Chapter 1: Sloy Pumped Hydro Storage Scheme: Introduction

Chapter 1: Introduction - Contents

Figures

Appendices

There are no appendices associated with this Chapter.

1. Introduction

1.1. Overview

SSE Renewables Services (UK) Limited (SSER Ltd.) ("the Developer") as agent for SSE Generation Limited ("the Applicant") is applying for consent to convert the current Sloy Hydroelectric Power Station into a pumped hydro storage scheme. For the purposes of this EIA both entities will hereafter be referred to as SSE. The Scottish Ministers previously granted consent for a pumping station at Sloy, however due to a perceived lack of market, the scheme was never built. In recent years there has been an increase in the development of flexible renewable schemes (principally wind farms) to assist the UK in attaining its commitment to increase the proportion of electricity generated using renewable resources. As a result, there is now a recognised, clear, and urgent need for the development of pumped hydro storage, to enable a greater balance between electricity supply and demand.

The permanent components of the Sloy Pumped Hydro Storage Scheme 'Proposed Development' would be located within the grounds of the existing Sloy Hydroelectric Power Station which is located opposite the Inveruglas Visitor Centre on the A82, and within the Loch Lomond and The Trossachs National Park (LLTNP) (see **Volume 2**, **Figure 1.1: Site Location**). The Proposed Development would consist of an extension to the existing tailrace, new intake structure, new underground pump(s), a new above ground building, extension of hard standing area and an area of landscape reinstatement to the north. During the construction phase temporary site establishment would be created within the grounds of the existing Sloy Hydroelectric Power Station and in the overflow car park at the Inveruglas Visitor Centre (owned by SSE). The purpose of the scheme will be to enable water to be pumped through existing pipelines and tunnels from Loch Lomond to Loch Sloy during times of low electricity demand, to store excess energy, ready for use during periods of higher demand or lower supply (see **Volume 2, Figure 1.2: Proposed Development**). In addition, the existing 32.5MW G4 turbine will be upgraded to 40MW to match its sister units in order to maximise the generation potential of the site.

The Proposed Development has been subject to an iterative design process, giving due consideration to the operational assets and environmental constraints specific to the site and surrounding area. Further detail on the iterative design process is provided in **Chapter 3: Site Selection and Design Evolution.**

A detailed description of the Proposed Development is included in **Chapter 4: Description of Development**, while the principal components are summarised in **Section 1.4.2** of this chapter.

1.2. Consent Requirements

The Scottish Ministers granted consent for a pumping station at the existing Sloy Hydroelectric Power Station in September 2010. Subsequent extensions to the Section 36 consent were granted in 2013 and 2014, until December 2018. SSE intends to submit a new application for consent under Section 36 of the Electricity Act 1989.

The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, hereafter referred to as the 'EIA Regulations', contains two schedules. Schedule 1 lists projects where EIA is mandatory. Schedule 2 lists projects where EIA may be required '*where proposed development is considered likely to give rise to significant effects on the environment by virtue of factors such as its nature, size or location*'. The Proposed Development is categorised as 'Schedule 2' development under the EIA Regulations.

Given the size of the Proposed Development (up to 100MW pumping capacity) and similarities to the previous consented scheme, SSE has taken the decision to produce an Environmental Impact

Assessment (EIA) Report to accompany an application for consent, without requesting a further EIA Screening Opinion from the Scottish Ministers.

In addition, Listed Building Consent is required (as it was for the previously consented scheme) as well as consent under the Water Environment (Controlled Activities) (Scotland) Regulations 2013 (CAR). Under CAR, licences to permit the abstraction of surface water from Loch Lomond is required.

1.3. Background and Project Need

Pumped hydro storage uses excess electricity during off-peak hours. During this time, it pumps water from a lower reservoir to an upper reservoir. Water is then released during peak demand periods. Water flows from the upper reservoir, downhill. As it moves, it passes through turbines to generate electricity.

One of the key advantages of pumped hydro storage is its large-scale storage capacity. This technology has the potential to store massive amounts of energy. This makes it easier to meet high supply demands than other technologies.

Long duration electricity storage is critical in our journey to achieve net zero. Energy storage is needed to complement variable renewable energy sources such as wind and solar. When the wind doesn't blow and the sun doesn't shine, we will increasingly need to rely on energy storage technologies. Storage technologies like pumped hydro storage will allow us to meet demand.

Energy storage helps to maximise the use of clean energy resources by:

- Storing excess energy during times of low demand;
- Releasing renewable energy when demand increases; and
- Releasing renewable energy into the system when renewable output decreases.

Pumped hydro storage also offers grid stability and flexibility. With its large-scale storage capacity, it can balance intermittent renewable energy sources. It can ensure a constant and reliable power supply. This stability is crucial in supporting the growth of renewable energy and the transition towards a cleaner and more sustainable energy system.

The Draft Energy Strategy and Just Transition Plan (Scottish Government, January 2023) recognises the crucial role that pumped hydro storage has, together with other storage technologies, in Scotland's energy system, as well as the National Planning Framework 4 (NPF4) (2023) which also recognises the need for pumped hydro storage and includes it as a development of national importance.

1.4. Development Context

1.4.1. THE EXISTING SLOY HYDROELECTRIC SCHEME

The existing Sloy Hydroelectric Power Station came into operation in 1950. It makes use of the waters of Loch Sloy, the surface of which lies at up to 285m above sea level, and the steep slope down to the shores of Loch Lomond, lying at less than 10m above sea level but only 4km away. Such a difference in height within a small horizontal distance offered ideal conditions for the development of the scheme. Sloy Dam (55m high and 357m long), raised the surface level of the loch by about 47m and doubled its length. A system of aqueducts and tunnels was built to divert water into Loch Sloy from areas well to the north and south, significantly increasing the catchment area.

From Loch Sloy the water is carried over 3km by a tunnel through Ben Vorlich, which towers almost 940m above Loch Lomond. The water then falls down the side of the mountain in four large high pressure steel

pipelines (penstocks) to the power station at Inveruglas Bay. A surge shaft and surge chamber, built into the tunnel system near its outlet, cope with variations in pressure during the operation of the turbines.

Inside the power station, four Francis Turbines drive four vertical shaft generating sets. Currently, three of these sets are rated 40MW and the fourth is rated 32.5MW. There is also a 450kW Pelton Turbine for emergency supplies. Energy is exported to the grid via 132kV overhead lines connected to the nearby Sloy Substation. With a total installed capacity of 152.5MW, Sloy is the UK's largest conventional hydroelectric scheme.

Sloy Dam, with a spillway crest level at 285m above sea level has an operational range of approximately 25m and when full, holds 36 million cubic metres of water. The operational storage capacity of Loch Sloy is approximately 15 GWh.

Sloy Hydroelectric Power Station generates around 130 GWh per year of average rainfall, with a rated capacity of 152.5MW this gives a load factor of approximately 10%. This means that for the equivalent of 90% of the time there is inadequate water in Loch Sloy to generate, Sloy is therefore generally run only at times of peak demand.

1.4.2. THE PROPOSED DEVELOPMENT

The Proposed Development would convert the existing Sloy Hydroelectric Power Station at Inveruglas, into a pumped hydro storage scheme by the introduction of pumps, located in the grounds of the existing hydroelectric scheme, immediately north of the power station building on the A82, and adjacent to Inveruglas Visitor Centre.

The pumps would enable water to be transferred from Loch Lomond through up to three of the existing four penstocks then via the tunnel to Loch Sloy during times of low demand (typically overnight) or oversupply (when there is too much renewable energy being generated from wind farms, run-of-river hydro schemes, marine devices etc).

The Proposed Development would enable the load factor at the Sloy Hydroelectric Power Station to increase from 10% to (up to) 20% and would help to reduce the likelihood of renewable energy from other sources being constrained off the grid during times of low demand.

It should be noted that no works would be required at Loch Sloy to enable the Proposed Development.

The principal components of the Proposed Development would comprise:

- A new surface building to house electrical switchgear, pump infrastructure and gantry crane(s);
- New multi-stage pumps, located within a new underground pump hall;
- New pump motors located within a large open plan hall;
- A small transformer compound containing the switchgear and transformers required to power the pumps;
- An new section of intake structure, located on the north side of the existing Sloy Hydroelectric Power Station tailrace to enable water to be conveyed to the pumps. The intake will be screened to protect fish and prevent floating debris from entering the pumps;
- New buried pipeline(s) to take the water from the pumps to connect into (up to) three of the existing four penstocks (the high pressure steel pipelines which convey water to the existing power station);
- A large reinforced concrete anchor block at the point of connection into the existing penstocks. This will require modifications to be made to the existing listed drystone wall to the rear of the power station;
- Reconfiguration of Sloy Hydroelectric Power Station internal road for vehicular access;
- Reinstatement of areas affected by construction of the Proposed Development with new profiled earthworks, and planting;

- Dismantling (to enable construction access) and reinstatement of Sloy Hydroelectric Power Station's listed northern entrance gates, gate pillars and a short section of walling;
- Creation of a site establishment area in the woodland to the north of the existing Sloy Hydroelectric Power Station and an area for on-site storage of excavated rock spoil;
- Regrading of the main construction compound / site establishment area and the reinstatement of the area to an improved condition to the existing, in order to achieve SSE's biodiversity net gain (BNG) targets;
- Creation of a secondary construction compound / site establishment area and vehicle holding area in the overflow car park (owned by SSE) to the north of the Inveruglas Visitor Centre car park, including permanent upgrades to the access junction and reinstatement post-construction; and
- The existing 32.5MW G4 turbine will be upgraded to 40MW to match its sister units in order to maximise the generation potential of the site.

The principal components proposed are set out in more detail in **Chapter 4: Description of Development.**

1.5. The Developer

SSE is a leading developer, owner and operator of energy generation across the UK and Ireland including onshore and offshore wind farms, hydro, battery and solar. They have an operational renewable portfolio of approximately 4.5GW, a secured future project pipeline of almost 15GW in development and plans to increase installed renewable energy capacity to 9GW by 2027, and over 16GW by 2032. SSE is well placed to provide the future renewable power needed to power a green economy.

SSE is committed to proactively engaging with the local supply chain to ensure that local companies are aware of and know how to tender for contracts related to the Proposed Development. SSE's Responsible Procurement Charter and Procurement Policy both highlight the importance of sustainable supply chains. Key to this is sharing economic opportunities with the people and businesses close to SSE's operations. As well as working with communities directly, SSE has a structured approach to engaging with its strategic suppliers and looks to them to form constructive local relationships so that communities gain from SSE's significant capital investments. By investing in communities, SSE recognises that it must be an active contributor to the communities it is part of and has an ongoing commitment to share value where it has been created.

To help promote opportunities more widely SSE hosts 'Meet the Buyer' events designed to provide an opportunity for local businesses to find out about the opportunities available within their pipeline of projects. Initiatives such as these, demonstrate SSE's strong commitment to maximising the positive economic effects of its projects through local companies where possible.

1.6. Environmental Impact Assessment

The EIA process enables the likely significant effects of the Proposed Development on the environment to be fully understood and taken into account during consideration of the application. The process is also used to develop mitigation measures to avoid, reduce or offset any adverse effects of the Proposed Development.

Given the size of the Proposed Development (up to 100MW pumping capacity) and similarities to the previously consented scheme, it was considered that an EIA Report should be prepared and submitted with the application for the necessary consent and deemed planning permission. The EIA Report provides environmental information in accordance with Schedule 4 of the EIA Regulations.

A formal request for a Scoping Opinion was made to the Scottish Ministers under Regulation 12 of the EIA Regulations in June 2023. A Scoping Report was submitted to support the request, which sought input from statutory and non-statutory consultees regarding the information to be provided within an EIA Report to accompany a Section 36 application. The Scoping Opinion was received from the Scottish Ministers in December 2023.

A copy of the Scoping Opinion is included in **Volume 4, Appendix 6.2**. A matrix detailing how key issues raised in the Scoping Opinion have been addressed is included in **Volume 4, Appendix 6.3: Scoping Matrix**. A schedule of mitigation measures proposed is also included as an appendix and cross-referenced in the relevant chapters (**Volume 4, Appendix 4.3: Schedule of Mitigation**).

1.7. EIA Report

The EIA Report the following four volumes:

- Volume 1: Main Report
- Volume 2: Figures
- Volume 3: NatureScot Visualisations
- Volume 4: Technical Appendices

Volume 1 of the EIA Report (this document) describes the project and the legal and policy framework within which the application will be determined. Details of how the design has evolved, are also included. The volume also includes the individual assessments undertaken under each of the specialist environmental topics identified, providing an assessment of the likely significant effects of the Proposed Development.

Volume 1 of the EIA report includes the following Chapters:

- Chapter 1: Introduction
- Chapter 2: The Existing Hydroelectric Scheme
- Chapter 3: Site Selection and Design Evolution
- Chapter 4: Description of Development
- Chapter 5: EIA Process and Methodology
- Chapter 6: Scoping and Consultation
- Chapter 7: Planning Policy and Context
- Chapter 8: Aquatic Ecology and Fish
- Chapter 9: Terrestrial Ecology
- Chapter 10: Ornithology
- Chapter 11: Soils, Geology and Water Environment
- Chapter 12: Landscape and Visual Impact Assessment
- Chapter 13: Traffic and Transport
- Chapter 14: Noise and Vibration
- Chapter 15: Cultural Heritage
- Chapter 16: Recreation

Volume 2 includes all accompanying figures referred to in Volume 1: Main Report, with figure numbering corresponding to the chapter numbers e.g. Figure 1.1, 2.1 etc.

Volume 3 includes visualisations of the Proposed Development according to NatureScot (NS) Standards 3.

Volume 4 comprises supporting appendices to Volume 1 of the EIA Report. Appendices include a Design Statement (**Volume 4, Appendix 4.1**), a Schedule of Mitigation (**Volume 4, Appendix 4.3**), and further detailed reporting or information to support the EIA Report and technical assessments contained therein.

1.8. Supporting Documents

A **Non-Technical Summary** (NTS) is included with the application to summarise the findings of the EIA Report in non-technical language.

A **Planning Statement** is included with the application, considering the acceptability of the Proposed Development in the context of existing and emerging planning policies.

1.9. Notifications

In accordance with Regulation 4 of the Electricity (Applications for Consent) regulations 1990, and Regulation 14 of the EIA Regulations, the application will be advertised in the Edinburgh Gazette, a national newspaper, and a local newspaper (to be agreed in consultation with ECU). It is proposed to advertise the application in The Scotsman, the Edinburgh Gazette, Helensburgh Advertiser and the Dumbarton and Vale of Leven Reporter.

In agreement with the ECU, the advert will describe the application, state where hard copies of the EIA Report are located, state a date by which any persons can make representations to the Scottish Ministers in relation to the application, and the address to where representations are to be sent. It is anticipated that SSE will arrange for hard copies of the EIA Report to be issued to the LLTNP Authority offices at Carrochan Road, Balloch, G83 8EG.

In accordance with Regulation 18 of the EIA regulations, copies of the EIA report will be available to view on the application website at: https://www.sserenewables.com/hydro/sloy-awe/sloy-power-station-redevelopment-plans/. Hard copies of the EIA Report will also be available to view at the following locations:

- LLTNP Authority Offices;
- Other locations to be agreed with ECU; and
- Additional copies will be made available subject to a reasonable fee when requested.