Earba Pumped Storage Hydro Scheme
CAR Licence Application

Non-Technical Summary

December 2024

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1.1 Introduction

Background Information

1.1.1 Earba Ltd. (hereafter referred to as “the Authorised Person”) is proposing to construct the Earba Pumped Storage scheme, located within Ardverikie Estate as shown in Figure 2.1 – Location Plan. The proposals, for which a Water Environment (Controlled Activities) (Scotland) Regulations 2011 Licence (or CAR Licence) is being sought by the Authorised Person, are referred to in this report as ‘the Proposed Development’.

1.1.2 The application for a CAR Licence is being prepared on behalf of the Authorised Person by Gilkes Energy Ltd, (hereafter referred to as “the Applicant”) with support from a number of specialist consultants.

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

https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00005062

1.1.4 The function of the Proposed Development would be to create a large-scale long duration electricity storage (LDES) scheme with up to 1,800MW generation capacity to store and release energy to or from the electricity transmission system, which would help to balance supply and demand for grid power at a national scale. The electricity storage capacity of the Proposed Development will be up to 40 GWhr, which equates to 22 hours of generation at 1,800 MW. This would make it the largest electricity storage facility in the UK, providing a very significant contribution towards meeting the Scottish Government’s commitment to pumped storage hydro, as set out in the Scottish Energy Strategy.

The Applicant

1.1.5 The Applicant, Earba Ltd, is a subsidiary of the Developer, Gilkes Energy Ltd (GEL). GEL specialises in the development of hydro power projects in the UK and comprises a multi-disciplined development team which includes engineering, consenting, project management, operations, commercial, financial and legal expertise. GEL is supported by an industry-leading team of specialist technical consultants. Over the last 14 years, GEL has successfully developed and built 17 conventional hydro projects. In 2018 GEL moved their focus from conventional smaller-scale hydro to larger Pumped Storage Hydro (PSH), with the aim of delivering increased flexibility for the UK electricity system to assist in the transition to a low carbon economy. As well as the Earba PSH, the Proposed Development under this application, GEL has one other PSH scheme in development. Both of these projects have been identified through a detailed screening process.

The Need for the Project

1.1.6 As the UK transitions away from a system dominated by large on-demand thermal generation to one dominated by intermittent renewables it becomes increasingly challenging to balance the grid. Weather patterns, especially wind, rather than the daily changes in demand, become the dominant factor. To balance longer consecutive periods of low wind with low winter solar output (which can last many hours, or even days), Long Duration Electricity Storage (LDES) is required.

1.1.7 LDES is typically understood to mean any technology that can store energy or release electricity for a continuous duration of 6 hours or more. This length of continuous generation cannot be delivered by short duration battery storage. Indeed, analysis by the Applicant and leading specialists suggests at least 12hrs of storage is required in order to provide optimum balancing services to the grid.

1.1.8 Other energy storage technologies that have been suggested include hydrogen, liquid air storage and thermal storage but many of these are yet to be developed at any feasible economic scale. PSH is an established, clean, large scale, LDES technology which has been successfully deployed in the UK for decades.

1.1.9 PSH can absorb excess energy on the grid and use it to pump water to an upper reservoir, storing this energy until times of high demand. At these times of peak demand, the water stored in the upper reservoir is sent through a turbine converting the stored energy back into electricity.

1.1.10 PSH installations are highly flexible and can deliver large quantities of power very quickly as they have the ability to rapidly start and stop. This means that PSH can provide the rapid response to balance the system when sudden significant increases in generated or absorbed power are required.

1.1.11 By storing energy from renewable sources and then releasing it at high demand PSH can reduce our reliance on expensive carbon emitting gas generation which currently supports the grid. The Proposed Development can store 40GWh of energy meaning it could save around 2 million tonnes of CO2 emissions a year, which would be a large step towards meeting Scotland's climate change target of net zero by 2045.

1.1.12 In summary, significant additional long duration electrical energy storage and dispatchable power capacity is required (LDES), to make a meaningful difference to the UK energy system as it moves towards net zero. The Proposed Development delivers on both of these requirements confirming that there is both a need for the project and that it is a scheme of national significance.

1.1.13 A large number of energy legislation and policy documents provide the context for the development of pumped storage hydro and these are summarised in more detail within the CAR Licence Report.

The Proposed Development

1.1.14 The layout of the Proposed Development is shown in **Figure 2.2 – Scheme Arrangement**. The Proposed Development would operate by transferring water between a lower reservoir, Lochan na h-Earba (Loch Earba) and an upper reservoir, Loch a' Bhealaich Leamhain (Loch Leamhain). The maximum water level of these existing lochs would be raised by constructing dams to increase their natural storage capacity. The reservoirs would be connected to each other via the powerhouse by an underground waterway system including up to three headrace tunnels.

1.1.15 The Proposed Development would also include a very significant package of habitat compensation and enhancement works which would demonstrably and significantly contribute to the enhancement of biodiversity, including restoring degraded habitats and building and strengthening nature networks and the connections between them.

1.1.16 Details of the Proposed Development are included in Section 1.3 below.

Associated Works

1.1.17 A grid connection, comprising a buried 400 kV cable and a sub-station adjacent to the Beauly to Denny overhead transmission line, is required to connect the Proposed Development to the national electricity grid. For regulatory reasons, this will be subject to a separate consenting process with Scottish and Southern Electricity Networks Transmission ("SSEN Transmission") as the applicant.

Site Context

1.1.18 The site comprises predominantly wet heath, with some smaller areas of blanket bog, dry heath, mire, woodland and scrub. There is a small area of scheduled ancient woodland in poor condition along the shore of Loch Earba. The Estate is used for highland sports, outdoor recreation, commercial forestry, hydroelectric generation (there are two existing reservoir storage hydro schemes), holiday accommodation and as a film location.

1.1.19 The site is within the River Spean catchment upstream of Loch Laggan. Lochan na h-Earba drains to Loch Laggan via the Allt Labhrach and Loch a' Bhealaich Leamhain via the Allt Loch a' Bhealaich Leamhain, the Allt Cam and the River Pattack. The catchment is already heavily modified by the operation of the existing Ardverikie, Pattack and Lochaber Hydro Schemes.

CAR Licence Application Specialist Team

1.1.20 The Applicant recognises that the Proposed Development may give rise to some environmental effects. Specialist consultants have therefore been appointed by the Applicant to provide expert knowledge in assessing the environmental effects as follows:

- Hydrology, Geomorphology and Water Management: Gilkes Energy Ltd, Mott MacDonald Limited, EnviroCentre Ltd;
- Aquatic Ecology:
  - Gavia Environmental Ltd;
  - [redacted] from the University of Glasgow, a recognised expert in the field of freshwater ecology specialising in Arctic Charr;
- Terrestrial Ecology: SLR Consulting Ltd;
- Ornithology: [redacted];
- Landscape and Visual; ASH Design and Assessment Ltd;
- Land Use: Gilkes Energy Ltd;
- Recreation and Access: Gilkes Energy Ltd; and
- Socioeconomics and Tourism: MKA Economics Ltd.

1.2 Site Selection, Consideration of Alternatives and Design Evolution

1.2.1 Pumped Storage Hydro (PSH) is currently the only proven grid scale energy storage facility which can provide large scale Long Duration Electricity Storage (LDES). It is a mature technology, has low operational and maintenance costs and long operating lifespans.

1.2.2 PSH requires a suitable location combining several key factors:

- Suitable topography and geology to be able to create substantial upper and lower reservoirs and a waterway system to provide meaningful LDES at scale.
- Practicable access to the electricity transmission network;
- Practicable access to the site; and
- The minimum footprint and impact on the natural environment from construction and operation of the scheme.

1.2.3 Several alternative sites were considered within a nationwide screening exercise undertaken over several years. The key criteria that are listed above are only satisfied at relatively few locations. The Highlands of Scotland do provide opportunities for PSH, however many potential sites have existing infrastructure or other stakeholder interest in the reservoirs. Furthermore, some sites may be located within sensitive and designated natural areas or do not provide significant energy storage.

1.2.4 The 1,800MW Earba PSH scheme is well located to satisfy the above criteria, being close to existing grid infrastructure, clear of migratory fish and other existing water interests and away from designated natural habitat areas.

1.2.5 The Proposed Development at Earba provides both significant quantities of dispatchable power generation (up to 1,800MW) and stored energy (up to 40GWh). When compared with other PSH projects it scores very highly and is one of the best potential stores of grid scale energy in the UK for a relatively modest development footprint.

1.2.6 The graph below, **Plate 1- PSH Projects Compared**, shows the power and stored energy ratings of Earba compared with the four existing operational PSH projects in the UK and any known PSH projects, either in development, in the planning system or consented but not constructed.

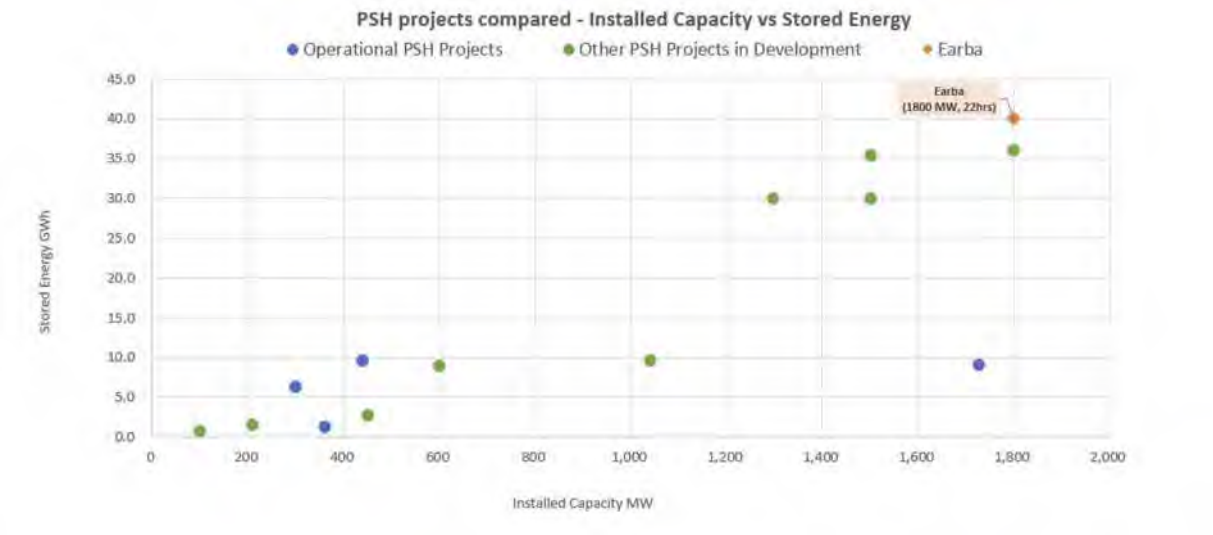


Plate 1 – PSH Projects Compared

1.2.7 The scheme design has been developed to minimise its environmental footprint and its extent would be confined mainly to the footprint of the reservoirs, the powerhouse and access tracks.

1.2.8 The Proposed Development would utilise the majority of earthworks arisings within the dam structures and maintain a balance of materials within each of the upper and lower parts of the site. This would avoid impacts on local road infrastructure and also avoid long haul routes for earthworks materials within the site, a key feature of the sustainable aims for the Proposed Development.

1.2.9 The main refinements of the design since Scoping stage have been to:

- Increase the power capacity from 900 MW to 1,800MW which would increase the powerhouse size;
- Increase the energy storage from 33GWh to 40 GWH by increasing the dam heights and hence reservoir volumes;
- Re-locate the main access and key site compounds as well as access tracks following ecology surveys, to keep clear of sensitive peatlands and bird habitats;
- Develop a significant local biodiversity enhancement and management programme to ensure biodiversity net gain in the local area;

1.2.10 In summary, the Proposed Development has been selected as one of the best located and most significantly sized PSH developments in the UK.

1.3 The Proposed Development

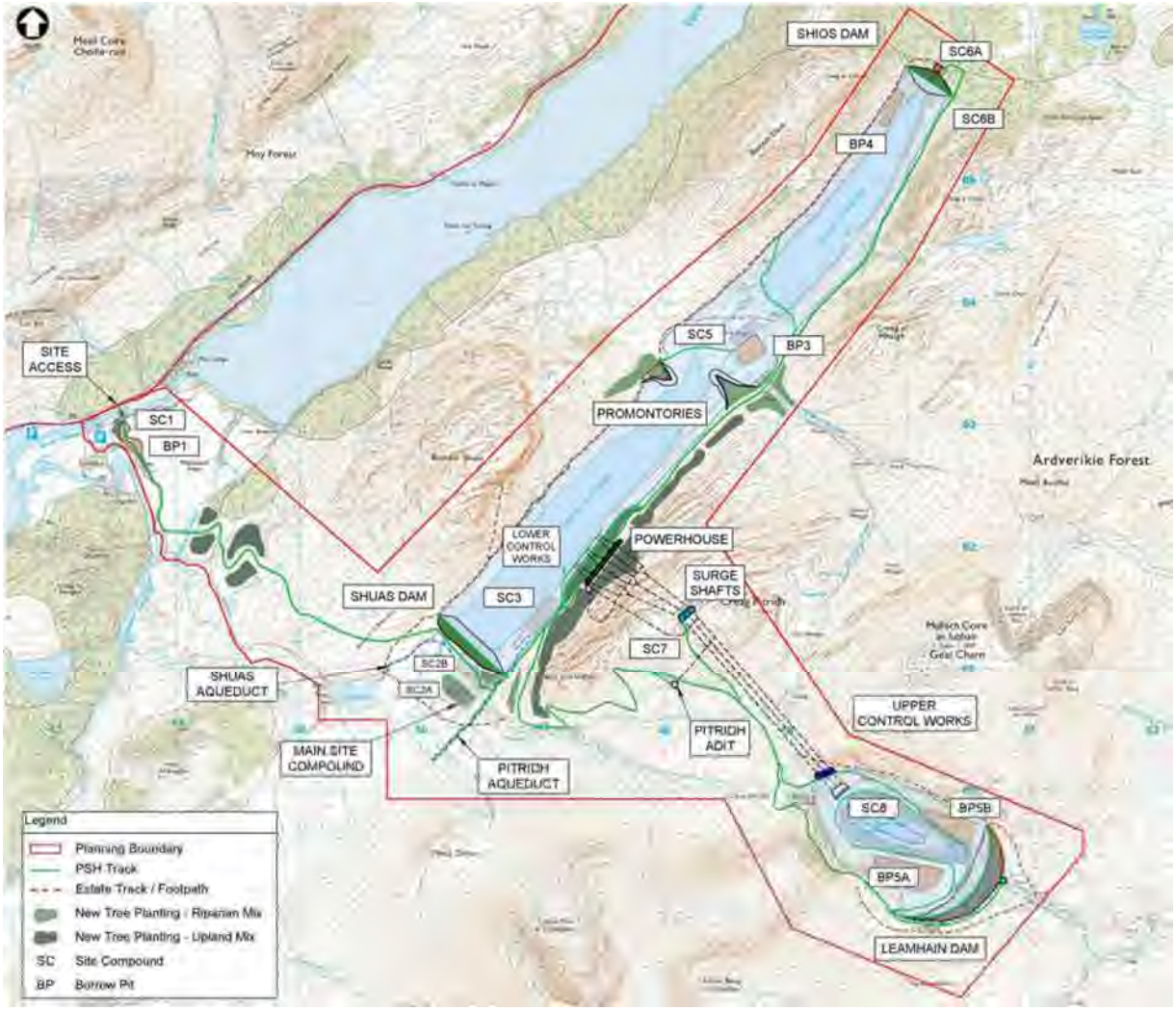


Plate 2 Scheme Layout (Extract from Figure 2.2)

1.3.1 The principal components of the Proposed Development, shown in **Figure 2.2 - Scheme Layout**, with an extract shown in **Plate 2** above, would be:

The Leamhain Dam and Upper Reservoir

1.3.2 A rockfill dam would be constructed just below the outflow of Loch a' Bhealaich Leamhain to create an upper reservoir capable of storing approximately 55 million cubic metres of water. This would raise the level of the loch from its existing level of 636m AOD to a maximum level of 710m AOD. The dam would be a concrete or asphalt faced rockfill dam. The upstream face would have an impermeable membrane of concrete or asphalt. The downstream face would be rockfill.

The Shuas and Shios Dams and Lower (Earba) Reservoir

1.3.3 Two embankment dams would be constructed at each end of Loch Earba (Shios Dam and Shuas Dam) to create a reservoir capable of storing approximately 65 million cubic metres of water. This would raise the level of the loch, which is

already a reservoir for the existing 1MW Ardverikie hydro scheme, from its existing top water level of 353m AOD to a maximum level of 376m AOD.

1.3.4 The Shios Dam would be an earthfill or rockfill dam with a nominal gradient of up to approximately 1:3 to the upstream and downstream faces. The upstream face would incorporate an impermeable membrane – either concrete or asphalt. The downstream face of the dam would require a section of concrete spillway but would otherwise be topsoiled and vegetated to blend in with the surrounding areas.

1.3.5 The Shuas Dam would be an earthfill dam or rockfill dam with a nominal gradient of up to approximately 1:3 to the upstream and downstream faces. The downstream face of the dam will be topsoiled and vegetated to match the surrounding areas.

Promontories

1.3.6 The area of grassland separating the existing Earba lochs would be permanently inundated by the Earba reservoir. In order to break up the linearity of the reservoir margins, promontory areas landscaped with trees, similar to that existing on the south shore of the existing north Earba Loch, would be created at the north and south sides reservoir.

Underground Waterway System

1.3.7 The underground waterway system would include:

1) Up to three headrace tunnels approximately 10m internal diameter connecting the Leamhain Reservoir to the Powerhouse;
2) Intake/outfall arrangements including screens and isolation gates at the northern end of the Leamhain Reservoir – the upper control works;
3) Up to three surge shafts, approximately 15m in diameter, on the upper flank of Creag Pitridh surface to provide relief for transient pressures within the tunnels during operation;
4) An access adit tunnel from Coire Pitridh to approximately the mid-point of the headrace tunnels to facilitate access for tunnel construction on multiple fronts and for maintenance access;
5) Tailrace tunnels between the powerhouse and the Earba Reservoir;
6) Access tunnels from the powerhouse area to the headrace tunnels; and
7) Intake/outfall structures including screens and isolation gates on the East shore of the Earba Reservoir – the lower control works.

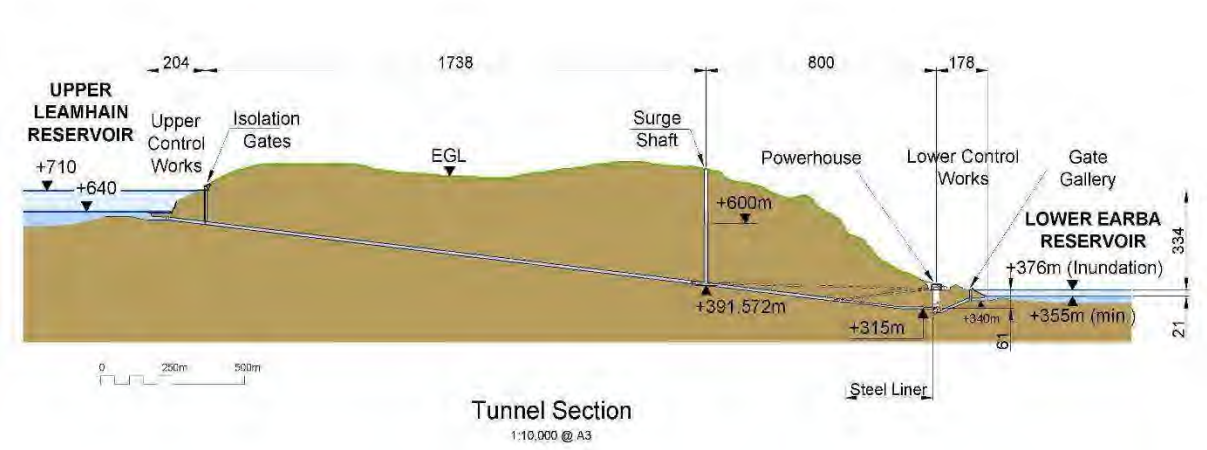


Plate 3 Tunnel Longitudinal Section

The Powerhouse and Switchyard

1.3.8 The powerhouse, located by the shore of Loch Earba, would comprise a series of up to six shafts approximately 70m deep, sunk from a floor level of 377m AOD in a benched cutting in rock excavated approximately 25m below the sloping hillside. Each shaft would contain a reversible pump turbine and motor generator together with associated equipment. The shafts would sit beneath a surface building which would contain an overhead crane and other facilities including offices, storage, transformers and other equipment.

1.3.9 The sides of the powerhouse "benched cutting" at 377m AOD would be tiered, with intermediate benches which would be planted with trees and other vegetation. The powerhouse surface building would have a green roof. Its roofline would be below the general profile of the surrounding finished ground level and so screening it from views along the Earba glen.

1.3.10 An indoor electrical switchyard with a plan footprint of approximately 150m x 70m would be required to the north end of the Powerhouse.

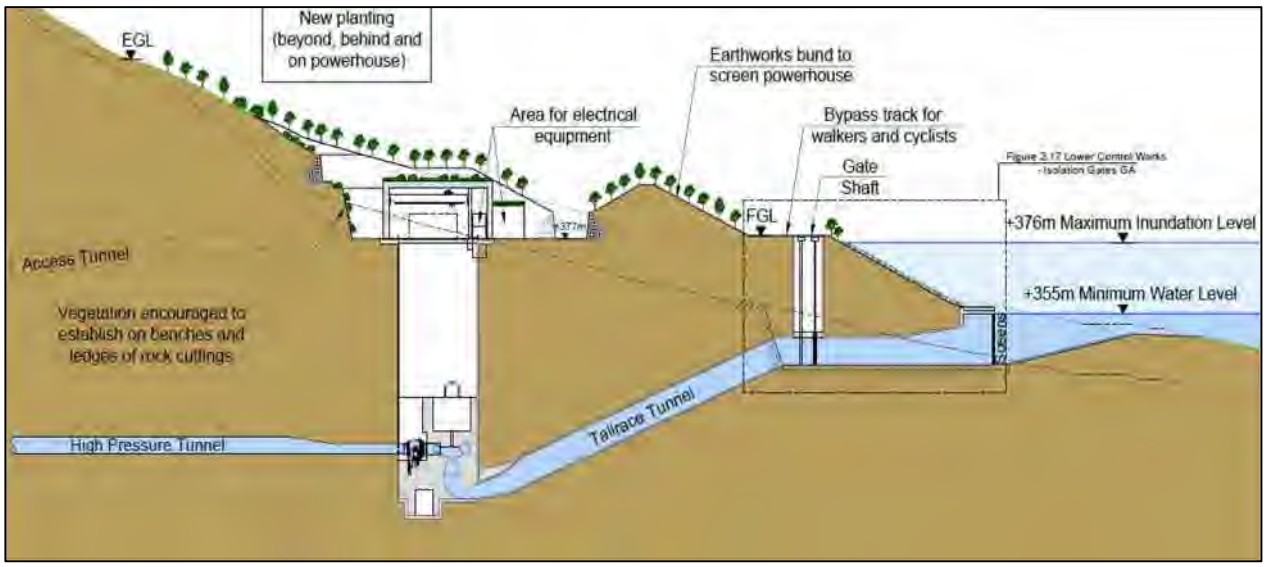


Plate 4 Typical Powerhouse Cross Section

Pitridh Aqueduct

1.3.11 An open trapezoidal channel aqueduct would pick up flows from the watercourses Allt Coire Pitridh and Allt Coire a' Chlachair to divert them around the Shuas Dam into the Earba Reservoir.

Shuas Aqueduct

1.3.12 The Shuas Aqueduct, a buried pipeline, would divert water from the downstream side of the Shuas Dam into the small reservoir to the west of this area, Loch Meall Ardruighe, which in turn drains to the Abhainn Ghuilbinn.

Access Tracks and Footpaths

1.3.13 Access tracks would be provided for the construction of the Proposed Development and for operational, maintenance, and emergency access.

1.3.14 The Proposed Development would be accessed for both construction and operation from the A86 trunk road at Moy Bridge. Existing tracks would be utilised wherever possible, subject to upgrading to the standard necessary for the expected construction and operational traffic. New permanent tracks will be necessary to replace sections that would become inundated by the new Earba reservoir, for access to the Leamhain reservoir, and where deviation from existing tracks is necessary to avoid locations of ornithological ecological sensitivity.

1.3.15 A new junction would be built to access the site from the A86 trunk road. This would be designed to a standard agreed with Transport Scotland. The junction will include a new bridge over the River Spean / Moy Channel as the existing bridge here is unsuitable. The original junction and bridge would be retained for use by Corrour Estate traffic and by recreational users.

1.3.16 Access tracks within the site are shown in **Figure 2.2 - Scheme Layout.**

1.3.17 Site access tracks would typically be constructed with graded rock or gravel won from borrow pits within the Site. Except for the access from the A86 to the site entrance compound, all access tracks would have an unbound surface, i.e. not tarmacked. Access tracks would be reduced in width following completion of construction.

Mass Balance Strategy

1.3.18 An outline mass balance / spoil management strategy has been designed for the Proposed Development which would maximise the use of materials generated from within the site for use in the construction of the permanent works and which would put any surplus materials generated from construction of the permanent works to beneficial use within the site. This would minimise the environmental impact of the Proposed Development by avoiding the need to transport bulk materials to the site wherever possible and by minimising the generation of any waste material that would need to be taken off site for disposal.

Borrow Pits

1.3.19 Borrow pits would be established at the locations shown in **Figure 2.2 - Scheme Layout.** The precise locations would be subject to micro-siting following detailed ground investigations.

Site Accommodation

1.3.20 A number of site compounds would be required to accommodate the construction site establishment and lay down areas, as well as a workers' residential camp. The locations of these compounds are shown in **Figure 2.2 – Scheme Layout.**

Areas of Habitat Compensation and Enhancement

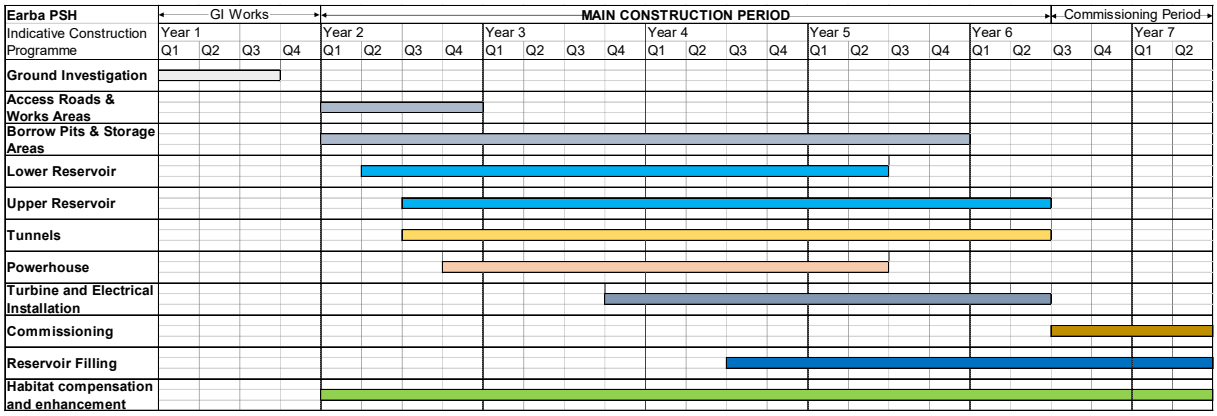
1.3.21 The Proposed Development would include a very significant package of habitat compensation and enhancement works, including approximately 600ha of peatland restoration, reduction in deer densities across the majority of Ardverikie Estate, over 1000ha of fenced land around the Earba reservoir and surrounding hills which will provide an area for woodland restoration, and some further species-specific habitat enhancement works. These proposals would demonstrably contribute to the enhancement of biodiversity, including restoring degraded habitats and building and strengthening nature networks and the connections between them. The Outline Biodiversity Enhancement and Management Plan (BEMP) which details the proposals, is appended to the EIA Report which forms part of the Section 36 Application.

Site Traffic

1.3.22 Construction traffic to the Proposed Development would take access from the A86 at Moy Bridge. All operational or maintenance traffic would also utilise this access route.

Construction Programme and Working Hours

1.3.23 An outline programme has been prepared for the Proposed Development and is shown below.



1.3.24 It is anticipated that the workforce would reach approximately 500 people on-site at the peak of the construction phase. The number of construction workers on-site will vary depending on the stage of the works.

1.3.25 Normal construction shifts would generally apply for the surface works – access tracks, dams, powerhouse, upper control works and lower control works - but these could be subject to some variation to suit the ongoing work, weather conditions and time of year. It is anticipated that surface works would generally be undertaken between 07.00 and 19.00 hours, seven days a week and that underground operations would continue 24 hours a day, seven days a week. As the workforce would be housed within the site, these hours should not lead to any "out-of-hours" traffic on the local roads.

1.3.26 It is proposed that the movement of HGVs into or out of the Site would only take place between 08.00 and 18.00 on Mon - Friday and 08.00 - 16.00 hours on Saturdays and Sundays.

Construction Environmental Management

1.3.27 Construction mitigation and environmental protection measures would be managed through a suite of documents under the umbrella of a Construction Environmental Management Document (CEMD). The CEMD would apply to all construction activities and be implemented via the Contractors' Construction Method Statements. In particular, the CEMD would specify conditions relating to protection of habitats and species, pollution prevention and the means by which site monitoring would occur.

1.3.28 Construction will be supervised and monitored by specialist advisers including Ecological Clerks of Works (ECoWs) to ensure that sensitive ecological habitats and species are adequately protected in accordance with the methodologies in the CEMD and associated documents.

Micro-siting

1.3.29 There may be a requirement to microsite elements of the Proposed Development as a result of additional constraints encountered during site works. Any micrositing would require agreement of the specialist advisors (e.g. the ECoW) as appropriate.

1.3.30

Site Reinstatement

1.3.31 Reinstatement would be undertaken as soon as practical following the construction works in each area. Site tracks and some hardstanding areas would be retained for use during maintenance operations, although except for the main track from the A86 to the powerhouse, construction tracks would be reinstated to 4 m with passing places. The track edges would as far as possible be blended to the adjacent contours, with natural vegetation being allowed to re-establish.

Land Take

1.3.32 It is estimated that the maximum permanent development footprint of the Proposed Development would be approximately 310 Ha. During the construction period it is estimated that a further 103 Ha would be temporarily required which would be reinstated following completion of the construction works.

Construction Lighting

1.3.33 For safety reasons, temporary lighting would be required for all external construction activities during hours of darkness and low natural light. This lighting would be designed to minimise illumination, glare or light spillage to nearby receptors.

Operational Lighting

1.3.34 Once operational, external lighting would only be provided at key areas, such as the lower control works but this would only be used during essential operational and maintenance activities, for example if a switching operation was necessary in the external switchyard. No lighting would be operated by PIRs. Prior to the commencement of Proposed Development, final design details for the external lighting during operation would be agreed with the Planning Authority. The powerhouse surface building will be designed with automatic blinds on all glazed windows and doors, with these closed between dusk and dawn.

Electric Car Charging Point Strategy

1.3.35 Wherever practicable, vehicles used in the operation of the Proposed Development would be electric vehicles (EVs). The powerhouse would be provided with sufficient charging points for all vehicles used to operate the scheme, as well as for staff vehicles to recharge whilst at work.

1.3.36 There is potential to locate temporary solar arrays within the footprints of the site compounds, which would enhance the sustainable use of electric vehicles and plant. Electrical power supply and charging from several of the local hydroelectric schemes in the vicinity of the works would also be explored as a viable sustainable temporary power supply.

Project Operation and Maintenance

1.3.37 The Proposed Development would be manned twenty-four hours a day, with most operations being controlled from the control building within the powerhouse or remotely. Regular visits would be made to inspect and maintain the scheme components.

Project Decommissioning

1.3.38 With proper maintenance, the Proposed Development should remain functional indefinitely and as such it is not anticipated that an assessment of decommissioning effects will be required.

1.4 CAR Licence Assessment Methodology

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

1.4.2 It is understood that this guidance (WAT-SG-67) is to be followed when determining whether or not SEPA should authorise a controlled activity that would potentially breach environmental standards. The guidance considers the significance of both positive and negative impacts across Social, Economic and Environmental issues. The Applicant has drafted a chapter on each area across the Social, Economic and Environmental sphere.

1.4.3 The assessment by the applicant is intended to assist with SEPA's evaluation and provide all the information in a concise report.

1.4.4 In some instances, the Applicant has made reference back to the Section 36 EIA report, as transferring the EIA findings to match SEPA's criteria was considered unnecessary.

1.4.5 A Shadow Balancing test has been included within the main CAR Licence report (summarised within this NTS). The balancing test following the SEPA guidance whilst acknowledging that SEPA will need to undertake this exercise following a review of the information presented within this report and the associated application forms.

1.4.6 This Non-Technical Summary documents the main points and conclusions from the CAR Licence Report below.

Summary of CAR Assessment

1.5 Hydrology and Water Management

1.5.1 The reservoir water level in Loch Earba is currently controlled by two dams, one at the link between Earba east and west and one at the loch outflow at the head of the Allt Labhrach. All of the water in Loch Earba, excluding spill, is currently reserved for hydro operations.

1.5.2 Two new dams would be required to raise Loch Earba and these would be built at the northern and southern ends of the loch and named Shios and Shuas respectively. During the initial period of construction, before filling, the construction works at the proposed Shios dam would maintain the natural outflow from Loch Earba into the Allt Labhrach. This flow would then be abstracted for hydro power at the existing generating station until the filling process starts.

1.5.3 At the upper reservoir, only one dam would be required on Loch Leamhain. The Proposed Development would not release compensation flow at the Leamhain Dam. Instead water would flow from the upper Loch Leamhain catchment via diversion channels. As part of the proposed INNS mitigation, no releases will be made directly from the Leamhain reservoir. The natural run off from upper Loch Leamhain catchment via the diversion channels will replicate the natural flow spectrum.

1.5.4 The Proposed Development requires the diversion of the Allt Pitridh and Chlachair watercourses that flow into the south of Loch Earba. These watercourses would be diverted above the proposed Shuas dam and into the Earba reservoir. The residual catchment below the diversion and below Shuas Dam would be diverted west via the Shuas culvert into Loch Meall Ardruighe.

1.5.5 The Proposed Development would introduce compensation flow from the foot of the Shios Dam into the Allt Labhrach downstream as a positive improvement to this watercourse, since currently no compensation flow is provided into the Allt Labhrach. A compensation flow of Q95 (190l/s) is proposed and would be agreed with SEPA as part of the CAR licence process.

1.5.6 The hydro-morphological character of key waterbodies has been assessed through a combination of spatial data analysis and site walkover survey, with a focus on channel forming processes. The impact of diminished flows in the watercourses impacted by the Proposed Development will be mitigated, for instance through the provision of compensatory flows and through the re-introduction of sediments removed from the diversion channel as part of a routine maintenance regime. Furthermore, consideration has been given to potential options for mitigating spawning habitat displacement on both the Moy Burn and the Pitridh Diversion channel, with the formation of a shallower-gradient secondary channels on both watercourses above the proposed maximum inundation level proposed.

1.5.7 Water from the Earba catchment area will be required to fill the lower reservoir prior to operation, which will take a number of years. A hydrological model has been prepared to simulate filling the lower Loch Earba reservoir according to a range of inflows and outflows. It is estimated that filling Loch Earba reservoir would take 2 to 5 years of flow capture. This filling would temporarily impact the downstream hydroelectric schemes at Ardverikie and Lochaber. Discussion with

the operators of these hydro-electric schemes is underway to form an operating agreement.

1.5.8 The Proposed Development would only operate between agreed minimum and maximum levels at both the upper and lower reservoirs. A stop generating level is proposed at Loch Earba to protect against overspill into the Allt Labhrach. A stop pumping level is proposed at Loch Leamhain to protect against overspill into the Allt Loch a'Bhealaich Leamhain.

1.5.9 A stop pumping level is also proposed to prevent pumping operations in Loch Earba during extreme low loch events and to protect against the reduction of the buffer storage provided for the existing hydro and for compensation flow.

1.5.10 In a full duration cycle, with pumping of the full storage volume at maximum rate, the Earba reservoir level would fall from the Top Water Level (TWL) to Bottom Water Level (BWL) in 30 hours. This would draw down at approximately 0.6m per hour. In a long duration full storage generating cycle the Earba reservoir would rise from the BWL to TWL in 22 hrs at a rate of 0.8m per hour.

1.5.11 Considering the same long duration cycle scenarios as outlined above at the Loch Leamhain reservoir would mean that the level rises from the BWL to the TWL in 30 hours at an average rate of approximately 2.4m per hour in a full pumping cycle. In a long duration full volume generating cycle the Leamhain reservoir would fall from BWL to TWL in 22 hrs at an average rate of approximately 3m per hour.

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

1.6 Effect on Biodiversity – Aquatic

1.6.1 The likely effects of the Earba Pumped Storage Hydro scheme on the water environment for the purposes of Controlled Activity Regulations has been considered. This includes the impact on encompassing waterbodies, watercourses, fish fauna, fish habitat, macroinvertebrates and macrophytes where a direct impact is likely to occur during the operation of the Proposed Development as a result of the controlled activity.

1.6.2 The assessment of the effect on aquatic biodiversity was undertaken by Gavia Environmental Ltd, with specialist input from [redacted] of Glasgow University.

1.6.3 A desk study and baseline field surveys were carried out in 2023 and 2024 including for macroinvertebrates, water quality, fish habitat, loch spawning habitat, fish population (including electrofishing, hydroacoustics and gillnetting), eNDA testing and macrophytes.

1.6.4 A total of 17 likely effects were identified. Three of these were scoped out in Section 3.2 due to predicted negligible impacts which included ingress and entrainment, impingement, and noise and vibration.

1.6.5 Assessment of magnitude, importance and significance of the 14 remaining factors concluded:

1.6.6 A total of eleven negative effects:

- **Very Low** (fish attraction to intake and water temperature changes from water transfer),
- **Low** (reduction in macrophyte cover),
- **Moderate** (loss of spawning habitat (watercourse), reduction in food availability for fish, fish stranding, water quality reduction and reduction in macroinvertebrate abundance),
- **Moderate-High** (loss of spawning habitat (waterbody), reduction in egg viability, and hatch success, and fragmentation of habitat (including access to spawning habitat) and
- **High** (fluctuations in water level).

1.6.7 A total of two positive effects:

- **Very Low** (water changes from compensation flow), and
- **Very Low** (additional flow to watercourses).

1.6.8 Water temperature changes from water transfer were predicted to have no impact, therefore significance effect was Very Low (likely negligible).

1.6.9 Mitigation Proposals have been developed with input from [redacted] of the University of Glasgow who is a recognised expert in the field of freshwater ecology specialising in Arctic Charr.

1.6.10 Mitigation of the negative effects on spawning and habitat loss within the watercourses and around the shoreline of the reservoirs would be provided by proposed new spawning habitat creation at the Moy Burn and the upper sections of the Pitridh aqueduct diversion channel which will both be above the maximum inundation level of the lower reservoir and accessible to spawning fish. The new channels will contain optimal spawning substrates to benefit both tributary spawning Arctic charr, if present, and Brown trout.

1.6.11 Marginal loch spawning habitat would be provided through the creation and maintenance of suitable areas of substrate just below the minimum reservoir drawdown level. These areas would contain optimal spawning substrate types for both Arctic charr and Brown trout; current spawning opportunity on loch margins is considered low due to existing depleted drawdown zones, thus presenting an opportunity for enhancement. Management provisions would be put in place to ensure that the habitat was kept clear of deleterious sediments.

1.6.12 Further mitigation of spawning and habitat loss around the shoreline of the reservoirs will be considered through providing floating / suspended habitats, to replicate shoreline margins, which may be utilised for spawning within the reservoirs under fluctuating water levels.

1.7 Effect on Terrestrial Ecology

1.7.1 The potential effects of the Proposed Development on designated sites (selected for non-avian, terrestrial ecology features), terrestrial habitats, and non-avian terrestrial species, during construction and operation have been assessed.

1.7.2 A locally significant effect was identified for the loss to inundation of a 5.35 ha strip of habitat mapped on the Ancient Woodland Inventory (AWI), which was found to support scattered mature trees on purple-moor grass dominated vegetation, comprising remnant ancient woodland in poor condition.

1.7.3 Significant adverse residual effects from habitat loss have been identified during construction for: blanket bog and modified bog including montane bog (at the County to national level); montane willow scrub (at the national level); unimproved calcareous grassland, base-rich marshy grassland, upland species-rich ledges, montane heath / dwarf herb, basic flush and bryophyte-dominated spring (at the County level); semi-natural woodland, wet and dry dwarf shrub heath, unimproved acid grassland, acid / neutral flushes and watercourses (at the local level).

1.7.4 Significant adverse residual effects have been identified at the local level upon invertebrates and reptiles, due to habitat loss during construction. Once embedded and best practice mitigation has been applied, including protected species licensing where required, non-significant residual adverse effects have also been identified upon water vole, otter, bats, red squirrel and pine marten.

1.7.5 All of the effects during construction would be compensated for through habitat works and species-specific habitat features, delivered via a Biodiversity Environmental Management Plan (BEMP). Additional to the compensation proposed, further significant environmental enhancement would be implemented with the woodland restoration / creation, montane willow scrub and other montane habitat restoration, heathland enhancement and positive management of a range of other upland habitats via deer control, as well as the provision of bat, red squirrel and pine marten boxes, which would be delivered via the BEMP.

1.7.6 With the implementation of continued best practice measures, no significant negative effects are predicted during the operational phase.

1.7.7 No potentially significant cumulative effects were identified.

1.8 Effect on Biodiversity - Ornithology

1.8.1 This assessment addresses impacts on ornithological biodiversity associated with the Proposed Development's effects on waterbodies and watercourses.

1.8.2 Three protected species, common sandpiper, black throated divers and red throated divers would be impacted by the effects of the Proposed Development on waterbodies and watercourses. With the mitigation proposed and the temporary nature of the disruption the Significance of Effect has been determined as ***Very Low***.

1.9 Effect on Economy

1.9.1 The economic effect of the proposed Earba Pumped Storage Hydro scheme (the Proposed Development) has been assessed in accordance with the SEPA Guidance Note WAT-SG-67.

1.9.2 The assessment has determined that the significance of the effect on the economy as a consequence of the Proposed Development is Positive High to Very High.

1.10 Effect on Health & Safety

1.10.1 The likely effects of the Proposed Development on the population in terms of human health and human safety has been assessed under the following categories:

- the risk of ill-health or disease;
- the risk of injury; or
- human well-being more generally.

1.10.2 The assessment concludes that the following effects would give rise to effects with the significances tabulated below.

Effect	Type of Effect	Magnitude of Effect	Importance of Effect	Significance of Effect
Ill Health or Disease				
Private water supplies	Negative	Very Small - Small	Medium	Very Low - Low
Hydrocarbon pollution	Negative	Very Small - Small	Medium	Very Low - Low
Risk of Injury				
Public / Construction interface	Negative	Small	Very High	Moderate - High
Water Hazards	Negative	Very Small	Very High	Low
Road Traffic Accidents	Negative	Very Small - Small	Very High	Low - Moderate
Human Well Being				
Disturbance to recreational access	Negative	Very Small	Medium	Low

1.11 Effects on Recreation

1.11.1 The assessment addresses only direct impacts on recreation and access, with those associated with visual amenity assessed in Chapter 11 on Visual Amenity and Landscapes.

1.11.2 The forms of public recreation known to take place within and around the site of the Proposed Development, and which have been assessed are as follows:

- Canoeing;
- Swimming;
- Angling; and
- Land based recreation including walking and running, mountaineering, rock climbing, cycling, backpacking, horse riding and caving.

1.11.3 The Proposed Development has the potential to impact upon recreational use and access within the proposed site and surrounding area. Most effects relate to construction disturbance and modifications to water discharges. Construction and operational disturbance would be managed by provision of the measures outlined in EIAR Appendix 15.1 – Draft Access Management Plan, which has been prepared in consultation with the Highland Council.

1.11.4 The most significant impacts on recreation and access during both construction and operation have been assessed as Low (for swimming) and Low (for canoeing the river Spean during filling of the Earba Reservoir only).

1.12 Effect on Well Being – Visual Amenity and Landscapes

1.12.1 The LVIA has identified that there would be localised significant landscape and visual effects occurring during the construction of the Proposed Development within an area around the Proposed Development up to around 3 – 4 km also affecting the Ben Alder, Laggan and Glen Banchor SLA and WLA 14: Rannoch – Nevis – Mamores – Alder. However, during operation, these effects would reduce and significant effects would become more localised, associated with the main permanent structures of the Proposed Development at the upper and lower reservoirs. Over time, and after 15 years, mitigation measures, including woodland planting proposed as part of the Proposed Development would lead to significant effects becoming further localised, mostly focussed around the Leamhain Dam and proposed upper reservoir, with some very localised effects to wild land characteristics around the Shuas Dam and powerhouse.

1.12.2 Although other elements of the Proposed Development, including operational drawdown would be perceptible, and in some cases more noticeable in the wider landscape, the overriding qualities of the surrounding landscape would remain present and these effects are not predicted to significantly change the existing characteristics of the landscape or lead to significant visual effects being experienced in the wider area.

1.12.3 By 15 years post construction, with the growth of proposed planting and other vegetation, the effect on the Ben Alder, Laggan and Glen Banchor SLA is predicted to be not significant. Whist localised significant effects are predicted for Wild Land Area 14; this is not predicted to lead to a significant effect on the Wild Land Area overall. No significant effects are predicted to the Special Landscape Qualities of the Cairngorms National Park.

1.13 Economic Opportunities for Disadvantage Groups

1.13.1 The effect of the Earba Pumped Storage Hydro (the Proposed Development) on economic opportunities of disadvantaged groups has been assessed in accordance with the SEPA Guidance Note WAT-SG-67.

1.13.2 The Construction stage of the project will provide around 500 employment opportunities for semi-skilled and skilled workers. The 6-year construction period is the focus of the assessment on opportunities for disadvantaged groups.

1.13.3 The Operational stage of the project will require around 20 skilled workers. The Authorised Person continues to explore training and educational opportunities for these skilled workers such that there would be a benefit to disadvantaged groups but this is ongoing and as such has been omitted from this assessment.

1.13.4 The assessment set out below has determined that the Proposed Development has a Positive effect of very low Significance relating to economic opportunities to disadvantaged groups.

1.14 Effects on Climate Change

1.14.1 The effect of the Earba Pumped Storage Hydro (the Proposed Development) on climate change has been assessed in accordance with the SEPA Guidance Note WAT-SG-67.

1.14.2 The assessment has determined that the Proposed Development has a Positive effect of Very High Significance on Climate Change.

1.15 Invasive Non Native Species (INNS)

1.15.1 The increased risk of the transfer of INNS has been assessed by SEPA and classed as high risk. Mitigation to substantially reduce this risk will be provided by preventing discharge from the upper reservoir into the downstream water course, the Allt Loch a' Bhealaich Leamhain.

1.15.2 Any rainfall within the upper Loch Leamhain catchment area, above reservoir level will be collected by a catchment transfer channel which will direct run off to the Allt Loch a' Bhealaich Leamhain which is immediately downstream of the Leamhain dam. This will ensure a continuous flow of water in the Allt Loch a' Bhealaich Leamhain without introducing an INNS transfer risk.

1.16 Summary & Draft Balancing Test

1.16.1 This Non-Technical Summary provides a summary of the CAR Licence Report for the Earba PSH scheme.

1.16.2 The Applicant acknowledges that SEPA must weigh up the positive and negative effects and make a recommendation based on the balance of these effects.

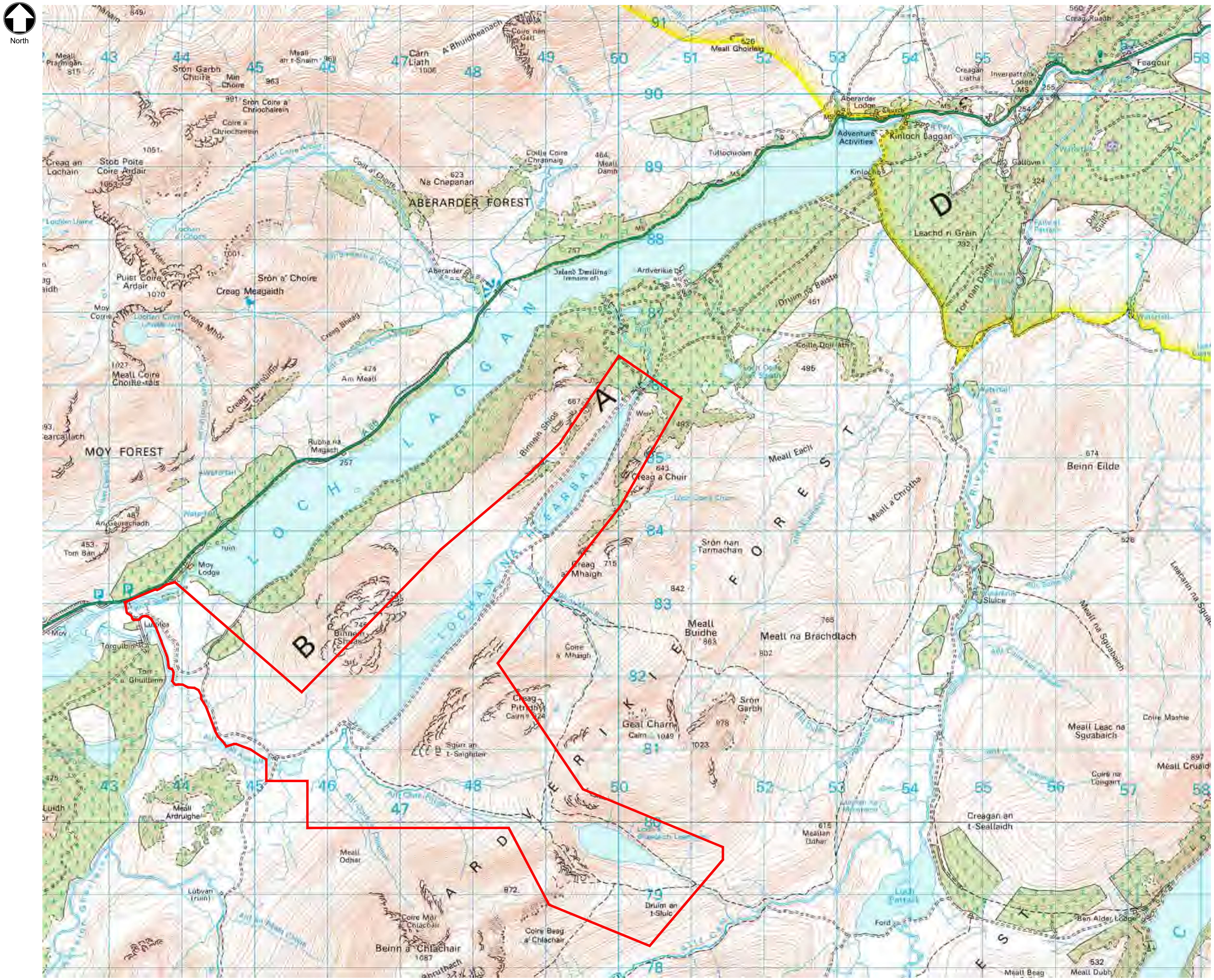
1.16.3 The Applicant has undertaken a draft balancing test and considers that the Proposed Development has positive benefits that outweigh those that are negative.

1.16.4 Further assessment was then done using a sensitivity analysis which involved assessing the implications of applying a best case and worst-case assumptions in relation to aspects of those effects which are uncertain. The effects that are classed as Moderate-High or greater are listed in the table below along with the results of the sensitivity analysis.

Effect	**Type of Effect**	**Significance of Effect**	**sensitivity analysis**
Loss of spawning habitat (waterbody)	Negative	Moderate-High	sensitive to uncertainties*
fluctuations in water level	Negative	High	insensitive to uncertainties
INNS	Negative	High	sensitive to uncertainties
Public / Construction interface	Negative	Moderate - High	sensitive to uncertainties
Additional flow to watercourses	Positive	Moderate-High	sensitive to uncertainties
Economy	Positive	High to Very High	insensitive to uncertainties
Climate Change	Positive	Very High	insensitive to uncertainties

1.16.5 The Very High positive effect on Climate Change was very robust when scrutinised in the sensitivity analysis and remained at Very High positive effect even with adjustment of associated factors used to determine the overall significance. This supports the conclusion that the very high positive effect on Climate Change is of a magnitude that concludes that the project has resulting greater positive benefits than negative.

Figures



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Supplied by: www.ukmapcentre.com

Plan
1:50,000 @ A3

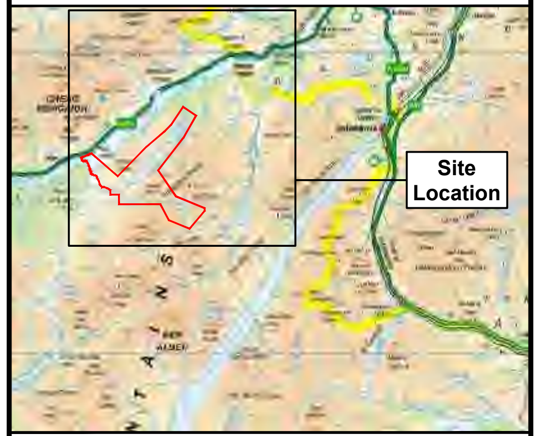
0 1.25km 2.5km

IF IN DOUBT - ASK

LEGEND

Planning Boundary

WIDER LOCATION PLAN



REV	DATE	DRAWN	NOTES	CHK'D	APP'D
P1	26.01.24	MH	FOR PLANNING	DT	GMcG

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CLIENT

EARBA STORAGE
A GILKES ENERGY COMPANY

PROJECT

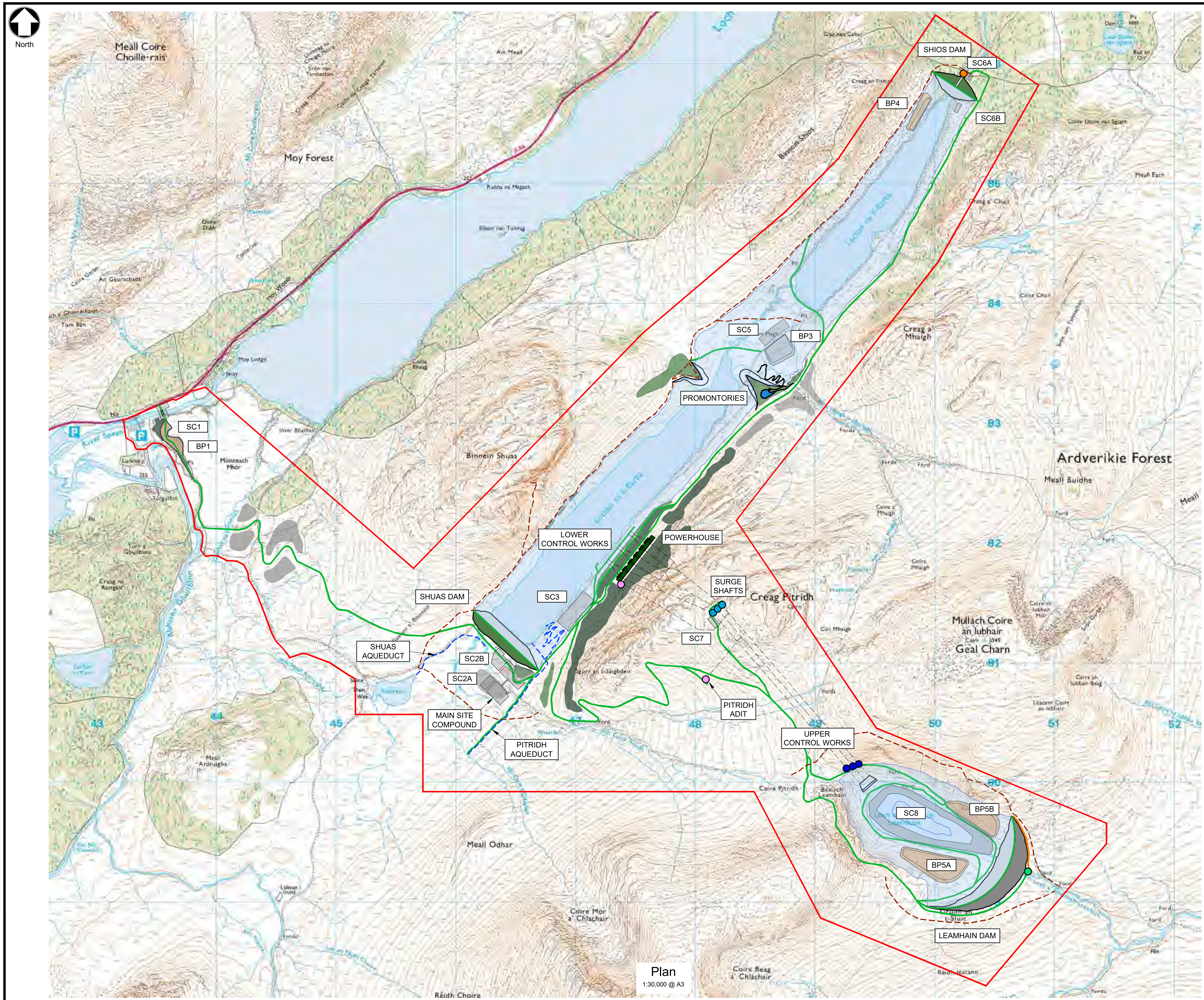
PROPOSED EARBA PSH

TITLE

LOCATION PLAN
FIGURE 2.1

SIZE	SCALE AT A3	STATUS
A3	1:50,000	PLANNING

DRAWING NUMBER	REVISION
EAR/GEL/001	P1



IF IN DOUBT - ASK

LEGEND

- Planning Boundary
- Inundation
- Dam
- Intake
- Surge Shaft
- Adit
- Shios Valve House and Fish Pool
- Leamhain Upper Gate House
- Leamhain Lower Valve House
- Tunnel
- Powerhouse
- Borrow Pit
- Compound
- Promontories
- Aqueduct / Diversion Channel
- Access Bridge
- PSH Track
- Estate Track / Footpath
- Leamhain Dam Spillway
- Loch a' Bhealaich Leamhain Proposed to be Drawn Down to +612m During Construction
- New Tree Planting - Riparian Mix
- New Tree Planting - Upland Mix
- Moy Burn Habitat

0 500m 1000m

REV	DATE	DRAWN	NOTES	CH'K'D	APP'D
P2	13.11.24	MH	CAR LICENCE SUBMISSION	DT	GMcG
P1	26.01.23	MH	FOR PLANNING	DT	GMcG

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PROJECT

PROPOSED
EARBA PSH

TITLE

SCHEME ARRANGEMENT
FIGURE 2.2

SIZE	SCALE AT A3	STATUS
A3	1:30,000	PLANNING

DRAWING NUMBER	REVISION
EAR/GEL/002	P2