



# Cruachan Expansion Project EIA Report

## Volume 3 - Non- Technical Summary

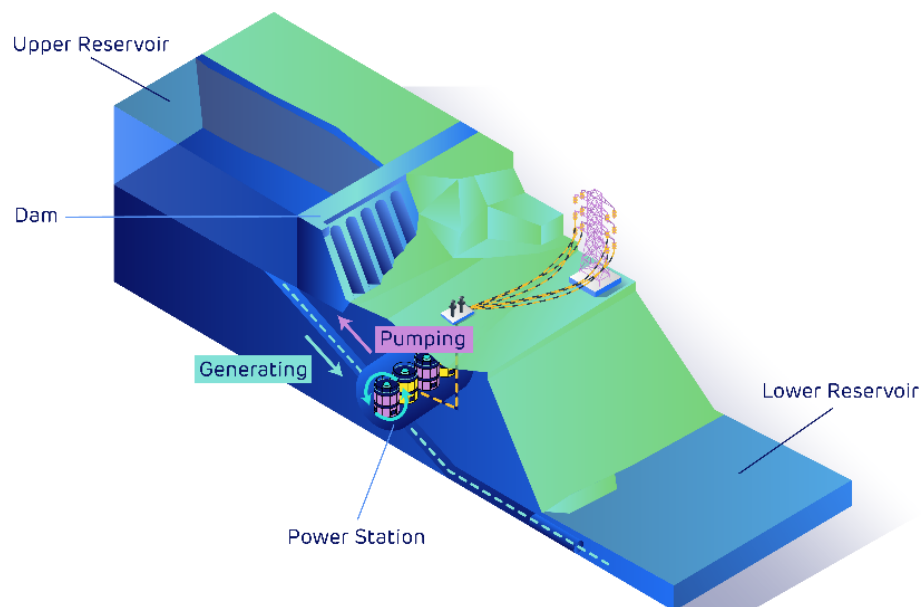
# 1 Introduction

## 1.1 Introduction

- 1.1.1 This document is the Non-Technical Summary (NTS) of the Environmental Impact Assessment (EIA) Report prepared by Stantec UK Limited (Stantec) on behalf of Drax Cruachan Expansion Limited ('the Applicant') for the proposed 'Cruachan Expansion Project' a new pumped storage electricity generating station (referred to hereafter as 'the Proposed Development'). The EIA Report formally accompanies an application for consent to the Scottish Ministers under Section 36 of the Electricity Act 1989 in accordance with Regulation 16 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
- 1.1.2 The EIA Report has been prepared to present the findings of the Environmental Impact Assessment (EIA) undertaken for the Proposed Development. This document summarises the EIAR in non-technical language. The aim of this NTS is to present the technical information included in the EIAR in an easily understood, concise format without the reader needing to refer to the main text of the ES.

### The Proposed Development

- 1.1.3 The Proposed Development seeks to optimise use of the existing Cruachan Reservoir and Dam through development of a new underground power station and associated infrastructure adjacent to Cruachan 1 to provide up to 600 megawatts (MW) 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](#).
- 1.1.4 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 tunnels, 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. The pump/turbines can operate in reverse to absorb excess renewable energy from the Grid. Water is pumped back to the upper reservoir via pumps from Loch Awe ready to be used to generate electricity when demand requires. An illustrative example of pumped storage hydro is shown below in Figure 1.



**Figure 1 – Principles of Pumped Storage Hydro Schemes**

## 1.2 Terms and Definitions

1.2.1 For ease of reference, the following terms have been used in this NTS:

- EIA – Environmental Impact Assessment;
- 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 A)** and as described in Chapter 2 – The Site and Surrounding Area;
- The Proposed Development – the development 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 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;
- The EIA Scoping Opinion – the EIA Scoping Opinion adopted on 29th October 2021 in response to the EIA Scoping Request;

## 1.3 The EIA, EIAR and Other Documents

1.3.1 An EIAR has been prepared to present the findings of an EIA undertaken for the Proposed Development in accordance with The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended), referred to hereafter as the “EIA Regulations”.

- 1.3.2 The EIA process has been used to inform the design of the Proposed Development and identify environmental constraints and opportunities for the Site.
- 1.3.3 The EIAR identifies the likely significant environmental effects of the Proposed Development at the demolition, construction and operational stages and identifies opportunities for environmental enhancement and further measures required to mitigate potential significant adverse effects that may occur.
- 1.3.4 The EIAR comprises the following volumes:
- **Volume 1:** Main Report;
  - **Volume 2:** Appendices; and
  - Non-Technical Summary: this document.
- 1.3.5 The application submission relates to land defined in the site location plan (**Figure 1.1 in Appendix A**) and in addition to this statement, includes the following:
- EIA Report (EIAR)
  - Flood Risk Assessment;
  - Loch Awe and Cruachan Reservoir Hydrology Technical Note
  - Species Reports: Bat, Otter, Ornithology, Fisheries, Badger, Red Squirrel, Pine Martin;
  - Ecological Constraints Plan;
  - Habitats Regulation Assessment;
  - Transport Assessment, including an Abnormal Indivisible Loads Assessment;
  - Draft Construction Traffic Management Plan;
  - Noise Monitoring;
  - Draft Peat Management Plan;
  - Cultural Heritage Assessment;
  - Draft Construction Environmental Management Plan;
  - Schedule of Mitigation;
  - Pre-Application Consultation (PAC) Report.
  - Planning Statement
  - Relevant Plans Figures and Drawings



## 2 Site and Surrounding Area

### 2.1 Site Location, Context and Access

- 2.1.1** The Site, shown on the indicative Site Location Plan (**Figure 1.1** in **Appendix A**), comprises all areas required for construction and operation of the Proposed Development. Given the scale and nature of the Proposed Development, the Site covers a broad area and includes a corridor of land running from Cruachan Reservoir, extending into Loch Awe, a corridor along the existing Dam 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.

### 2.2 Site Use and History

- 2.2.1** Cruachan 1 is one of only four large-scale pumped storage facilities in the UK and currently operates with a nominal maximum output of 440 MW in full generation mode.

- 2.2.2** Cruachan 1 comprises the following main components:

- Cruachan Reservoir (upper head pond);
- Twin 4.6 m diameter headrace tunnels that bifurcate to four steel-lined unit penstocks;
- Subterranean tunnels to direct water to underground powerhouse cavern housing turbines; and
- Tunnel and inlet/outlet structure on the bank of Loch Awe which discharges water used for power generation into Loch Awe.

#### Environmental Characteristics

- 2.2.3** The area around the Proposed Development is characteristic of the wider Scottish Highlands, with high mountains, steep rocky outcrops and narrow Lochs scattered within the valleys. The area is generally remote, with small towns and villages scattered around the area.
- 2.2.4** A range of habitats are present on site, including 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, Appendix B**)
- 2.2.5** 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.
- 2.2.6** SEPA Flood Maps indicate that the area has a Low-High likelihood of flooding. Areas surrounding Loch Awe at the Allt Cruachan watercourse from Cruachan Reservoir down to the Loch are at High Likelihood, whereas the areas of high ground across the mountain are Low Likelihood.

## **2.3 The Surrounding Area**

- 2.3.1 Most areas of the Site are accessed from the A85, which 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, 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 Castles Farm will be accessed via the B8077 (Stronmilchan Road).
- 2.3.2 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 and the wider Cruachan mountain range.
- 2.3.3 In relation to built 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 Lochawe 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. The 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 15<sup>th</sup> Century Castle) is located approximately 700m south of the location proposed for the construction compound.

## 3 Proposed Development

### 3.1 Description of the Proposed Development

3.1.1 The Proposed Development will be located adjacent to Cruachan 1. It will use the same upper reservoir (Cruachan Reservoir) and lower reservoir (Loch Awe) and there will be no need for construction or modification of the existing Dam.

3.1.2 The Proposed Development will comprise the following main elements:

- **Upper Control Works** – A new intake structure would be located within and adjacent to the Cruachan Reservoir to direct water into a new tunnel and underground waterway system;
- **Underground Waterway System** – A series of underground shafts and tunnels carrying water between the upper reservoir and lower reservoir, directed through the underground powerhouse cavern;
- **Powerhouse Cavern** - A series of underground caverns containing turbines and generators which will use water to produce electricity;
- **Substation** – The existing substation compound requires to be extended in order to provide a suitable connection to the existing overhead circuits 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.
- **Tailrace Tunnel** – A concrete-lined low-pressure tunnel will conduct water between the turbines and Loch Awe, the lower reservoir.
- **Lower Control Works** – Comprising screened inlet / outlet structure, 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.
- **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.

3.1.3 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 A**). 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;

3.1.4 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).

## **3.2 Construction Methods**

3.2.1 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.

3.2.2 Key construction activities will include the following:

- Mobilisation, site set up, establishing construction compound and haul roads.
- Setup traffic management and temporary diversion of A85
- Construct bridging structure to be created in the main A85 carriageway
- Re-divert A85 back onto its permanent alignment;
- Construction of initial phase of working quayside platform on the foreshore of Loch Awe
- 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.
- Excavation and support of powerhouse complex.
- Excavation and support of the high-pressure tunnel system connecting the Cruachan reservoir and 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.

### **3.3 Consideration of Alternatives**

- 3.3.1 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.
- 3.3.2 Expansion of Cruachan 1 presents the opportunity to utilise much of the current infrastructure. There is no requirement for new overhead power lines, 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.
- 3.3.3 The development of the new facility will not be detrimental to the operation of the existing facility or its current efficiency rates.
- 3.3.4 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.

## 4 Methodology

### 4.1 Overview of Process

4.1.1 This chapter describes the process by which the EIA has been carried out.

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

- **Screening** – determining the needs for an EIA.
- **Scoping** – identifying significant issues, determining the scope of the EIA.
- **Establishing Baseline** – drawing together and reviewing available data and undertaking surveys to determine the baseline conditions.
- **Assessment and Iteration** – assess likely significant effects of development, evaluate alternatives, provide feedback to the design team on potential adverse impacts, modify development or impose parameters, incorporate mitigation, assess effects of mitigated development.
- Preparation of the EIAR.

4.1.3 It should also be noted that consultation with relevant stakeholders has been undertaken at appropriate stages within the EIA process.

4.1.4 Due to the nature of the Proposed Development and known environmental sensitivities within and surrounding the Site, the Applicant is of the view that the EIA is appropriately provided in relation to the application for consent for the Proposed Development therefore the Applicant has voluntarily chosen to submit an EIAR as part of the consent application. The Proposed Development was therefore not screened in relation to EIA.

4.1.5 A Scoping Report was submitted to the Scottish Ministers in July 2021 which described the scope of assessment to be undertaken as part of the EIA. In accordance with the EIA Regulations, the EIA Report is based on the EIA Scoping Opinion (received from Scottish Ministers in October 2021) 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.

### 4.1 Consultation

4.1.1 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;
- Visit Scotland.

## **4.2 Assessing Effects**

- 4.2.1 The EIA has assessed the likely significant effects of the Proposed Development against baseline conditions which have been established through technical surveys and assessments.
- 4.2.2 The EIA has also assessed the likely significant environmental effects that could occur during the construction and operational phases. To provide a robust assessment and one that is generally consistent between topic chapters, the EIA has focused on assessing the likely significant environmental effects of the completed development to identify the operational effects of the proposed development.

- 4.2.3 Specific significance criteria have been prepared as appropriate for each specialist topic for adverse and beneficial effects as required, based on the generic criteria set out in **Table 4.1** below.

Table 4.1: Generic Significance Criteria

	Significance Level	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 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	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.

- 4.2.4 For the purposes of undertaking the assessment, effects determined to be moderate or greater are considered significant in EIA terms. Where significant effects have been identified, appropriate mitigation and monitoring requirements have been proposed to allow effects to be reduced to an acceptable level.

### **4.3 Approved Developments**

- 4.3.1 Approved developments are considered to be planning permissions that are partially built out and extant planning permissions. These applications are considered within EIA assessments in order to assess any effects that could arise as a result of applications that are not part of the baseline but are confirmed to be constructed and operational in future.
- 4.3.2 A review of approved schemes under the Town and Country Planning (Scotland) Act 1997 or the Electricity Act 1989 has been undertaken, and it has been identified that there are none which are of significant size or scale that would likely to lead to potential cumulative effects in combination with the Proposed Development.
- 4.3.3 Although not yet existing or approved, the Applicant has been made aware of a proposed 1.5GW pumped storage hydro scheme at Balliemanoach, approximately 12km south of the Proposed Development. At the time of preparing this EIA Report, the Scoping Report for the Balliemanoach scheme has been lodged with the ECU.
- 4.3.4 Given the status of the Balliemanoach 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 Balliemanoach 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.

4.3.5 Based on a review of information in the Balliemanoach 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.

4.3.6 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 socio-economics. Further assessment of these potential impacts is therefore described in Chapters 7, 11 and 13 respectively.

## 5 Policy Context

### 5.1 Energy

- 5.1.1 Statutory and policy requirements at UK and Scottish level to mitigate climate change and increase renewable energy generation are informed by higher level international agreements, primarily the Paris Agreement (2015) which commits United Nations 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.
- 5.1.2 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. A range of policy documents set out the UK Governments binding commitments to cut carbon emissions through the deployment of renewable energy, including the UK Government's Ten Point Plan for a Green Industrial Revolution (2020), Energy White Paper (2020), Carbon Plan (2011), the UK Renewable Energy Roadmap (2011) (updated 2012 and 2013) and the British Energy Security Strategy.

### 5.2 Planning

- 5.2.1 At a national level, planning policy relevant to the determination of the application for consent comprises National Planning Policy Framework 3, the Scottish Planning Policy 2014 and the draft National Planning Policy Framework 4.
- 5.2.2 The national policy position contains a clear presumption in favour of development that contributes to sustainable development; coupled with support for the delivery of renewable energy generation capacity, including energy storage projects at a range of scales. Support for such schemes feeds into policy consideration and guidance at all levels, in recognition of the wide range of benefits they offer.
- 5.2.3 NPF3 identifies hydroelectric power as a key asset and recognises that increasing the capacity of PSH can complement ambitions for more renewable energy capacity. The expansion of Cruachan is specifically cited as being amongst the most advanced plans for new PSH schemes and the relationship with Cruachan 1 is noted.
- 5.2.4 The emerging policy position as drafted for consultation in NPF4, takes this support further towards delivery, working from a baseline focussed on tackling climate change and setting a target of net zero emissions by 2045, with significant progress required by 2030.
- 5.2.5 In the draft NPF4, under "Productive Places" the Cruachan Expansion project is specifically listed as a Scotland Wide National Development: 9. Pumped Storage Hydro. Ben Cruachan at Loch Awe is named as the initial focus of the PSH capability, with an all-Scotland intention thereafter. This will be further reinforced when NPF4 forms part of the development plan in due course.
- 5.2.6 The development plan, a material consideration in the determination of this application, comprises the Argyll and Bute Local Development Plan (LDP) 2015, and associated Supplementary Guidance. The LDP sets out the overarching vision, spatial strategy, and policies to guide development in the administrative area and Key Policy Theme, Policy LDP 6: Supporting the Sustainable Growth of Renewables confirms that, "*the Council will support renewable energy developments where these are consistent with the principles of sustainable development*" and it is demonstrated that there are no cumulative or individual unacceptable significant adverse effects, including on "*local communities, natural and historic environments, landscape character and visual amenity*" and that the proposed development should be compatible with adjacent land uses.
- 5.2.7 The relevant policy is assessed in the Planning Statement.



- 5.2.8 The Cruachan Expansion project, has firm policy support at all levels, recognising its' key role in contributing to climate change policy objectives.

# 6 Assessment of Effects

## 6.1 Introduction

- 6.1.1 This chapter provides a non-technical summary of each of the technical assessment chapters of the EIAR.

## 6.2 Ground Conditions

### Baseline

- 6.2.1 According to the available BGS information, superficial (surface) geology is absent across the majority of the site apart from shallow and localised areas of Alluvium, clay, Diamicton, Sand and Gravel.
- 6.2.2 The bedrock geology below the proposed development is of the Argyle and Appin Groups. 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 Quartzite, Metalimestone, Semipelite and Pelite, with numerous 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.
- 6.2.3 The Site is underlain by bedrock aquifers. Broadly to the south of Cruachan Reservoir is the Oban and Kintyre and Cruachan Reservoir aquifer and land to the north is the Upper Glen Coe bedrock aquifer. According to SEPA, both were in Good condition in 2020 (the latest available data). The aquifers are recorded to be low productivity.
- 6.2.4 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 this was investigated visually and by initial peat probing during the site walkover.
- 6.2.5 For the area around the lower inlet/outlet 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.
- 6.2.6 In the area proposed for the construction compound, a layer of peat or thin organic soil was identified. This is illustrated on **Figure 6.2 – Peat Survey** in the EIAR. 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.
- 6.2.7 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.

### Embedded Mitigation

- 6.2.8 The embedded mitigation measures of relevance to this assessment are set out below.
- Development and implementation of a Construction Environment Management Plan (CEMP). 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.

- 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.
- 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.
- A Geotechnical Risk Register will be completed as part of the design phase and geotechnical supervision will be provided throughout construction.

### Construction Effects

- 6.2.9 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.
- 6.2.10 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.
- 6.2.11 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.
- 6.2.12 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.
- 6.2.13 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

- 6.2.14 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

- 6.2.15 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.

6.2.16 With implementation of the PMP, residual effects on peat deposits will be negligible.

### **6.3 Hydrology**

#### **Baseline**

6.3.1 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.

6.3.2 The inflows to the reservoir include, in order of magnitude: water pumped up from Loch Awe; water imported by 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.

6.3.3 Loch Awe covers an area of 38 km<sup>2</sup> 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 and storage volume. Loch Awe is impounded by the Loch Awe Barrage, operated by Scottish and Southern Energy Renewables (SSER).

6.3.4 A number of additional surface water bodies and unnamed overland drains are present within the Study Area, downstream of the Proposed Development.

#### **Embedded Mitigation**

6.3.5 Construction phase embedded mitigation measures will be implemented through a 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.

6.3.6 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.

6.3.7 The following mitigation measures will be embedded within the CEMP and implemented during the construction phase:

- 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;
- 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;

- Construction materials brought to the Site should be free of any contaminated material, so as to avoid any possible contamination of watercourses;
- 6.3.8 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);
- 6.3.9 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](#).
- 6.3.10 As with Cruachan 1, the Proposed Development will be largely sub-terranean, with all tunnels and the power-house 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 is considered very unlikely, given that the power station has operated safely for over 55 years to date and Drax continue to operate the Proposed Development in accordance with the requirements of the Reservoirs (Scotland Act (2011)). Further description of the risk of major accidents and disasters is presented in Chapter 3 of the EIAR.
- 6.3.11 A temporary canopy structure, enclosed on three sides by brick or concrete with a corrugated roof, will be designed to protect the spoil storage pile from natural elements including the wind from the dominant north westerly direction. An indicative layout for the canopy structure is shown on Figure 3.3 of the EIAR.

### Construction Effects

- 6.3.12 The following potential effects have been assessed during construction of the Proposed Development:
- Increased road runoff and pollution potential associated with the temporary diversion of the A85, increase in road traffic haulage and plant movements, including accidental chemical/fuel leaks and spills – **Negligible effects given the implementation of embedded mitigation measures.**
  - Increase in sedimentation to waterbodies – **Negligible effects given the implementation of embedded mitigation measures.**
  - 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) – **Negligible effects given the implementation of embedded mitigation measures.**
  - Temporary increases in flood risk due to increased surface water runoff from Contractor compounds, working areas and the temporary diversion/extension of the A85 – **Negligible effects given the implementation of embedded mitigation measures.**

### Operational Effects

- 6.3.13 The following potential effects have been assessed during operation of the Proposed Development:

- Potential for alterations in the hydrological regime and hydro-morphology of Cruachan Reservoir  
**Negligible effects given the very minor changes in overall hydrological discharge and abstraction from Cruachan Reservoir**
- Potential for alterations in the hydrological regime of Loch Awe - **Negligible effects given the very minor changes in overall hydrological discharge and abstraction from Loch Awe**
- Potential effects of the new quayside structure on volume displacement, water levels and flood risk within Loch Awe - The quayside structure will have a **negligible** impact on volume displacement and consequentially a **negligible** impact on water levels and flood risk given it is such a small surface area compared to Loch Awe.
- Potential flood risk to new quayside structure - The set design level and the embedded 1m retaining wall will provide flood protection to the 1 in 100 year flood event and therefore no effects from flooding are anticipated;
- Potential increases in surface water runoff due to an increase in permanent impermeable surface areas - **The net increase in hardstanding area as a result of the Proposed Development is negligible. There would therefore be an effect of negligible significance.**
- Potential for increased chemical and physical pollution of surface water bodies, due to the operational use of the quayside structure - **Negligible effects given the implementation of embedded mitigation measures.**
- Potential additional scour or morphological damage to the bed and banks of Loch Awe – **Negligible given that the operational phase from the outfalls, the velocity will be limited to a maximum of 0.3m/s by the installation of fish screens.**
- Potential for increased foul water effluent from operational buildings on the quayside – **Negligible given mitigation measures and appropriate foul water handling.**

## 6.4 Ecology / Ornithology

### Baseline

- 6.4.1 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).
- 6.4.2 Ancient woodland 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 Loch Etive Woods SAC and the associated Coille Leitire Site of Special Scientific Interest (SSSI).
- 6.4.3 The main aquatic habitat within the Site was standing water, (Cruachan Reservoir and Loch Awe), collectively comprising just over 17 % of the Site.
- 6.4.4 Grasslands, including types of marshy grassland, comprised just over 13 % of the Upper Works part of the Site.
- 6.4.5 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
- 6.4.6 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.
- 6.4.7 The following protected Species were identified and surveyed:



- Otter – present within the site - Populations of Local importance
- Badger – present on the steep woodland slopes north of the A85 and possibly within site boundary – Site level importance
- Red squirrel - 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. – Council level importance
- 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 but unlikely to be resident within the Site
- Bats – potential for tree roosting and hibernating – species of Local importance
- Golden eagle and white tailed eagle both active within the site
- 50 other species of breeding birds
- 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.
- Timed electrofishing surveys were also carried out on Loch Awe. In total four species of freshwater fish were identified; European minnow, European perch, European eel and brown trout.
- 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.

#### **Embedded Mitigation**

- 6.4.8 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 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 20 mph for all construction traffic will be in place to protect otter, badger, red squirrel and pine marten.

### Construction Effects

6.4.9 Prior to additional, specific mitigation measures being introduced to reduce impacts on habitats and species, some environmental effects have been predicted on habitat types including GWDTEs and the following species:

- Otter
- Badger
- Red Squirrel
- Pine Marten
- Bats
- Eagle
- Breeding birds
- Fish populations

6.4.10 These additional mitigation measures needed during construction include, for example:

- Pre-commencement surveys undertaken by a competent expert for otter, badger, red squirrel, pine marten;
- Tightly containing works areas as far as reasonably practicable, using fencing-off and clear signage of no-go zones for construction personnel, plant and vehicles
- A full Habitat Restoration 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.
- 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;
- Construction Site speed limit of 15 mph;

6.4.11 Following the implementation of these mitigation measures, there would be remaining residual effects for:

- Northern Wet Heaths (also GWDTEs) – **Site level** adverse impact due to the removal of habitat for construction compound; and

- Otters – Adverse effects at the Site level due to loss of habitat and resting places on the shores of Loch Awe.
  - 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.
- 6.4.12 However, these effects are very localised and would not be significant in terms of overall species or habitat populations across the wider area.

### Operational Effects

- 6.4.13 Prior to additional, specific mitigation measures being introduced to reduce impacts, some environmental effects have been predicted on the following species:
- Otter
  - Badger
  - Red Squirrel
  - Pine Marten
  - Bats
  - Eagle
  - Breeding birds
  - Fish populations
- 6.4.14 However, the following additional mitigation measures will be implemented, such that there are no likely significant residual effects during operation of the Proposed Development:
- Permanent lighting plan for the operational phase to utilise wildlife-friendly strategy; no floodlighting of woodland, woodland edges, watercourses or waterbodies.
  - 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.
  - Construction Site speed limit of 15 mph.
- 6.4.15 In addition, details of tree planting and ecological enhancement measures will be provided in a Habitat Restoration and Landscape Mitigation Plan which will further reduce residual effects and provide biodiversity enhancement.

## 6.5 Transport and Access

- 6.5.1 The scope of the TA and **Chapter 9: Transport and Access** of the EIA Report have been determined based on liaison with Transport Scotland and Argyll & Bute Council, in May 2021 and July 2021 respectively. Based on the scoping discussions, the assessment of transport effects only considers the construction phase of the Proposed Development as the operational phase is not expected to result in material impacts and has been scoped out.

### Baseline

- 6.5.2 The assessment study area includes the surrounding highway network that would be subject to daily traffic flow changes as a result of construction of the Proposed Development. This includes St Conan's Road and sections of the A85 and A82 trunk roads in close proximity to the site. The existing traffic flows upon which the assessment is based on has been determined using automatic traffic count (ATC) data from Transport Scotland's National Traffic Data System as well as ATC data undertaken separately by Drax.
- 6.5.3 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.
- 6.5.4 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.
- 6.5.5 A review of the Road traffic accident data between January 2016 to December 2020 identified that no collisions occurred in the vicinity of the proposed construction works on or adjacent to the A85.
- 6.5.6 Currently, pedestrian and cycle facilities are limited within the immediate locality of Cruachan Power Station. However, there are a number of tourist destinations at and surrounding the Site which attract walkers and cyclists to the site. In terms of public transport connectivity, Cruachan Power Station is accessible by infrequent bus services and a rail station (Falls of Cruachan) that is only open during the summer months, from March to October.
- 6.5.7 A separate Transport Assessment (TA) has been prepared which provides a detailed assessment of the impacts on the surrounding transport network and its users, associated the Proposed Development. **Chapter 9: Transport and Access** of the EIA Report has been prepared on the basis of the detailed assessment reported in the TA.

### Embedded Mitigation

- 6.5.8 The Proposed Development will incorporate a number of embedded mitigation measures to address potential transport effects. These include:
- The construction process for the Proposed Development will consider and include where appropriate and feasible: the minimisation of the use of materials; the reuse of materials within the design of the development to reduce importing and exporting where viable; the use of appropriate transport methods; and minimising workforce travel.
  - 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; and

- Consideration will also be given to the preparation of travel packs so that when the site is built-out, there will be information available to employees advising them of the optimum travel options to and from the site. Similar information would be provided to visitors through the visitor centre's website.

### Construction Effects

- 6.5.9 The assessment of transport effects during the construction phase has shown that drivers and pedestrians along the A85, in close proximity to Cruachan Power Station, would be subject to adverse effects.
- 6.5.10 In terms of driver delay, drivers on the A85 in the immediate locality of Cruachan Power Station would be subject to an average delay of 38 seconds, resulting in a temporary direct effect of **Minor Adverse** significance, which is Not Significant. 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.
- 6.5.11 In terms of pedestrian fear and intimidation, pedestrians on the A85 in the immediate locality of Cruachan Power Station and on the A82 south of Tyndrum would be subject to a 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.
- 6.5.12 The assessment of all other transport effects result in a **Negligible significance** of effect across the study area.
- 6.5.13 In terms of beneficial effects, during the construction of the main access tunnel portal, a signalised pedestrian crossing would be provided which would result in beneficial pedestrian delay and pedestrian amenity effects on the A85, adjacent to the Falls of Cruachan railway station. Pedestrians would be subject to a temporary direct effect of **Minor Beneficial** significance, which is Not Significant.
- 6.5.14 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.

### Operational Effects

- 6.5.15 As agreed with Transport Scotland and Argyll & Bute Council during the scoping discussions, the assessment of transport effects only considers the construction phase of the Proposed Development as the operational phase is not expected to result in material impacts and has been scoped out.

## 6.6 Noise and Vibration

### Baseline

- 6.6.1 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 eight locations considered representative of the nearest noise sensitive receptors.
- 6.6.2 The existing sound climate at the Site was dominated by traffic movements on the surrounding road network, namely the A85.

### Construction

- 6.6.3 An assessment of construction noise, vibration and road traffic has been undertaken. Construction noise levels can be mitigated through careful phasing of the works as well as controlling construction times and durations. Furthermore, construction road traffic noise levels can be mitigated through avoiding

unnecessary revving of engines and restricting construction vehicle movements to sociable daytime hours. Therefore, it is likely that the significance of effects at existing receptors can be reduced, and unlikely that any significant residual effects would occur.

- 6.6.4 The use of blasting during the construction phase of the Proposed Development has been considered. A number of practical measures will be implemented that are likely to reduce the significance of effects at nearby receptors. These measures can be implemented through the use of a CEMP. A detailed assessment will be undertaken once detailed information regarding the exact location, methodology and outcome of trial blasting is known in order to determine the noise and vibration impact of blasting at nearby noise sensitive receptors.

### Operation

- 6.6.5 An assessment of the impact of the change in noise levels associated with operational road traffic on the surrounding road network has been undertaken. The assessment indicates that significant effects are unlikely to occur and therefore no significant residual effects are likely to occur.

## 6.7 Landscape and Visual

### Baseline

- 6.7.1 A Landscape and Visual Impact Assessment (LVIA) has been undertaken for the Proposed Development, which has considered the potential for significant effects on the landscape resource and the visual amenity of members of the public within a study area 3.5 km from the Proposed Development boundary to the north, east and west and extending on to 6km from the Proposed Development to the south. Potential effects were considered during the construction phase of the Proposed Development and during operation, approximately 10 years following completion when areas of re-vegetation would be established.
- 6.7.2 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.
- 6.7.3 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, Claddich and Achlian, and across the upland moorland and forestry area to the south-east up to around 7.5 km from the proposed quayside.
- 6.7.4 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.



### Embedded Mitigation

- 6.7.5 Embedded mitigation measures are proposed as part of the Proposed Development, involving the replacement of trees and woodland removed for the construction on the quayside area and planting and encouragement of vegetation growth at the base of rock cuttings at the proposed upper intake structure. The assessment of operational effects has assumed that these measures would be in place as part of the Proposed Development.

### Landscape Assessment

#### Construction

- 6.7.6 During the construction phase of the Proposed Development 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. Potential effects to the remaining two LCTs within the study area: LCT 37 (Upland Glens – Argyll) and LCT 40 (Craggy Upland) would not be significant, as changes would be localised and are considered unlikely to notably change the characteristics of the LCT.

#### Operation

- 6.7.7 During the operational phase of the Proposed Development, after 10 years, 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 not be anticipated to lead to any notable change to the character of the landscape within the surrounding area.
- 6.7.8 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 the 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 designation. No significant effects are anticipated to the Ardanaiseig GDL or the Key Qualities of WLA 09: Loch Etive Mountains.

### Visual Assessment

- 6.7.9 The detailed assessment of effects on the visual amenity has considered potential effects on visual receptors (those obtaining views) based in buildings and residential areas, using transport and recreational routes, and taking advantage of the view at defined outdoor viewing locations.

#### Construction

- 6.7.10 During construction, the assessment has identified that 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.
- 6.7.11 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 eastern construction compound (Castles Farm), and therefore the works would appear fairly prominent within the view.

### **Operation**

- 6.7.12 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.
- 6.7.13 Similar significant effects are also anticipated for visual receptors using two public roads and two recreational routes which pass close to the major construction areas of the Proposed Development: the A85, passing close to the quayside works; the B8077 and a recreational ascent of the mountains Beinn Eunaich and Beinn a Chochuill which pass close to the eastern compound area; and the Cruachan Horseshoe mountain route and ridge walk which passes close to the upper reservoir and substation works. However, these effects to travellers and users of recreational routes are also anticipated to reduce to not significant levels by 10 years post construction as the construction based effects would be temporary and permanent features of the Proposed Development would be seen within a context of existing features of Cruachan Power Station and unlikely to form very detracting additions.

### **Cumulative Landscape and Visual Effects**

- 6.7.14 Cumulative landscape and visual effects may occur where the effects of more than one development combine to form a greater level of effect on a landscape area or within a view.
- 6.7.15 The potential for cumulative landscape and visual effects to occur has been considered in combination with two other developments: Proposed transmission infrastructure projects on the southern side of Loch Awe between Creag Dhubh and Dalmally; and a proposed pumped storage scheme at Balliemore. Consideration was also given to the cumulative effects with the existing Cruachan Pumped Storage Scheme during operation. The assessment has determined that due to the localised nature of the effects of the Proposed Development and the distance between the individual sites considered in the cumulative assessment, no greater cumulative effects would be anticipated than those which have been identified from the Proposed Development alone.

## **6.8 Cultural Heritage**

### **Baseline**

- 6.8.1 A baseline heritage study comprising desk-based research and site visits has been undertaken to inform the assessment.
- 6.8.2 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).
- 6.8.3 There are no Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Battlefields or Conservation Areas located within the Site.
- 6.8.4 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 Hotel – Category C (LB4701)
- Inventory Designed Landscape
  - Ardanaiseig House (GDL00018)

6.8.5 It has been established through site visits there is no intervisibility between the Listed Buildings and Scheduled Monuments. Nor is there potential for them to be seen in combination with the Proposed Development. There is therefore no potential for the Proposed Development to affect their setting. They have not therefore been taken through to assessment and are not considered further. Site visits established that there is a very low degree of intervisibility with Ardanaiseig House IGDL. This has therefore been taken through to the assessment of operational effects.

### Non-Designated Heritage Assets

6.8.6 There are a total of 10 known non-designated heritage assets in the Site which are all Post-Medieval or Modern in date, including:

- 18th century military road;
- Cruachan Reservoir;
- Tunnels associated with Cruachan Power Station;
- Charcoal burning platforms;
- Post-Medieval bank;
- Clearance cairn;
- Enclosure;
- Rig and furrow;
- Railway halt; and
- Allt Cruachan Footbridge.

### Embedded Mitigation

6.8.7 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.

### Construction Effects

6.8.8 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.

- 6.8.9 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**.
- 6.8.10 The construction of the access tracks will potentially remove elements of four Post-Medieval or later agricultural features, resulting in a **permanent adverse effect of minor significance**. No mitigation is proposed in respect of this.

### Operation

- 6.8.11 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.

## 6.9 Socioeconomics

- 6.9.1 An assessment of the likely significant effects on socio-economics, tourism and recreation from the Proposed Development is provided in **Volume 1, Chapter 12 of the EIAR**. The chapter has been split into a socio-economic assessment and a tourism and recreation assessment.

### Socio-economic

- 6.9.2 The Study Area for the socio-economic assessment is based on the Argyll and Bute local authority area.
- 6.9.3 An extensive desk-based review of publicly available information was undertaken to establish the baseline conditions of the Study Area. The following socio-economic indicators have been considered:
- Current and future demographic characteristics including population and age structure; and
  - Labour market indicators including economic activity, employment and qualifications.
- 6.9.4 The principal socio-economic assessment criteria relate to employment effects within the Study Area. These are defined in terms of Full-Time Equivalent (FTE) jobs and the Gross Value Added (GVA) generated by those jobs.
- 6.9.5 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.

### Tourism and Recreation

- 6.9.6 The 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. Facilities or notable points of focus for visitor attraction and recreation within this area have been reviewed.
- 6.9.7 A desk-based analysis has been carried out to determine key factors which impact upon tourism trends and they key drivers influencing the market. Factors such as visitor patterns and trends, bednights and popular visitor attractions are analysed.

- 6.9.8 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 lead to expenditure by visitors.
- 6.9.9 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.
- 6.9.10 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 the presence of the Proposed Development would result in a change in the visitor attractiveness or tourism potential of the identified tourism and recreation receptors.

## **6.10 Waste Management**

### **Baseline**

- 6.10.1 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.
- 6.10.2 Based on the likely geological make up at the site, the 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 (for instance, for general infill material within the proposed quayside structure).
- 6.10.3 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.

### **Embedded Mitigation**

- 6.10.4 A number of embedded mitigation measures will be in terms of waste generation. These include:
- 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;
- Site Waste Management Plans (SWMP) and Materials Management Plans (MMP) will be produced where appropriate.

### Construction Effects

6.10.5 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 (wind blown silt and runoff) entering Loch Awe from material which is temporarily stored on the quayside structure;** - Mitigated by the temporary canopy structure. Therefore, there is likely to be an effect of negligible significance (not significant).
- **Handling of spoil within the Site** - Mitigated by embedded mitigation measures such that there would be negligible effects.
- **Impacts on the road network arising from transport of the spoil off-site;** - 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.
- **Not being able to find a suitable re-use for the spoil.** - 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.

6.10.6 In addition, the outcomes of the Potentially Acid Generating (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 acid rock drainage (ARD).

### Operational Effects

- 6.10.7 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.
- 6.10.8 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.

## 6.11 Climate Change

### Baseline

- 6.11.1 The greenhouse gas (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. 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, with a high sensitivity.

### Embedded Mitigation

- 6.11.2 A series of mitigation measures have been proposed to reduce emissions during construction. The implementation of a CEMP, and CTMP will help to reduce emissions during the construction phase. All waste will be diverted from landfill and used elsewhere. A Peat Management Plan is presented as **Appendix 6.2** in the EIAR Report. This, alongside avoidance of areas of deep peat will mitigate any effects from climate change as a result of loss of peat / carbon rich soils.
- 6.11.3 A series of embedded design measures have been adopted to reduce GHG emissions associated with the Proposed Development.

### Construction

- 6.11.4 An iterative value engineering process has been undertaken to reusing existing infrastructure of Cruachan 1 where possible, reduce material quantity required for the build and reduce the amount of waste generated. There will be no new reservoir, no changes to the volume of the existing reservoir, and limited changes to the existing hydrological regime. The footprint has been reduced as far as possible, reusing existing access tunnels, overhead lines and other infrastructure of Cruachan 1.

### Operational

- 6.11.5 During the operational phase, the Proposed Development will be actively reducing emissions by displacing fossil fuel generation that export to the national grid, and 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.
- 6.11.6 In accordance with IEMA guidance (2022) the implementation of this mitigation is contributing to the national net zero target, and therefore emissions during construction have all been identified as Minor adverse (not significant). During operation, the benefits of onsite carbon sequestration and landscape stabilisation will be negligible. However, the contribution to decarbonising the national grid will be a beneficial (significant) effect.

## 6.12 Impact Interactions

- 6.12.1 Significant environmental effects can result from incremental changes caused by the interactions between effects resulting from a development.
- 6.12.2 In response, an assessment has been undertaken to summarise the principal findings of each topic chapter of the ES to enable assessment of the potential for impact interactions.

### Natural Resources

- 6.12.3 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.
- 6.12.4 During the construction phase of the Proposed Development temporary significant effects are anticipated within two Landscape Character Types (LCTs). These effects would be *localised*, affecting the landscape around the key areas of the Proposed Development at the upper reservoir / Cruachan Dam area and the quayside and would arise due to the intensity of construction activities occurring within the rural landscape which would form new focus and distraction.
- 6.12.5 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

- 6.12.6 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.
- 6.12.7 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.
- 6.12.8 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.
- 6.12.9 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.

## **6.13 Operational Effects**

### **Natural Resources**

- 6.13.1 No operational effects on Natural Resources related to Ground Conditions and Contamination, and Water Resources and Flood Risk are predicted.

### **Human Beings and Society**

- 6.13.2** 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.
- 6.13.3 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
- 6.13.4 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 the presence of the Proposed Development would result in a change in the visitor attractiveness or tourism potential of the identified tourism and recreation receptors.
- 6.13.5 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.

## 7 Conclusions

- 7.1.1 This ES NTS provides a background and sets the context of the Proposed Development and summarises (in non-technical language) the assessment of environmental effects from the Proposed Development.
- 7.1.1 The Proposed Development will deliver up to 600 megawatts (MW) of additional generating capacity from a renewable source. The Proposed Development has strong support at both a national and local policy level, identified as a national development in the draft National Planning Framework 4.
- 7.1.2 The Site is ideally suited and appropriate to support a project of this nature. The Proposed Development is uniquely placed to utilise existing Cruachan 1 infrastructure such as Cruachan Dam, access roads, the powerhouse cavern, substation and grid infrastructure. Other key features of the Project are in close proximity to the existing Cruachan 1 infrastructure.
- 7.1.3 The assessment of environmental effects has shown that the Project can be responsibly delivered without causing significant harm to the environment. No likely significant effects are predicted on local noise, ecology, water quality, ground conditions, traffic and transport and historic environment during the construction or operational phases or decommissioning phases in isolation, or cumulatively with other developments.
- 7.1.4 Based on the assessment, most of the predicted significant landscape and visual effects will occur during the construction period and are therefore of a limited duration and are localised. Few significant effects persist into the operational period and some benefits are predicted with the maturing of new vegetation.
- 7.1.5 Minor positive effects are likely to result on the socio-economics of the area surrounding the Site due to the significant capital investment and an increase in workforce during all phases of the Project.

# Appendix A - Figure 1.1





Client

Drax Generation  
Enterprise Ltd

## CRUACHAN EXPANSION PROJECT

### Site Location Plan

0 0.5 1  
km

© Crown copyright and database rights [2021] Ordnance Survey 0100031673  
Contains public sector information licensed under the Open Government Licence v3.0.

1:17,500 @ A3

Date: 03/03/2022

Drawn: JP

Checked: CL

Figure 1.1

Rev D



## Appendix B - Figure 2.1



