal has potential to not just deliver against Scottish Government targets for the country to be net zero by 2045, it can also address the biodiversity crisis through providing net habitat gain, with securing positive effects for biodiversity now one of the outcomes for the National Planning Framework.	The potential for the Proposed Development to help deliver Scottish Government targets for net zero has been set out in section 15.9 of this chapter. Opportunities for net habitat gain are presented in Chapter 8 – Ecology and Biodiversity of the EIA Report.
ABC	It is noted that the applicants also specify those matters which they consider require to be “scoped in” and addressed by the EIA as follows: - Climate change, including carbon balance across construction and operational periods	This chapter provides a qualitative assessment outlining the likely sources of GHG emissions during construction and operation. Measures which have been embedded into the design to reduce GHG emissions have also been described in section 15.7. IEMA guidance notes that a qualitative approach is acceptable where design measures are agreed early in the design phase. Therefore, calculating the carbon balance was not

Name of Consultee	Comment	Response (Ensure Ref Included)
		proposed within the methodology of the scoping report, and will not be provided as part of the climate chapter. The design measures have been set out in Section 15.7 below.
ABC	A further list of matters the applicant suggests should be “scoped out” of an EIA is set out at 5.1.4 as follows - Vulnerability of the Proposed Development due to climate change during construction	Due to the nature of the Proposed Development, vulnerability to climate change is also scoped out during the operational phase, as detailed in the EIA Scoping Report.

15.4 Methodology

Study Area

15.4.1 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 the generation of purchased electricity, heat, or steam; and
- **Scope 3:** Other indirect emissions, such as the extraction and production of purchased materials and fuels, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc.

15.4.2 The GHG emissions assessment study area includes the Site and extends to include activities that occur beyond the Site boundary, such as the generation of electricity off site. As GHG impacts are global and cumulative with all other sources of emissions, no specific geographical study area is defined for the identified GHG emission sources that are set out in **Table 15.2**.

Table 15.2: 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 natural process within landscaping and soil.
	Scope 2	Emissions associated with electricity usage e.g. lighting.

15.4.3 During the operation of the Proposed Development, it is anticipated that there will be limited Scope 1 GHG emissions. 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 Proposed Development is operational. It is considered that their emissions would be insignificant as they would be operational for a very limited time.

- 15.4.4 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.
- 15.4.5 IEMA guidance emphasises the need for proportionality in the context of national, sector and local GHG emissions. The guidance recognises that qualitative assessments are acceptable, particularly where mitigation measures are agreed early on in the design stage and is agreed during the EIA scoping stage with stakeholders. Taking a qualitative approach has been agreed with Argyll and Bute Council (ABC) as appropriate and proportionate for the Proposed Development at scoping, as the Proposed Development comprises new infrastructure to extend the existing facility, does not include a new reservoir, and the Proposed Development will deliver significant benefits with regards to grid decarbonisation. Scottish Ministers have adopted ABC's response in their Scoping Opinion.

Baseline Data Collection

- 15.4.6 A high-level review of existing land use and associated activities on Site has been undertaken to identify the baseline GHG emissions. This includes the UK Carbon Budgets, Scottish Carbon Budgets and UK local authority GHG inventory data (DBEIS, 2021).
- 15.4.7 A review has also been undertaken of relevant reports that will be submitted with the planning application, including the draft Peat Management Plan, draft Construction Environmental Management Plan (CEMP) and draft Construction Traffic Management Plan (CTMP).

Sensitive Receptors

- 15.4.8 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.

Assessment Methodology

- 15.4.9 There is no nationally adopted method for assessing climate change within EIA and therefore the assessment approach draws upon IEMA guidance (IEMA, 2022). It identifies that all GHG emissions contribute towards climate change so significance must depend on whether a project contributes towards reducing emissions, relative to a comparable baseline consistent with a trajectory towards net zero by 2050. The GHG emissions assessment will be based on the broad parameters of the Proposed Development, as the design will be progressed subsequently.
- 15.4.10 The Proposed Development has embedded several measures to reduce GHG emissions associated with the design and construction, outlined in Section 15.7 below. In addition, there is anticipated to be limited emissions on Site once the Proposed Development is operational.

Determining Significance

- 15.4.11 Since submission of the Scoping Report in June 2021, new guidance from IEMA has been published on GHG emissions assessments within EIA. The new guidance, published in February 2022, provides

greater clarity on determining significance in EIA. The new guidance also plays greater emphasis on meeting the Paris Agreement's 1.5°C target, reflecting the urgency of addressing climate change. It is therefore considered appropriate to adopt the most recent guidance, which is explained below.

- 15.4.12 IEMA guidance identifies three underlying principles to inform the assessment of significance and conclude that:

"The crux of significance is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050.

Often a project will cause a change in GHG emissions compared to the baseline which should be assessed. When setting this impact into context to determine significance, it is important to consider the net zero trajectory in line with the Paris Agreement's 1.5°C pathway"

- 15.4.13 Therefore, determining significance relies on whether the project's GHG emissions support or undermine a trajectory towards net zero. It is a practitioner's professional judgement on how best to contextualise a project's GHG impact, drawing on the available guidance, policy, and scientific evidence.
- 15.4.14 When determining significance, any embedded mitigation measures that form part of the design should be considered. A project's impact can shift from significant adverse to non-significant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero.
- 15.4.15 Therefore, significance of effect will be determined by how the Proposed Development has embedded design features to reduce GHG emissions and identified opportunities for further mitigation in the Proposed Development's design and delivery, with consideration of the IHA Sustainability Guidelines (2020).
- 15.4.16 **Table 15.3** presents a table showing how to distinguish different levels of significance under IEMA (2022) guidance. Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

Table 15.3: Significance Criteria from IEMA Guidance

Significance	Measure of Impact
Major Adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate Adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Minor Adverse	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions

Significance	Measure of Impact
Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

- 15.4.17 Additional mitigation measures should be considered to reduce significant adverse effects to acceptable and non-significant level, or as good practice to reduce non-significant or further enhance the beneficial effects of a development.

Limitations

- 15.4.18 The trajectory of GHG emissions into the future is dependent on influences outside of the Applicant's control, for example Government policy and global technology and economic shifts, which are difficult to predict. The UK carbon budgets are legally binding, and the Government have an array of policies and levers to be deployed if the carbon budgets are not likely to be met.

15.5 Current Baseline Conditions

National and Regional Emissions

- 15.5.1 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.

- 15.5.2 **Table 15.4** sets out the UK carbon budgets from 2008 until 2017.

Table 15.4: 2008-2017 UK Carbon Budget

UK Budget	Carbon Budget Level (Million Tonnes Carbon Dioxide Equivalents - MtCO ₂ e)	Reduction Below 1990 Levels	UK Emissions
1st carbon budget (2008 to 2012)	3,018 MtCO ₂ e	25%	2,982 MtCO ₂ e
2nd carbon budget (2013 to 2017)	2,782 MtCO ₂ e	31%	2,398 MtCO ₂ e
3 rd carbon budget (2018 to 2022)	2,544 MtCO ₂ e	37%	N/A

- 15.5.3 From a national perspective, in 2019, UK total GHG emissions were estimated to be 334.5 million tonnes carbon dioxide equivalents (MtCO₂e), a decrease of 3.6% compared to 2018 (DBEIS, 2021). National GHG emissions in 2019 have decreased by 35.9% since 2005 (DBEIS, 2021).
- 15.5.4 The Department for Business, Energy & Industrial Strategy (DBEIS, 2021) sets out the CO₂ emissions estimates from a number of sources for 2005-2019, and is available for the UK, Scotland, and Argyll and Bute. The CO₂ estimates for 2019 is presented in Table 15.5 below for total emissions, industry electricity, commercial electricity, public sector electricity and domestic electricity.

Table 15.5: National, Scotland and Argyll and Bute CO₂ Estimates for 2019

	Total (ktCO ₂)	Industry Electricity (ktCO ₂)	Commercial Electricity (ktCO ₂)	Public Sector Electricity (ktCO ₂)	Domestic Electricity (ktCO ₂)
UK	344,511.6	14,887.4	17,964.5	4,347.5	22,106.8
Scotland	31,045.2	955.5	1,568.5	421.0	2,010.8
Argyll & Bute	266.7	18.1	26.3	6.0	54.8

- 15.5.5 Table 15.6 shows that Argyll and Bute represent approximately 0.86% of the total emissions in Scotland, and only 0.08% of the UK total emissions.

Local Emissions

- 15.5.6 Current Scope 1 GHG emissions on Site include emissions associated with the existing reservoir (IHA, 2020). These emissions may comprise of:
- Diffusive influx, where CO₂ and methane (CH₄) diffuse slowly from the sediment through the water column;
 - Bubbling, where CH₄ 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.
- 15.5.7 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.
- 15.5.8 There will be Scope 1 GHG emissions associated with the machinery of Cruachan 1. 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 Cruachan 1 is operational.
- 15.5.9 Scope 2 emissions will be generated as Cruachan 1 imports electricity from the transmission network operator e.g., for operation of motors, pump/turbines and from the distribution network operator e.g. for heating, lighting of offices.
- 15.5.10 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. **Chapter 6 Ground Conditions** notes that there is a layer of peat or thin organic soil present in the eastern area, shown on **Figure 6.2** – Peat Survey. The peat ranged in thickness, generally less than 1m, with a maximum thickness of 2.2m at a single location. It is therefore anticipated that there is limited GHG sequestration on the Site through natural sequestration processes.

15.6 Baseline Evolution and Expected Future Baseline

National and Regional Emissions

- 15.6.1 The Climate Change Act 2008, as amended, requires the government to set five-yearly carbon budgets, after taking advice from the Committee on Climate Change (CCC). The budgets are fixed in advance and set five-year caps on the total GHG emissions allowed to ensure the UK meets its emissions reductions commitments.
- 15.6.2 The carbon budgets enable net increases in emissions to be managed within the carbon budgets by balancing with performance in other sectors. Governments can use an array of policies and levers to achieve the net reductions necessary to meet the carbon budgets whilst taking an economy-wide and national approach to securing overall emissions reductions whilst facilitating other objectives including economic growth, energy security and levelling up.
- 15.6.3 The UK carbon budget for the period 2023-2026 is set to reduce GHG emissions by an average of 51% lower than the 1990 baseline emissions, as set out in **Table 15.7** below. The 6th carbon budget, for the period 2033-37, was accepted by the Government in April 2021 and adopted into law in July 2021. It is the first budget to consider the UK's net zero target by 2050 with a trajectory that is consistent with the Paris Agreement.

Table 15.6: 2018-2037 UK Carbon Budget Targets

UK Budget	Carbon Budget Level (Million Tonnes Carbon Dioxide Equivalents - MtCO ₂ e)	Reduction Below 1990 Levels
4 th carbon budget (2023 to 2027)	1,950 MtCO ₂ e	51% by 2025
5 th carbon budget (2028 to 2032)	1,725 MtCO ₂ e	57% by 2030
6 th carbon budget (2033 to 2037)	965 MtCO ₂ e	78% by 2035

- 15.6.4 The Scottish Government has set targets for annual emissions. The Climate Change (Annual Targets) (Scotland) Order 2011 and 2016 set out the annual targets up to 2032, which is set out in Table 15.7.

Table 15.7: Annual Target for Scotland

Year	Annual Target for Scotland (MtCO ₂ e)
2023	37.16
2024	35.79
2025	34.12
2026	32.45
2027	30.78
2028	29.85
2029	28.96

Year	Annual Target for Scotland (MtCO ₂ e)
2030	28.09
2031	27.25
2032	26.43

Local Emissions

- 15.6.5 It is anticipated that there would be continued emissions associated with the reservoir, through the release of gases associated with the decomposition of organic material. However, as the reservoir has been in place for many decades, this is anticipated to be limited.
- 15.6.6 There will also be continued emissions associated with the existing Cruachan 1 machinery, such as very intermittent use of diesel generators (when required).
- 15.6.7 Carbon sequestration associated with the peatland and organic soil will continue.

15.7 Embedded Mitigation

Construction Phase

- 15.7.1 The Applicant has committed to a series of measures to reduce GHG emissions that arise as a result of construction activities, such as those relating to transport, materials and waste, as outlined below relating to.

Scope 1

- 15.7.2 The Applicant has committed to not removing any spoil or rock from the upper works via the Dam access road. Instead, all spoil generated by the upper works will be dropped down the vertical shaft and penstocks and then removed via the main access tunnel at Loch Awe, thereby reducing Scope 1 emissions associated with transport.
- 15.7.3 A draft CEMP has been prepared and submitted as part of the application. The CEMP includes several mitigation measures to reduce Scope 1 emissions, including:
- Optimising construction vehicle use and movement, particularly for large scale excavation and filling;
 - Driver training in efficient vehicle operation;
 - Optimising transport efficiency for materials delivery, waste disposal and construction workers travel; and
 - Re-use of the spoil generated on site as far as reasonably practicable to avoid transport emissions with removal off-site or through importing material.
- 15.7.4 A draft CTMP will also be prepared prior to construction which will help to reduce GHG emissions associated with transport, for example by consolidating delivery trips. In addition, a Green Travel Plan will be prepared to manage the construction workforce transportation, which will include measures such as using minibuses to transport en masse and reduce single car use.
- 15.7.5 A draft Peat Management Plan ([Appendix 6.2](#)) has been prepared which sets out measures proposed to manage the peat habitat at the site, firstly to avoid the peat habitats during construction where possible, and secondly, where this is not possible, that peat is handled effectively with minimal loss

of carbon to the atmosphere. Further information is provided in the Peat Management Plan and **Chapter 6 Ground Conditions**.

Scope 2

- 15.7.6 In addition, the CEMP includes measures to reduce Scope 2 emissions such as minimise energy used in temporary site buildings.

Operational Phase

Scope 2

- 15.7.7 During the operational phase, the Proposed Development will contribute to reducing emissions by displacing fossil fuel generation and improving the feasibility of variable renewables through grid reliability services: flexible generation, ramping capability, and energy storage.
- 15.7.8 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”.
- 15.7.9 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.

Design Principles

- 15.7.10 While it is acknowledged that Scope 3 emissions have been scoped out of this EIA chapter, it is important to note that the design of the Proposed Development has undergone an iterative process to refine and improve the proposals in relation to a range of design requirements and criteria, including the consideration of sustainability, material use and construction efficiency. Although these measures technically fall under Scope 3 emissions, they are important to contributing towards a decrease in GHG emissions associated with the Proposed Development.
- 15.7.11 In accordance with IEMA guidance (2022), the design has adopted the GHG Management Hierarchy (eliminate, reduce, substitute, compensate) through reusing existing infrastructure where possible, and reducing the number of materials required and waste generated. This includes the following design mitigation measures and improvements:
- As set out in the development description, there will be no new reservoir constructed 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 development area 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 increase power density with further expansion and will make use of the existing accesses and tunnel infrastructure of Cruachan 1. There will be no need for additional overhead transmission lines, as the existing circuits have sufficient capacity to absorb the uplift. 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 upper intake structure has been redesigned and relocated slightly to the east, with a significant proportion to be constructed on the eastern bank of the reservoir on dry land. Although this will result in a need to remove additional rock from the hillside and the upper intake structure will be more visible (with a larger above ground structure), the need for an underground gate shaft and extensive construction within the reservoir will be avoided;
- All spoil material will be diverted from landfill. It is intended that spoil will be dealt with primarily in three ways: re-used on site including for quay reclamation; where appropriate, provided to local quarry operator(s) for subsequent re-use in the local market, and/or taken off site for use in the wider construction market. As a worst case the EIA assumes 100% of spoil is transported by road both to the east and west on A85; and
- 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.

15.8 Realistic Worst-Case Parameters for Assessment

- 15.8.1 Consideration has been given to the maximum design parameters set out in **chapter 3** of this EIA Report. This therefore assumes the maximum amount of material use and spoil generation during construction.

15.9 Assessment of Likely Effects

Construction

Scope 1

Construction Activities

- 15.9.1 The main sources of direct GHG emissions during construction relate to the combustion of fossil fuels during the transportation of building materials and waste by Heavy Goods Vehicles (HGV) to and from the Site, as well as powering construction plant engines and equipment. Against the baseline, there will be a temporary increase in GHG emissions related to construction activities.
- 15.9.2 The Applicant has committed to the preparation of a CEMP which will help to manage and reduce GHG emissions associated with construction vehicles, plant, and equipment a draft CEMP is included in **Appendix 3.1**. In addition, the implementation of the CTMP will help to reduce GHG emissions associated with transportation of materials and waste.
- 15.9.3 While GHG emissions will still be emitted during the construction, the Applicant has sought to reduce GHG emissions in line with policy requirements. This is complying with up-to-date policy and 'good practice' GHG emission reduction measures. Therefore, in accordance IEMA (2022) guidance, there is anticipated to be a **Minor Adverse** (not significant) effect.

Land Clearance

- 15.9.4 The enabling activities and land clearance activities required for the construction of the Proposed Development will result in direct GHG emissions released from movement and disturbance of organic material on Site. Against the baseline, there will be a temporary increase in GHG emissions associated with land clearance.
- 15.9.5 The Proposed Development will result in some disturbance of the peat deposits on site, which will result in the release of GHG emissions. As set out in **Chapter 6 Ground Conditions**, the Proposed Development avoids construction on areas of peat, and the draft Peat Management Plan (**Appendix 6.2**) will reduce impacts on peat as far as possible. The following has been applied in the design of the proposed development and will be implemented during construction: (1) prevent creation of waste peat, (2) use peat on site or offsite in peatland restoration, (3) recycle / recover, and (4) disposal. TBC.
- 15.9.6 As set out in **Chapter 11 Landscape and Visual Impact Assessment**, there will be habitat and landform reinstatement which would be integral to the restoration of areas disturbed during construction. This would be achieved through a combination of natural regeneration in sensitive upland habitat areas, seeding where required and planting of appropriate woodland species. These measures will be secured through the CEMP.
- 15.9.7 The Proposed Development is complying with 'good practice' reduction measures. Therefore, in accordance IEMA (2022) guidance, there is anticipated to be a **Minor Adverse** (not significant) effect.

Scope 2

- 15.9.8 The temporary construction office, welfare facilities, and temporary lighting on the Site will require electricity purchased from an electricity supplier. This will result in indirect GHG emissions generated from the burning of fossil fuels to deliver electricity to the National Grid and the local distribution network. Against the baseline, there will be a minor uplift in the required electricity purchased compared to the existing Cruachan 1 scheme.
- 15.9.9 The implementation of the CEMP will help to manage and control the use of electricity on Site. This is complying with up-to-date policy and 'good practice' GHG emission reduction measures. Therefore, in accordance IEMA (2022) guidance, there is anticipated to be a **Minor Adverse** (not significant) effect.

Operation

Scope 1

- 15.9.10 There is not anticipated to be any further impacts on peat during the operational phase. The peat on Site will continue to sequester carbon. The habitat that is reinstated would also deliver minor benefits with regards to carbon sequestration and soil stabilisation.
- 15.9.11 The Peat Management Plan is complying with 'good practice' measures and therefore, in accordance IEMA (2022) guidance, there is anticipated to be a **Negligible** effect.

Scope 2

- 15.9.12 It is anticipated that limited GHG emissions will be produced as electricity via the National Grid is purchased for heating, powering appliances, and maintaining lighting on the Site. However, the Proposed Development will significantly contribute to reducing carbon emissions through the displacement of fossil fuel generation and improving grid reliability services. Compared to the baseline, there will be a reduction in GHG emissions associated with national and local GHG emissions as emissions associated with the National Grid are displaced.
- 15.9.13 This will be contributing to reducing emissions on a net zero trajectory. It is therefore anticipated that this will result in a **Beneficial** (significant) effect.

15.10 Further Mitigation and Enhancement

- 15.10.1 All mitigation measures are embedded, and therefore no further mitigation measures are proposed.

15.11 Residual Effects

- 15.11.1 The assessment of effects takes into consideration the anticipated benefits of the embedded mitigation measures proposed, and therefore the construction and operation effects outlined above should be considered representative of residual effects.

15.12 Monitoring

- 15.12.1 Construction activities, including transport, energy consumption and plant emissions will be monitored and managed through the CEMP.
- 15.12.2 The reinstated habitat and planting proposed will be monitored over the initial establishment period of 5 years.

15.13 Cumulative Effects

- 15.13.1 As stated above in the Section 15.4 (Assessment Methodology), the global concentration of GHGs in the atmosphere, rather than the flow of emissions, is what causes effects on climate change and therefore all cumulative sources are relevant. This has been taken into account in the assessment through defining the high sensitivity of the global climate as a receptor and through the consideration of emissions in the context of UK emissions.

15.14 Referencing

- CCC (2020) The Sixth Carbon Budget Electricity Generation. Climate Change Committee. Online, available at: <https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Electricity-generation.pdf>.
- DBEIS (2021) 2019 UK local authority and regional carbon dioxide emissions national statistics, Department for Business, Energy & Industrial Strategy. Online, available at: [e](#) Accessed: 07/02/2022.
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- International Hydropower Association (2020) Hydropower Sustainability Guidelines. Online, available at: <https://www.hydropower.org/publications/hydropower-sustainability-guidelines> Accessed: 07/02/2022.

16 Impact Interactions

16.1 Overview

- 16.1.1 Significant environmental effects can result from incremental changes caused by the interactions between effects resulting from a development.
- 16.1.2 The direct and indirect effects of the Proposed Development have been assessed within the relevant topic chapters of the ES prepared by technical specialists. Environmental effects are assessed relative to the topic under consideration. This approach can lead to the interaction of effects being reported in separate chapters but the collective effect on the same environmental resource(s) not being considered.
- 16.1.3 In response, this chapter summarises the principal findings of each topic chapter of the ES to enable assessment of the potential for impact interactions.

16.2 Methodology

- 16.2.1 The assessment methodology involves the identification of impact interactions associated with both the construction and operational phases of the Proposed Development upon one or more environmental resources. This assessment of impact interactions is undertaken using a qualitative appraisal process. Receptors have been grouped into 'Natural Resources' and 'Human Beings and Society' categories.
- 16.2.2 A summary of mitigation measures is provided in [Appendix 4.1](#) which has been used to help identify where there is a likelihood for potential significant adverse impact interactions to occur.

16.3 Construction Effects

- 16.3.1 As set out in the topic chapters, careful management of the construction works, including the implementation of a CEMP, will minimise the adverse effects of construction. As a result, the majority of the construction effects identified in [Chapters 6 – 15](#) are not significant. The following sections discuss, in more detail, impact interactions and effects associated with the construction phase.

Natural Resources

- 16.3.2 With the implementation of the CEMP and use of best practice techniques, along with additional mitigation in the form of a Peat Management Plan, construction effects on Natural Resources related to Ground Conditions and Contamination, and Water Resources and Flood Risk are considered to be not significant.
- 16.3.3 During the construction phase of the Proposed Development temporary significant effects are anticipated within two Landscape Character Types (LCTs) LCT 35 (Rugged Mountains); and LCT 53 – Rocky Coastland. These effects would be *localised*, affecting the landscape around the key areas of the Proposed Development at the upper reservoir / Cruachan Dam area (LCT 35) and the quayside (LCT 53) and would arise due to the intensity of construction activities occurring within the rural landscape which would form new focus and distraction.
- 16.3.4 The assessment has further determined that the temporary effects to landscape character during construction of the Proposed Development would lead to a localised temporary effect on the North Argyll APQ, within Coire Cruachan and around the small, separated arm of Loch Awe, leading to the Pass of Brander. However, these effects would reduce to a non-significant level during operation and therefore it is not considered that this would affect the integrity of the North Argyll APQ designation.

- 16.3.5 There will be a small loss of habitat during the construction phase which will be permanent, impacting upon habitats and species on Site. However, the only residual significant effect anticipated would be on a small area of Northern Wet Heaths, which are a Groundwater Dependent Terrestrial Ecosystem (GWDTE). This would be as a result of direct loss from ground preparation associated with the construction compound.

Human Beings and Society

- 16.3.6 The potential interactive effects on Human Beings and Society are likely to be impacts on the amenity of residents in adjacent areas and impacts on construction workers. Residents may experience some noise and air quality effects, although it is noted that no significant adverse residual construction impacts for Transport and Access, Noise and Vibration, Air Quality, and Ground Conditions and Contamination have been identified. This disruption will, at least in part, be offset by employment opportunities and the boost to the local economy during the construction period.
- 16.3.7 Effects to construction workers may also include noise and air quality effects, these effects will be mitigated through provision of appropriate protective clothing and best practice techniques to manage risk and will therefore be negligible.
- 16.3.8 During construction, significant effects would occur for visual receptors based at three out of twenty-three built properties / property groups, and four out of twelve routes. No significant effects were identified for those at other outdoor viewing locations.
- 16.3.9 The three building-based receptor locations where significant effects are anticipated to occur are all located within 1 km of key areas of proposed construction works at the quayside (properties at and around Tervine) and the temporary construction compound to the east of the Lower Works, and therefore the works would appear fairly prominent within the view. However, these effects would all reduce to levels which would be not significant by 10 years into the operational phase when the intensity of activities within the view would be reduced and planting and vegetation re-growth associated with the Proposed Development would begin to establish.

16.4 Operational Effects

Natural Resources

- 16.4.1 No operational effects on Natural Resources related to Ground Conditions and Contamination, and Water Resources and Flood Risk are predicted.

Human Beings and Society

- 16.4.2** As the Proposed Development provides opportunities to maximise the use of renewable energy, there are multiple beneficial effects on the wider UK population that come as a result of the reductions in GHG from increased use of low carbon and renewable energy sources and reduced reliance on fossil fuels.
- 16.4.3 The socio-economic assessment shows that the Proposed Development will have a minor beneficial socio-economic impact through temporary construction employment and indirect employment supported through supply chain linkages in the wider economy and job creation during the operation of the Proposed Development
- 16.4.4 The assessment of tourism and recreation shows that once additional mitigation is taken into account, receptors will experience no significant effects. Overall, it is unlikely that that presence of the Proposed Development would result in a change in the visitor attractiveness or tourism potential of the identified tourism and recreation receptors.
- 16.4.5 No significant impact interactions are anticipated from noise and vibration, landscape and visual amenity, flood risk or contamination during the operational phase of the Proposed Development.