

EARBA STORAGE

A GILKES ENERGY COMPANY

Earba Pumped Storage Hydro Scheme EIA Report

Appendix 4.5: Gate Check 1 Report Part 2 of 3

February 2024



Appendix 2 – The Proposed Development

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2. The Proposed Development

2.1 Introduction

- 2.1.1 This chapter describes the principal components of the Proposed Development. It also describes the anticipated construction methodology, together with the outline programme for its construction. An overview of the operational and decommissioning phases of the development is also provided. The location of the Proposed Development is shown in **Figure 2.1 – Location Plan** and its general arrangement is shown in **Figure 2.2 – Scheme Arrangement** and **Figure 2.3 – Scheme Arrangement Aerial View**.
- 2.1.2 The function of the Proposed Development would be to create a large-scale long duration electricity storage scheme with up to 1800MW generation capacity to store and release energy to or from the electricity transmission system, to help balance supply and demand for power at a national scale. 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 by an underground waterway system including up to three headrace tunnels.

2.2 Site Description

- 2.2.1 The Proposed Development would be situated within Ardverikie Estate “the Estate” to the south of Loch Laggan approximately mid-way between Newtonmore and Spean Bridge.
- 2.2.2 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 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.
- 2.2.3 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 and Lochaber Hydro Schemes.

2.3 Scheme Operation

- 2.3.1 The Proposed Development would be operated either in ‘generating’ mode or in ‘pumping’ mode. Generating mode is when electricity would be produced by releasing water from the upper reservoir through the reversible pump turbines and into the lower reservoir. Pumping mode is when electricity would be used to pump water through the reversible pump turbines from the lower up to the upper reservoir. The generating capacity of the scheme would be up to 1800 MW, with enough storage with the upper reservoir full to generate for approximately 22 hours at this capacity (a storage capacity of 40 GWhr).

2.4 Site Selection

2.4.1 Pumped storage hydro for long duration electricity storage requires a site with the following attributes:

1. Suitable topography to be able to create an upper and lower reservoir, either by altering the level of an existing waterbody or by creating a new one;
2. As high as possible an elevation difference between the upper and lower reservoirs;
3. As short as possible distance between the upper and lower reservoirs;
4. Suitable geological conditions;
5. Practicable access to the electricity transmission network;
6. Practicable access to the site;
7. The minimum number and impact of any effects on the natural environment from construction and operation of the scheme; and
8. The minimum number and impact of any effects on other uses of the site from construction and operation of the scheme.

2.4.2 The Proposed Development scored highly on these attributes compared with others considered within the UK.

2.4.3 Compared with the existing pumped storage hydro schemes in operation in the UK and those already in the planning system, the Proposed Development would have the highest energy storage capacity and would effectively double the UK's existing energy storage capacity. This is illustrated in Chart 1.1 below.

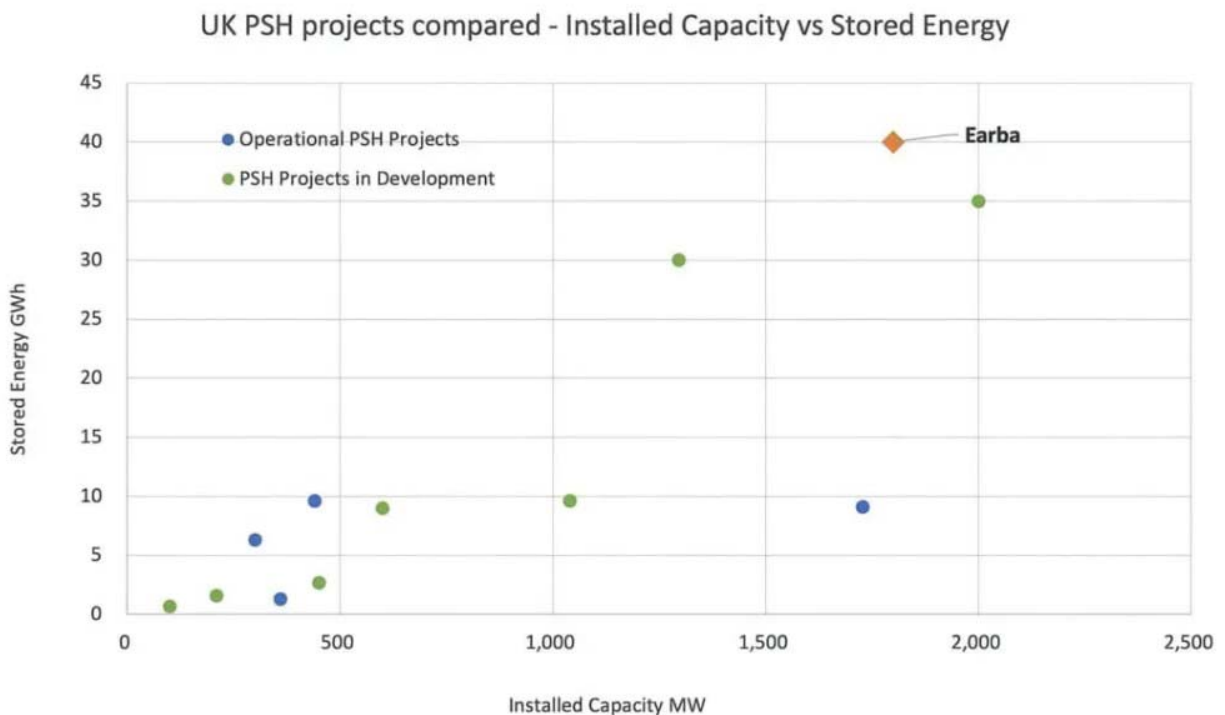


Chart 1.1 – PSH Projects Compared

2.5 Scheme Description

2.5.1 The principal components of the Proposed Development would be:

- The Leamhain Dam and Upper Reservoir
- The Shuas and Shios Dams and Lower (Earba) Reservoir
- The Underground Waterway System and Associated Structures
- The Powerhouse and Substation
- The Pitridh and Shuas Aqueducts
- A new junction off the A86 and bridge over the River Spean / Moy Channel
- Access Tracks and Footpaths
- Temporary Construction Facilities and Borrow Pits
- Areas of Ecological Compensation and Enhancement

The Leamhain Dam and Upper Reservoir

2.5.2 A rockfill dam would be constructed just below the outflow of Loch a' Bhealaich Leamhain to create a 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 plan, sections and finishes of the dam are shown in **Figure 2.4 – Leamhain Dam GA**.

2.5.3 The dam would be a concrete or asphalt faced rockfill dam. The material for the dam would be quarried from borrow pits within the reservoir drawdown footprint. The faces of the dam will be at an approximately 1:1.5 gradient. The upstream face would have an impermeable membrane of concrete or asphalt. The downstream face would be rockfill.

2.5.4 The dam would have an access road across the crest, together with other facilities including a bottom outlet valve house for passing water past the dam if required and facilities for the release of compensation flows to the watercourse downstream, reached by an access track around the toe of the south side of the dam. There would also be a concrete-lined spillway down the north side of the dam to accommodate the emergency discharge of over-pumping flows in the highly unlikely event of a multiple failure of pumping control systems.

2.5.5 During construction of the dam and associated facilities, Loch Leamhain would be temporarily partially drained to the level 612m AOD. This would offer significant benefits for silt and drainage management during construction and allow for working areas and some of the borrow pits for the dam construction to remain below the final low water level in the reservoir, by reducing the requirement for these facilities to be in otherwise undisturbed montane peatland areas. Dewatering of the loch during the construction period would be maintained by means of over-pumping from the loch to the Allt Loch a' Bealaich Leamhain, while using best practice in drainage and silt control management.

The Shuas and Shios Dams and Lower (Earba) Reservoir

2.5.6 Two earthfill or rockfill 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.

- 2.5.7 The north-eastern dam, the Shios Dam, shown in **Figures 2.6 – Shios Dam GA** is relatively constrained in its location by the existing dam and local topography. The 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. There would be some flexibility in the final design of the profile of the dam to alter it to improve its setting in the landscape.
- 2.5.8 The Shios dam would be constructed from materials won from the construction of the powerhouse and tunnels, supplemented by material from local borrow pits.
- 2.5.9 For the existing Ardverikie hydro scheme there is currently no requirement to release any hands-off flow to the Allt Labhrach, but it is expected that this would be required by SEPA for the Earba PSH scheme. The dam will include facilities for the release of this flow. It will also incorporate a mechanism for releasing water to the existing 1MW Ardverikie hydro scheme, which will remain in operation. These will include a valve house at the toe of the dam. The dam will have a spillway for the safe passing of any flood flows.
- 2.5.10 The southwestern dam, the Shuas Dam, shown in **Figure 2.5 – Shuas Dam GA**, will be located at or close to the SW end of Loch Earba. This location has been selected based on preliminary ground investigation, the avoidance of areas of peatland and other ecological sensitivities to its south-west, the setting of the dam within the landscape, and construction logistics considerations. Whilst preliminary geotechnical investigations already carried out give reasonable confidence on the dam location, the final micro-siting of this dam would be based on further detailed ground investigations prior to commencing construction. A micro-siting allowance of up to 50m to the southwest and 100m to the northeast of the indicated location is requested.
- 2.5.11 The Shuas Dam would be an earthfill 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. There is some flexibility in the final design of the profile of the dam to alter it to improve its setting in the landscape.
- 2.5.12 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 as shown in **Figure 2.2 – Scheme Arrangement**.

Underground Waterway System

- 2.5.13 The underground waterway system, shown in **Figure 2.2 – Scheme Arrangement**, would include:
- Intake/outfall arrangements including screens and isolation gates at the northern end of the Leamhain Reservoir – the upper control works;
 - up to three tunnels connecting the Leamhain Reservoir to the Powerhouse;
 - up to three surge shafts on the upper flank of Creag Pitridh;
 - an access adit tunnel from Coire Pitridh to approximately the mid-point of the tunnels to facilitate access for tunnel construction on multiple fronts and for maintenance access;
 - Tailrace tunnels between the powerhouse and the Earba Reservoir;

- Access tunnel(s) from the powerhouse area; and
- Intake/outfall structures including screens and isolation gates on the East shore of the Earba Reservoir – the lower control works.

Leamhain Reservoir Upper Control Works

- 2.5.14 Up to three intake/outfall structures located side by side at the NW end of Loch Leamhain would feed up to three headrace tunnels carrying water between the upper and lower reservoirs, through the powerhouse. The intakes would be reinforced concrete structures, largely below the reservoir operational low water level. Flows through the intakes would be reversible, depending on whether the scheme was pumping or generating. The intakes would incorporate screens with a small bar spacing to prevent debris and fish from entering the underground waterway system, and a maximum approach velocity limit of approximately 0.3 m/sec in front of the screens. Access to the screens for maintenance would be with the reservoir at its lowest operating level.
- 2.5.15 A shaft would connect each tunnel to the surface, approximately 200m back from the outfall screens. These shafts would contain hydraulic gates for the isolation of the tunnels. The gatehouses would be semi-buried, set into the hillside, with access from the downslope side facing the Leamhain Reservoir. This would reduce the visual impact of the gatehouses from the popular walking routes close to this location.

Headrace Tunnels

- 2.5.16 Each tunnel would be up to approximately 10m in internal diameter and fully lined with concrete or steel. As the tunnels approach the powerhouse they will split so that one tunnel continues to each of the powerhouse shafts. There are various options for the vertical alignment of the tunnels and for construction access to them, all of which are covered by the infrastructure and temporary works described in this document. Material from construction of the tunnel systems will be used in the construction of the dams.

Surge Shafts

- 2.5.17 Surge shafts would connect each tunnel to the surface to provide relief for transient pressures within the tunnels during operation. The size and top level of the surge shafts is dictated by the hydraulics of the tunnels, which in turn drives the location of the surge shafts to where there is sufficient elevation. Each surge shaft would be up to 15m diameter at the surface. The surge shafts would be located on the flank of Creag Pitridh. At the surface there would be a concrete wall approximately 2.5m high around each surge shaft to provide security against personnel falling into the shafts.
- 2.5.18 It is planned to construct the surge shafts with a raise boring technique which leaves the excavation arisings in the tunnel at the bottom of the shaft to be transported out through the low-level tunnels. This reduces the transport of excavated material from the top of the shafts, and consequently the scale of access track and site establishment required there.

Coire Pitridh Access Adit

- 2.5.19 An intermediate tunnel adit in Coire Pitridh would provide access to approximately the mid-point of the tunnels. This would allow access for construction of the tunnels

to proceed on multiple fronts concurrently. The adit would be retained for any future access and maintenance works in the tunnels.

Tailrace Tunnels

- 2.5.20 At approximately 100m long the tailrace tunnels would connect each pump turbine to the lower control works in the Earba Reservoir. These tunnels would be concrete lined.

Earba Reservoir Lower Control Works

- 2.5.21 The lower control works would need to accommodate flows into and from the powerhouse, depending on whether the scheme is operating in pumping or generating mode.
- 2.5.22 The lower control works would comprise up to six concrete inlet / outlet structures positioned side by side at the end of the tailrace tunnels. These structures would house the necessary screen arrangements and be shaped to smoothly channel the water in and out of the Earba Reservoir at low velocities.
- 2.5.23 The tailrace tunnels and lower control works would be below the normal Earba Reservoir minimum operating water level. The top of the structure would be just visible when the reservoir is at its lowest operating level. The tailrace screen frontage would be approximately 200m long and 18m in depth, below lowest operating level.
- 2.5.24 The tailrace tunnels would be provided with hydraulic gates for isolation of the tunnels from the reservoir during some maintenance activities. The gates would be connected to the ground surface by shafts, each with a hoist chamber at the top to house the operating mechanisms for the gates. The gate hoist chambers would be set below ground level.
- 2.5.25 The majority of construction at the lower control works would take place in dry conditions using drill, blast, muck and haul techniques. The tailrace tunnel portals would be formed in an excavation behind a natural cofferdam of unexcavated material to minimise the amount of underwater construction work. Part of the excavation of the tailrace tunnels is likely to commence from this excavation.
- 2.5.26 The tailrace structures would require screens for the exclusion of fish and debris, likely to be vertical bar screens with a 12mm spacing and a maximum approach velocity limit of approximately 0.3 m/sec in front of the screens.
- 2.5.27 A hardstanding area would be provided to allow for access to and cleaning of the screens and maintenance of the lower control works.
- 2.5.28 Landscape mitigation, including mounding, planting and other screening would be provided to minimise visual impact.

The Powerhouse and Substation

- 2.5.29 The powerhouse, located by the shore of Loch Earba, would comprise a series of up to six shafts approximately 70m deep. These shafts would be sunk from a floor level of 377m AOD in a benched cutting on rock excavated approximately 25m below the sloping hillside, as shown in plan in **Figure 2.7 - Powerhouse Site Plan** and in section in **Figure 2.8 – Powerhouse Section**. 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. The architectural arrangement of the powerhouse will be presented in the EIAR.

- 2.5.30 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 ground level and so screening it from views along the Earba glen. Other landscaping mitigations would include native woodland planting around the powerhouse such that it is enclosed within a wooded area located on the surrounding landform between 390 – 420m AOD, well above the sunken powerhouse platform. Further details of the preliminary architectural design of the powerhouse will be presented in a Design and Sustainability Statement to accompany the EIAR.
- 2.5.31 An indoor electrical switchyard with a plan footprint of approximately 150m x 50m would be required to the north end of the Powerhouse. The ground level of the switchyard would be the same as that for the Powerhouse, on the sunken platform with screening by native woodland planting on the higher existing ground around it.
- 2.5.32 The Developer has accepted a Grid Connection Offer from National Grid. The powerhouse would be connected to the national electricity network by a buried cable between the powerhouse switchyard and a new substation located adjacent to the Beaully Denny overhead powerline at Kinloch Laggan. The switchyard, buried cable and sub-station would be constructed by the Transmission Network Operator, SSE Networks, and they would be responsible for any planning consents required for the cable and sub-station. The grid connection would be covered by a separate planning application so consideration of the environmental effects associated with it will not be considered in this Section 36 Application and supporting EIA Report.

Pitridh Aqueduct

- 2.5.33 An aqueduct with a number of intakes would pick up flows from the watercourses Allt Coire Pitridh and Allt Corie a’ Chlachair to divert them around the Shuas Dam into the Earba Reservoir.
- 2.5.34 The intakes would be low profile stone and concrete structures with local boulders on the downstream faces. Facilities would be provided for the release of hands off flows.
- 2.5.35 The aqueduct would be an open trapezoidal channel up to approximately 5m wide and 2-3m deep, lined with local boulders to maintain a semi natural appearance similar to the existing Allt Coire Pitridh burn.

Shuas Aqueduct

- 2.5.36 Although flows up to a 1:1,000 year return flow + 20% climate change event from the Allt Coire Pitridh and Allt Corie a’ Chlachair would be diverted to the Earba Reservoir via the Pitridh Aqueduct, higher flow events than this would spill down the original watercourses below the diverted burns and into the area to the southwest of the Shuas Dam. In addition, there would be a flow from the small direct catchment for this area, as well as any hands-off flows from the Pitridh and Chlachair burns. Because the Earba Dam would be blocking the original outlet of these watercourses to Loch Earba, an alternative drainage outlet would be required. It is proposed to

construct a new buried piped water conduit – the Shuas Aqueduct – and divert any flows to this area through this into the small reservoir to the west of this area, which in turn drains to the Abhainn Ghuilbinn.

- 2.5.37 The aqueduct would comprise an intake structure feeding a buried pipeline.

Access Tracks and Footpaths

- 2.5.38 Access roads would be provided for the construction of the Proposed Development and for operational, maintenance, and emergency access.
- 2.5.39 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. All of the permanent tracks would be reduced in width after completion of construction.
- 2.5.40 Safe access for recreational users will be maintained throughout the construction and operation of the Proposed Development. Where existing routes are altered by inundation or new structures, alternative routes would be provided, with these in place before the original routes are affected by construction.

Junction with the A86 to Site Entrance Compound SC1

- 2.5.41 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 new junction will include a new bridge over the River Spean / Moy Channel – the existing bridge is unsuitable – and would lead directly into a site entrance compound area (SC1). The original junction and bridge would be retained for use by Corrour Estate traffic and by recreational pedestrians and cyclists.

Site Entrance Compound to Main Compound SC2 at Loch Earba

- 2.5.42 Access from the site entrance compound (SC1) to the main compound (SC2) at Loch Earba would initially follow the line of the existing track, which will be widened and strengthened. Some localised realignment may be necessary at bends.
- 2.5.43 Approximately 1.5km from the A86, the track would diverge to the north of the existing track alignment to mitigate potential disturbance to a number of sensitive ornithological sites. The original track would however be retained for pedestrian and cycle access, and for Estate access to Lubvan, with new links to the existing path in Coire Pitridh and the proposed new access track on the north shore of the Earba Reservoir.
- 2.5.44 Material to construct the track between the site entrance compound SC1 and the main compound SC2 at Loch Earba would be won from the existing borrow pit (BP1) adjacent to the site entrance compound.

Earba Reservoir and Powerhouse

- 2.5.45 New permanent tracks out with the dam and reservoir footprints would be constructed for both construction and operational access. The track along the south

shore of Loch Earba would also give access for construction of the buried grid connection cables which would be laid adjacent to this track. The existing track along the south shore of Loch Earba would be retained for construction use until it becomes inundated by filling of the reservoir.

- 2.5.46 A new landrover track would be constructed along the north shore of Loch Earba, above the level of the proposed reservoir inundation. This would be used for recreational access along Loch Earba during the construction period when the south shore track would be busy with construction traffic. During operation of the Proposed Development, this track would become part of a circular cycling/walking route around Loch Earba. It would also be used by the Estate for land management purposes. A mountain footpath would be constructed from this track up to the base of the Binnein Shuas cliffs to improve access for rock climbers.

Leamhain Reservoir Access

- 2.5.47 A new track would be constructed between the west end of Loch Earba and Loch Leamhain. This would incorporate a branch to the surge shaft on Creag Pitridh. A track would also branch off the main dam access track at the Bealaich Leamhain to access the intake at the West end of Loch Leamhain. In Coire Pitridh the new track would be separated from the existing Munro access footpath.
- 2.5.48 The Leamhain Reservoir access track would be a two-way track, with the exception of the branch to the surge shafts, which would be single track with passing places in areas where the topography is unsuitable for a wider track.

Access Track Construction

- 2.5.49 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 main compound, all access tracks would have an unbound surface, i.e. not tarmacked.
- 2.5.50 The proposed widths of the access tracks are shown in Table 1 below.

Track Section	Construction Period Detail	Operation Period Detail
A86 Junction to the Powerhouse site	8m, generally cut, but with sections of floating construction over any blanket bog.	Reduced from 8m to 6m
Powerhouse site to Shios Dam, south side of Earba Reservoir	6m wide cut track	Reduced from 6m to 4m with passing places
North side of Earba Reservoir	3m wide cut landrover track	3m wide
Rock climber's access track to Binnein Shuas cliffs	1m wide mountain path	1m wide mountain path

Track Section	Construction Period Detail	Operation Period Detail
Walkers' path connecting the existing estate track at the small reservoir to the stalkers' path in Coire Pitridh	1m wide mountain path	1m wide mountain path
Adjacent to the Pitridh Aqueduct	3m wide cut track	3m wide
Shuas Dam crest track	n/a	3.5m wide
Shios Dam crest track	n/a	3.5m wide
Powerhouse site to Leamhain Dam (Leamhain Track)	6m wide cut track	Reduced to 4m with passing places
Leamhain track to surge shafts	6m wide cut track, reduced to 4m where constrained by topography	Reduced to 4m with passing places
Leamhain track to tunnel adit	6m wide cut track	Reduced to 4m with passing places
Leamhain track to Leamhain intake and reservoir	6m wide cut track	Reduced to 4m with passing places
Tracks within the Leamhain Reservoir drawdown zone	6m wide cut track	6m wide
Leamhain Dam crest track	n/a	3.5m wide
Leamhain Dam gatehouse access track	6m wide cut track within dam construction working area	Reduced to 4m wide

- 2.5.51 The alignment of tracks has wherever possible been designed to avoid areas of peat, but where this is not possible and the depth of peat is over 1m, floating road construction would be utilised. In all other areas the tracks would be constructed using cut track techniques.

- 2.5.52 Where appropriate, peat and soil from excavations on site would be utilised for reinstatement along both sides of the track verges and allowed to regenerate naturally. In areas where tracks would be more visible, for example traversing the flank of a hillside, these would be landscaped by bunding to the downslope side of the tracks.
- 2.5.53 Drainage of access tracks will be designed to the requirements of SEPA.

Footpath Construction

- 2.5.54 Construction details for the proposed temporary and permanent new footpaths, including signage, will be included in a Draft Access Management Plan

Mass Balance Strategy

- 2.5.55 A mass balance / spoil management strategy has been designed for the Proposed Development which would maximise the use of materials generated from within the site, using them in the construction of the permanent works. 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.
- 2.5.56 The following materials would be won from the site:
- Aggregates for the construction of access tracks;
 - Aggregates for the site manufacture of concrete (cement would need to be imported, as well as possibly some clean sand, if this cannot be sourced within the site);
 - Rock and earth fill materials for construction of the dams; and
 - Earth and peat materials for use in landscaping. This would include materials for the construction of the “landscaping peninsulas” on either side of the centre of the Earba Reservoir to replicate and maintain the existing natural and visual separation between the two Earba Lochs.
- 2.5.57 These materials would be generated from the following sources:
- Aggregates would be sourced from the powerhouse excavation, from the excavation of the underground waterway systems, and from a number of borrow pits;
 - Rock materials would be sourced from excavation of the underground waterway system and from a number of borrow pits;
 - Earth fill materials would be sourced from the powerhouse excavation and from removal of unsuitable material from the footprints of the dams; and
 - Only where necessary, peat will be taken from the footprint of the various structures.

Borrow Pits

- 2.5.58 Borrow pits would be established at the locations shown in **Figure 2.2 – Scheme Arrangement**. The precise locations would be subject to micro-siting following detailed ground investigations. Some preliminary ground investigation (GI) has however been carried out at these locations to establish the suitability of the materials for use in the works, the depth to rock where this is the desired borrow material, and the volumes of peat and other soils which would need to be temporarily stored before being used to restore the borrow pits on completion of extraction

operations. This GI has been used in developing the mass balance strategy. Borrow pits would be established at the following locations:

- Borrow Pit 1 (BP 1) - at the Moy Bridge area, adjacent to the proposed main site compound, based on enlargement of an existing borrow pit there. The material from this borrow pit would be used to construct the tracks up to Loch Earba and the powerhouse area and for the manufacture of concrete.
- Borrow Pit 2 (BP2) – Not Used.
- Borrow Pit 3 (BP3) - between the two existing Earba Lochs. Gravel material from this area which lies within the final inundation area would be suitable for track and dam construction and for the manufacture of concrete.
- Borrow Pit 4 (BP4) - Adjacent to the Shios Dam. Materials used in construction of the Shios dam.
- Borrow Pits 5A and 5B (BP5a and BP5b) - At the north and south of Loch Leamhain, within the proposed reservoir drawdown, materials used in construction of the Leamhain dam.
- The powerhouse excavation would effectively become a borrow pit for generation of aggregate and rock materials for use elsewhere within the works, mainly for the rockfill dams.

Site Accommodation

- 2.5.59 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 Arrangement**.
- 2.5.60 A Site Entrance Compound (SC1) would be established for the duration of the construction of the Proposed Development on an area over the Moy channel at the entrance point of the new access junction. This would be located on the area of wet heath, avoiding the blanket bog adjacent to this.
- 2.5.61 This compound would include the following facilities:
- Access security;
 - Site offices;
 - Parking for cars and lorries;
 - Laydown Areas; and
 - Wheel wash facilities.
- 2.5.62 The site entrance compound would be surrounded by an earth bund to screen the area visually and acoustically from neighbouring properties.
- 2.5.63 The main construction compound and accommodation camp (SC2) would be located in the area to the southwest of the Shuas Dam. The final arrangement for this would be developed during design development and procurement and would be agreed with the planning authority in advance of works on the Proposed Development commencing.
- 2.5.64 This compound would incorporate the following facilities:
- The main site offices and associated welfare facilities;
 - Temporary accommodation facilities for up to 600 people, including welfare and recreation facilities;
 - Workshop and internal storage facilities;
 - Parking;

- Laydown areas for materials deliveries;
- Plant storage areas;
- Facilities for power generation, water supply and waste treatment;

2.5.65 In the Loch Earba area, site compounds, materials handling areas and office and welfare facilities would be needed for construction of the two dams, the powerhouse and for access for driving the tunnels.

2.5.66 A small satellite compound would be required at the surge shafts location (SC7).

2.5.67 At the Loch Leamhain works satellite compound SC8 would be established within the proposed reservoir inundation area and the drawn down Loch Leamhain. This would accommodate materials handling areas as well as site accommodation, welfare and lay-down areas.

2.5.68 Areas within the footprint of the lower reservoir would have the disadvantage of becoming inundated as impoundment of this reservoir would commence before the rest of the construction and reinstatement works are complete. However, these areas would be restricted to materials handling areas and would be reinstated before impoundment.

Areas of Ecological Compensation and Enhancement

2.5.69 Areas for proposed habitat compensation and enhancement will be detailed in an Outline Biodiversity Enhancement and Management Plan.

2.6 Site Traffic

2.6.1 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.

2.6.2 An estimate of construction traffic generation and the potential effects of this on the local road network will be included in the EIAR.

2.6.3 During operation, the Proposed Development would be manned from the administration area inside the powerhouse. It is estimated that an average of 10 to 15 staff would require daily access to the site. Infrequent access by heavier vehicles for maintenance and refurbishment would occur as required.

2.7 Construction Programme and Working Hours

2.7.1 An outline programme for the Proposed Development will be provided with the EIAR.

2.7.2 It is anticipated that the construction and commissioning period would last approximately five to six years and 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.

2.7.3 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.

- 2.7.4 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.
- 2.7.5 Although it will be far enough away from any noise sensitive receptors so as not to cause any nuisance, any surface blasting on site would only take place between the hours of 09.00 to 17.00 on Monday to Friday inclusive and 10.00 to 14.00 on Saturdays, Sundays and on National Public Holidays, unless otherwise approved in advance in writing by the Planning Authority.
- 2.7.6 Underground operations and other agreed works that would continue to take place out-with normal surface working hours, would have management measures in place to ensure that any noise and lighting is mitigated for receptors above ground. The final CEMD, to be prepared by the appointed Principal Contractor, will include a Construction Noise and Vibration Management Plan (CNVMP) for construction activities, including blasting activities. This plan will also include measures that would be implemented during construction to ensure local receptors are not adversely affected by noise and measures for community liaison to advise on the timing and duration of blasting activities. The final CNVMP will be submitted to the Planning Authority for approval prior to the commencement of the Proposed Development.

2.8 Construction Environmental Management

Construction Environmental Management Processes

- 2.8.1 Construction mitigation and environmental protection measures would be managed through a suite of documents under the umbrella of a Construction Environmental Management Document (CEMD). An outline CEMD will be provided with the EIAR.
- 2.8.2 The Construction Environmental Management Document (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. The final site-specific CEMD would be drawn up by the Applicant, in consultation with the Highland Council (THC), Scottish Environment Protection Agency (SEPA), and NatureScot, once planning permission had been obtained and the main contractor appointed.

Ecological Clerk of Works

- 2.8.3 Construction will be supervised and monitored by specialist advisers including an Ecological Clerk of Works (ECoW) and an Ornithological Clerk of Works (OCoW) to ensure that sensitive ecological habitats and species are adequately protected in accordance with the methodologies in the CEMD and associated documents.

Micro-siting

- 2.8.4 There may be a requirement to microsite elements of the Proposed Development from the positions shown on **Figure 2.2 – Scheme Arrangement**, as a result of

additional constraints encountered during site works. Any micro-siting would require agreement of the specialist advisors (e.g. the ECoW) as appropriate.

Schedule of Mitigation

- 2.8.5 A schedule of mitigation will be included in the EIA Report, which will consolidate and cross reference all the suggested mitigation measures.

Site Environmental Management

- 2.8.6 The Construction Main Contractor would have overall responsibility for environmental management on the Site. The services of specialist advisors, such as the project ECoW and OCoW, would be retained as appropriate to be called on as required to advise on specific issues. The Main Contractor and the Applicant would ensure construction activities are carried out in accordance with the mitigation measures outlined in this EIA Report and those detailed in the approved CEMD.
- 2.8.7 Contractors would be required to adhere to the following in order to reduce or mitigate the environmental effect of the construction process:
- The requirements set out in this EIAR;
 - the conditions of any granted consent; and
 - relevant environmental regulations.
- 2.8.8 A copy of any conditions of consent and the CEMD would be incorporated into tender and contract documents and form part of the contract between the Applicant and the Main Contractor. The selection criteria for the Main Contractor would include their record in dealing proactively with environmental issues, and provision of evidence that they incorporate all environmental requirements into their method statements and thereafter implement these on site.

Site Reinstatement

- 2.8.9 Reinstatement would be undertaken as soon as practical following the construction works in each area.
- 2.8.10 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.
- 2.8.11 All construction equipment and other temporary infrastructure would be removed from site and the temporary storage areas would be reinstated.

2.9 Land Take

- 2.9.1 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.

2.10 Lighting

Construction Lighting

- 2.10.1 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.
- 2.10.2 The final CEMD, to be prepared by the appointed Principal Contractor, will include a detailed description of lighting requirements for construction activities and measures that would be implemented during construction to minimise illumination, glare or light spillage out with the Site boundary.

Operational Lighting

- 2.10.3 Once operational, external lighting would only be provided at key areas, such as the lower control works but 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.
- 2.10.4 The powerhouse surface building will be designed with automatic blinds on all glazed windows and doors, with these closed between dusk and dawn.

2.11 Electric Car Charging Point Strategy

- 2.11.1 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.

2.12 Project Operation and Maintenance

- 2.12.1 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 as follows:
- Daily visits to the powerhouse, intake and tailrace screens for routine operation and maintenance;
 - Weekly visits to the dams, for routine operation and maintenance;
 - Non-routine and scheduled major maintenance tasks would be carried out at longer intervals as required. These tasks could potentially extend to several weeks/months;
 - Periodic inspection of the underground tunnel works and dam structures; and
 - As-required maintenance of the access tracks and other infrastructure.

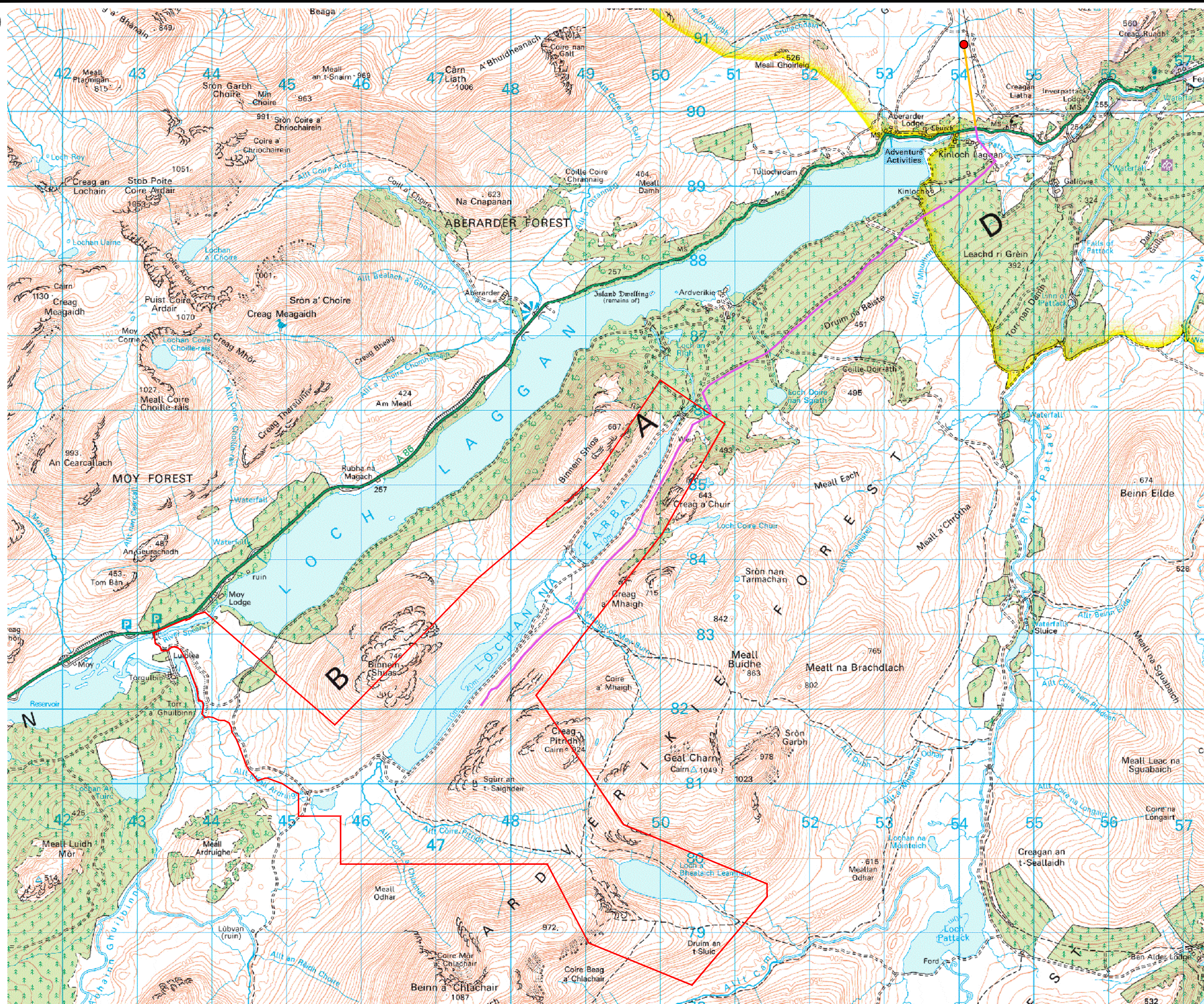
2.13 Project Decommissioning

- 2.13.1 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 as part of the EIA Report. If the Proposed Development ceases operation, decommissioning would take place and the site would be restored as follows:

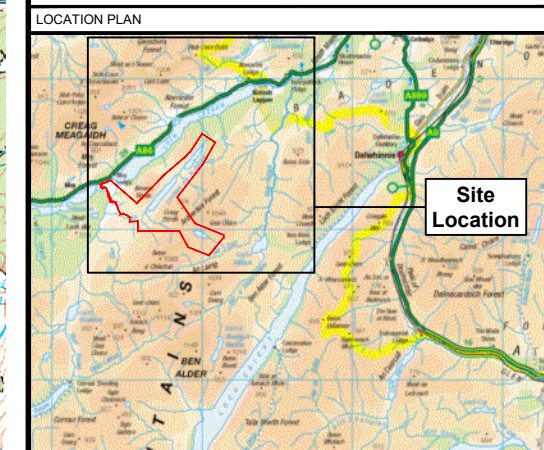
- Moveable infrastructure would be removed;
- Underground tunnels would be sealed;
- Generation plant would be removed;
- Where removal of infrastructure, for example the dams, would result in more damage than leaving in place, they would be left in-situ; and
- Disturbed ground would be reinstated.

Full details of the decommissioning plan would be agreed with the appropriate authorities and landowners prior to any decommissioning works commencing.



IF IN DOUBT - ASK

NOTES	
	Proposed Buried Grid Route (indicative)
	Proposed O/H Grid Route (indicative)
	Proposed Electrical Substation



P1	20.12.23	MH	FOR PLANNING	DT	GMCG
REV	DATE	DRAWN	NOTES	CH'K'D	APP'D
			FESTIVAL HOUSE 177 WEST GEORGE STREET GLASGOW G2 2LB UNITED KINGDOM T: 01539 720 028 E: info@gilkesenergy.com W: www.gilkesenergy.com		
CLIENT					
 A GILKES ENERGY COMPANY					
PROJECT					
EARBA PSH					
TITLE					
LOCATION PLAN					
SIZE	SCALE AT A3		STATUS		
A3	1:50,000		PLANNING		
DRAWING NUMBER					REVISION
FIGURE 1					P1

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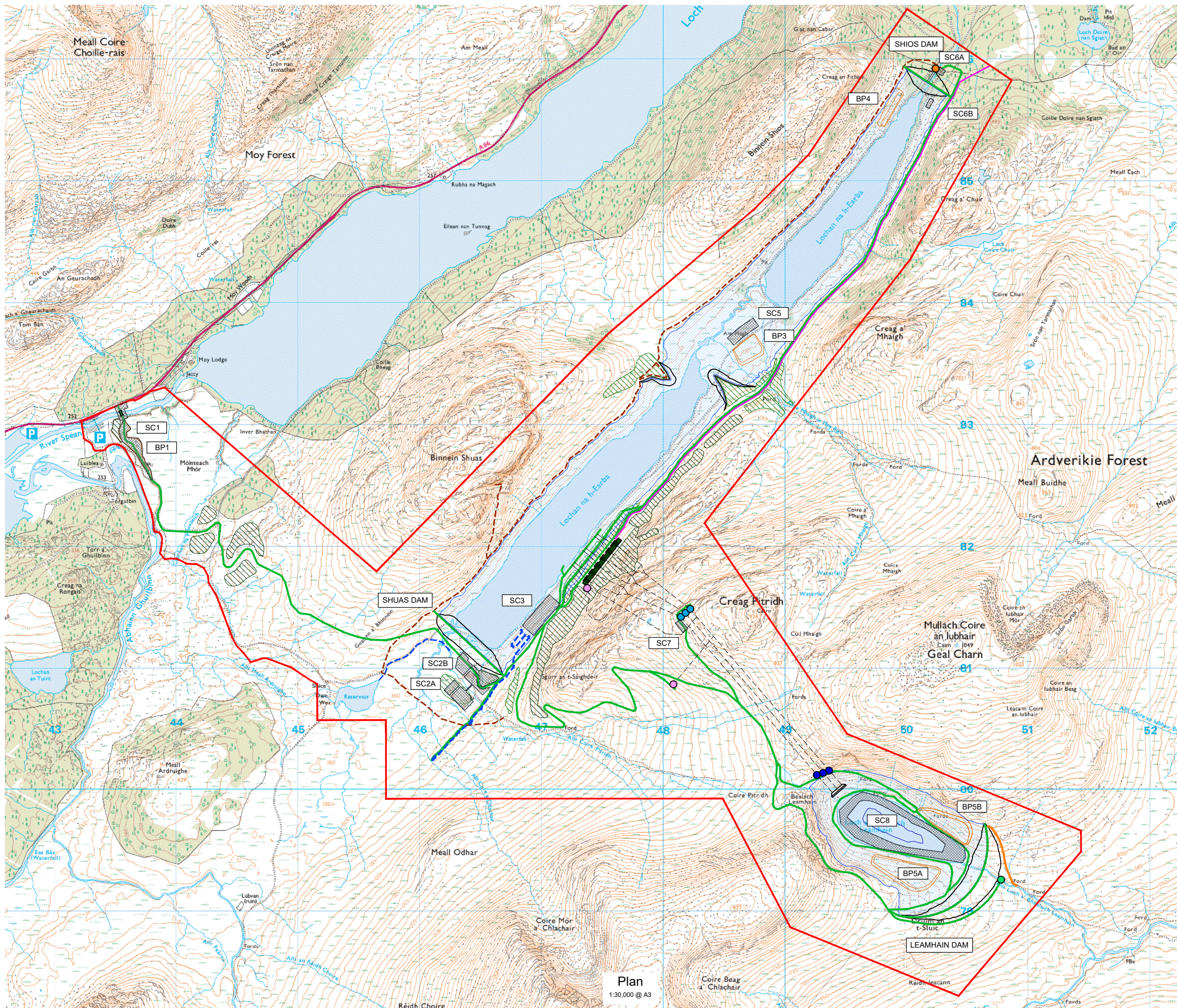
Plan
1:50,000 @ A3

0 1.25km 2.5km

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North



Plan
1:30,000 @ A3

IF IN DOUBT - ASK

NOTES

- Planning Boundary
- Proposed Inundation
- Proposed Dam
- Proposed Intake
- Proposed Surge Shaft
- Proposed Adit
- Proposed Shios Valve House and Fish Pool
- Proposed Leamhain Upper Gate House
- Proposed Leamhain Lower Valve House
- Proposed Tunnel
- Proposed Powerhouse
- Proposed Borrow Pit
- Proposed Compound
- Proposed Peninsula
- Proposed Aqueduct / Diversion Channel
- Proposed Access Bridge
- Proposed PSH Track
- Proposed Grid Route
- Proposed New Estate Track / Footpath
- Proposed Leamhain Dam Spillway
- Loch a' Bhealaich Leamhain Proposed to be Drawn Down to +612m During Construction
- New Tree Planting - Riparian Mix 1600 per ha
Total Area = 22.4ha
- New Tree Planting - Upland Mix 2000 per ha
Total Area = 46.7ha

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0 500m 1000m

P1	20.12.23	MH	FOR PLANNING	DT	GMCG
REV	DATE	DRAWN	NOTES	CHK'D	APP'D

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EARBA STORAGE
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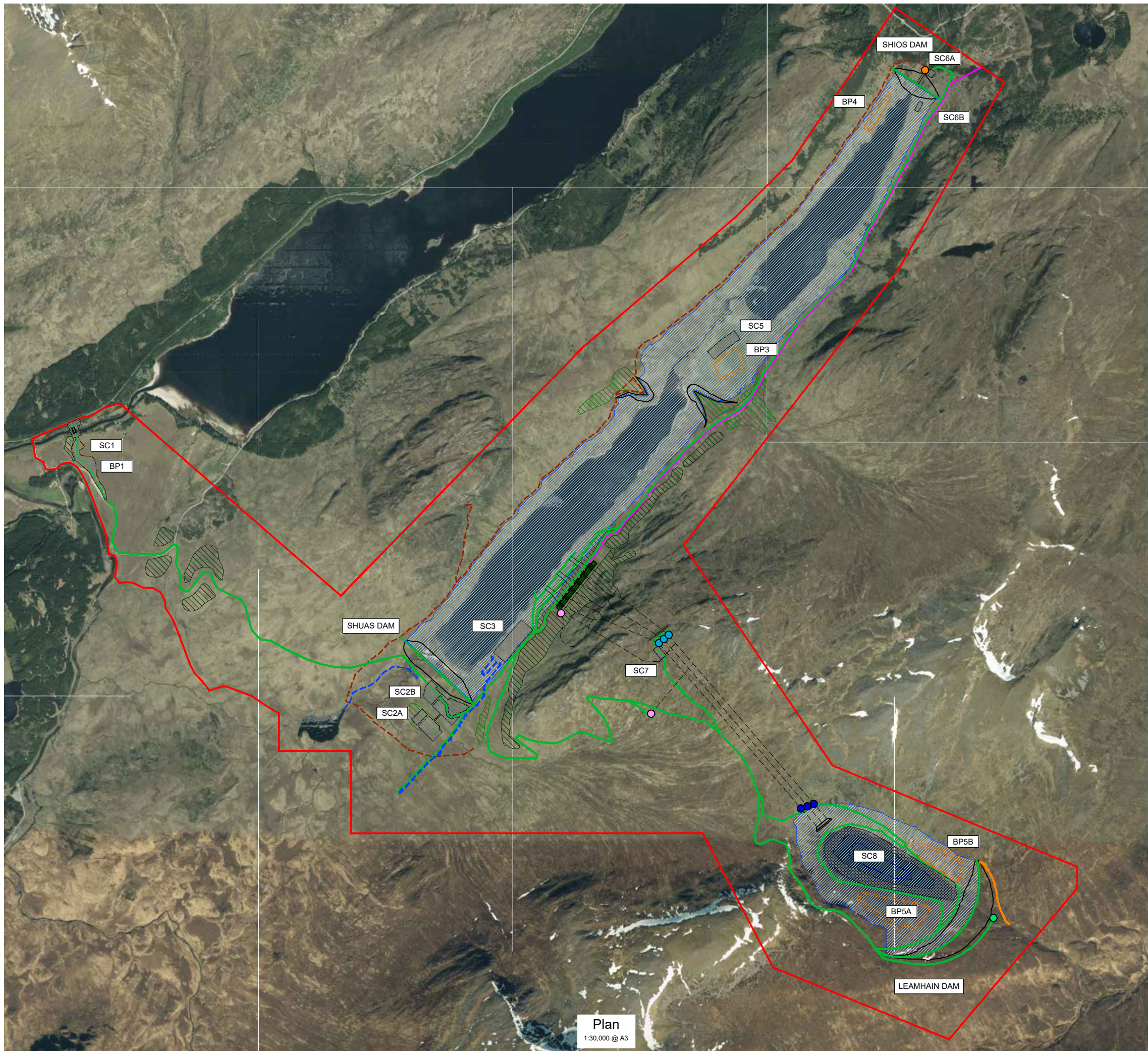
PROJECT

EARBA PSH

TITLE

SCHEME ARRANGEMENT

SIZE A3	SCALE AT A3 1:30,000	STATUS PLANNING	REVISION P1
DRAWING NUMBER	FIGURE 2		



IF IN DOUBT - ASK

NOTES

- Planning Boundary
- Proposed Inundation
- Proposed Dam
- Proposed Intake
- Proposed Surge Shaft
- Proposed Adit
- Proposed Shios Valve House and Fish Pool
- Proposed Leamhain Upper Gate House
- Proposed Leamhain Lower Valve House
- Proposed Tunnel
- Proposed Powerhouse
- Proposed Borrow Pit
- Proposed Compound
- Proposed Peninsula
- Proposed Aqueduct / Diversion Channel
- Proposed Access Bridge
- Proposed PSH Track
- Proposed Grid Route
- Proposed New Estate Track / Footpath
- Proposed Leamhain Dam Spillway
- Loch a' Bhealaich Leamhain Proposed to be Drawn Down to +612m During Construction
- New Tree Planting - Riparain Mix 1600 per ha
Total Area = 22.4ha
- New Tree Planting - Upland Mix 2000 per ha
Total Area = 46.7ha

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0 500m 1000m

P1	20.12.23	MH	FOR PLANNING	DT	GMcG
REV	DATE	DRAWN	NOTES	CHK'D	APP'D

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PROJECT

EARBA PSH

TITLE

SCHEME ARRANGEMENT
AERIAL VIEW

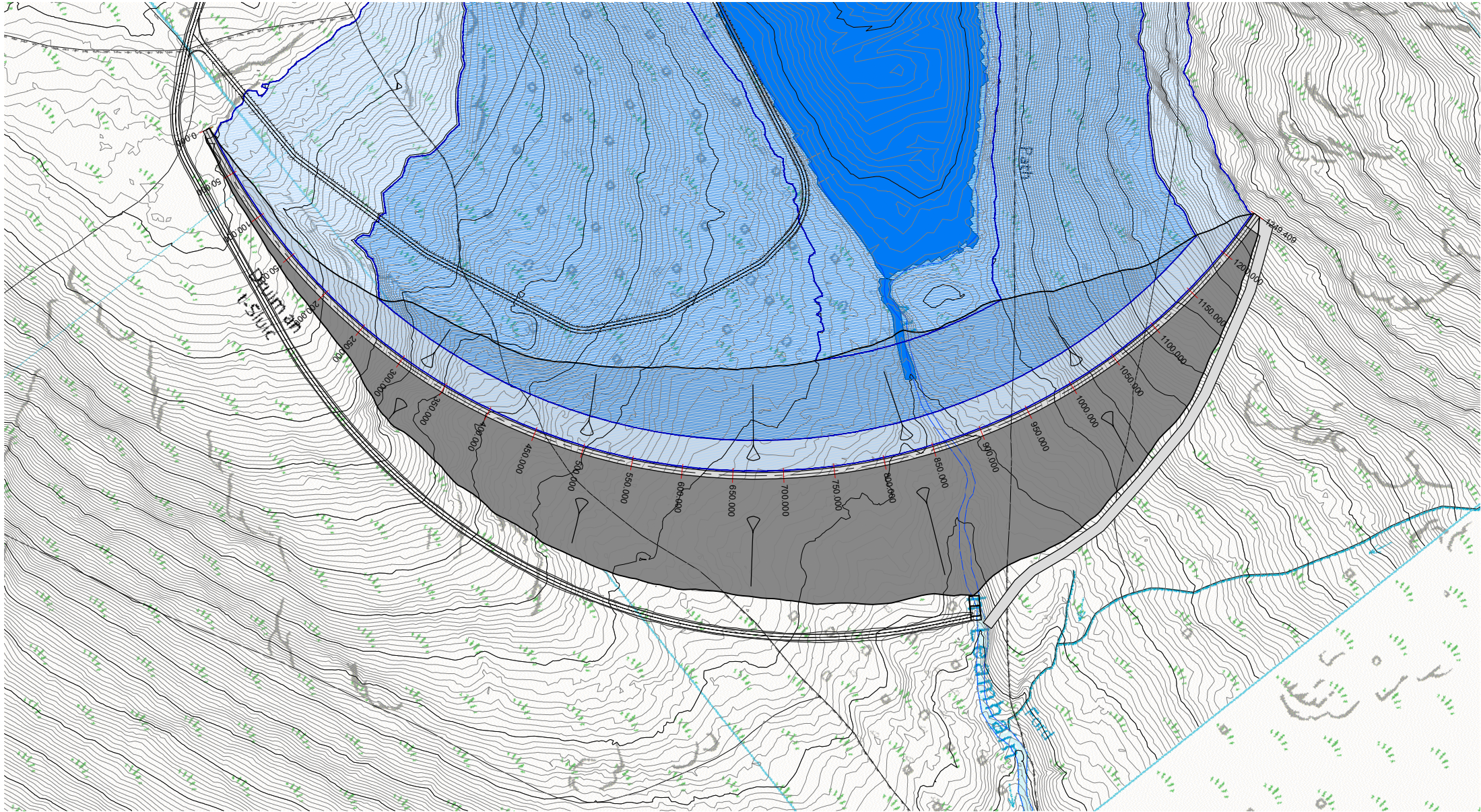
SIZE A3	SCALE AT A3 1:30,000	STATUS PLANNING	REVISION P1
DRAWING NUMBER	FIGURE 3		



IF IN DOUBT - ASK

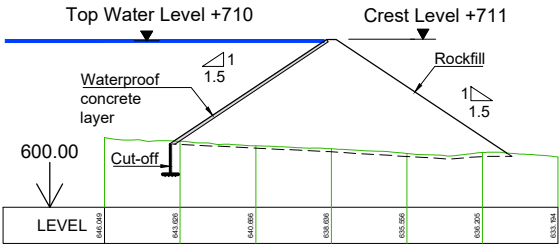
NOTES

- All levels are in metres above ordnance datum (mAOD).
- All dimensions are in metres unless otherwise noted.



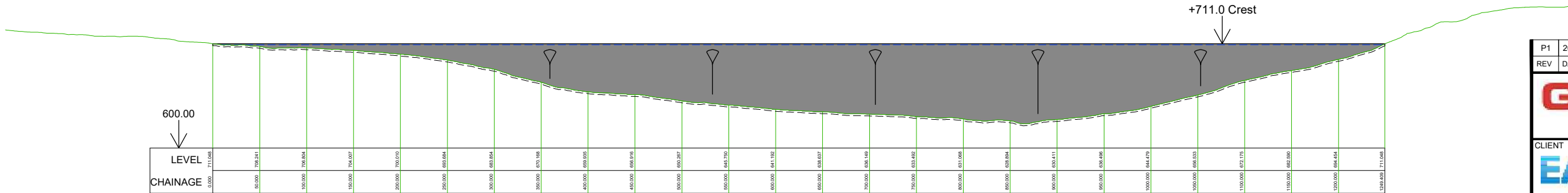
Plan

1:5000 @ A3



Dam Cross Section

Horiz: 1:5000, Vert: 1:5000 @ A3



Downstream Elevation

Horiz: 1:5000, Vert: 1:5000 @ A3

P1	20.12.23	MH	FOR PLANNING		DT	GMCG
REV	DATE	DRAWN	NOTES		CHK'D	APP'D
			FESTIVAL HOUSE 177 WEST GEORGE STREET GLASGOW G2 2LB UNITED KINGDOM T: 01539 720 028 E: info@gilkesenergy.com W: www.gilkesenergy.com			
CLIENT						
						
PROJECT						
EARBA PSH						
TITLE						
LEAMHAIN DAM GENERAL ARRANGEMENT SHEET 1						
SIZE	SCALE AT A3		STATUS			
A3	1:5000		PLANNING			
DRAWING NUMBER					REVISION	
FIGURE					P1	

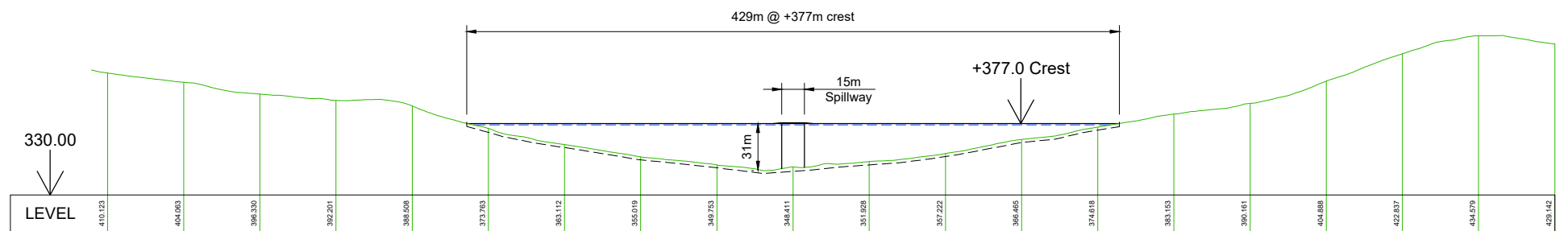
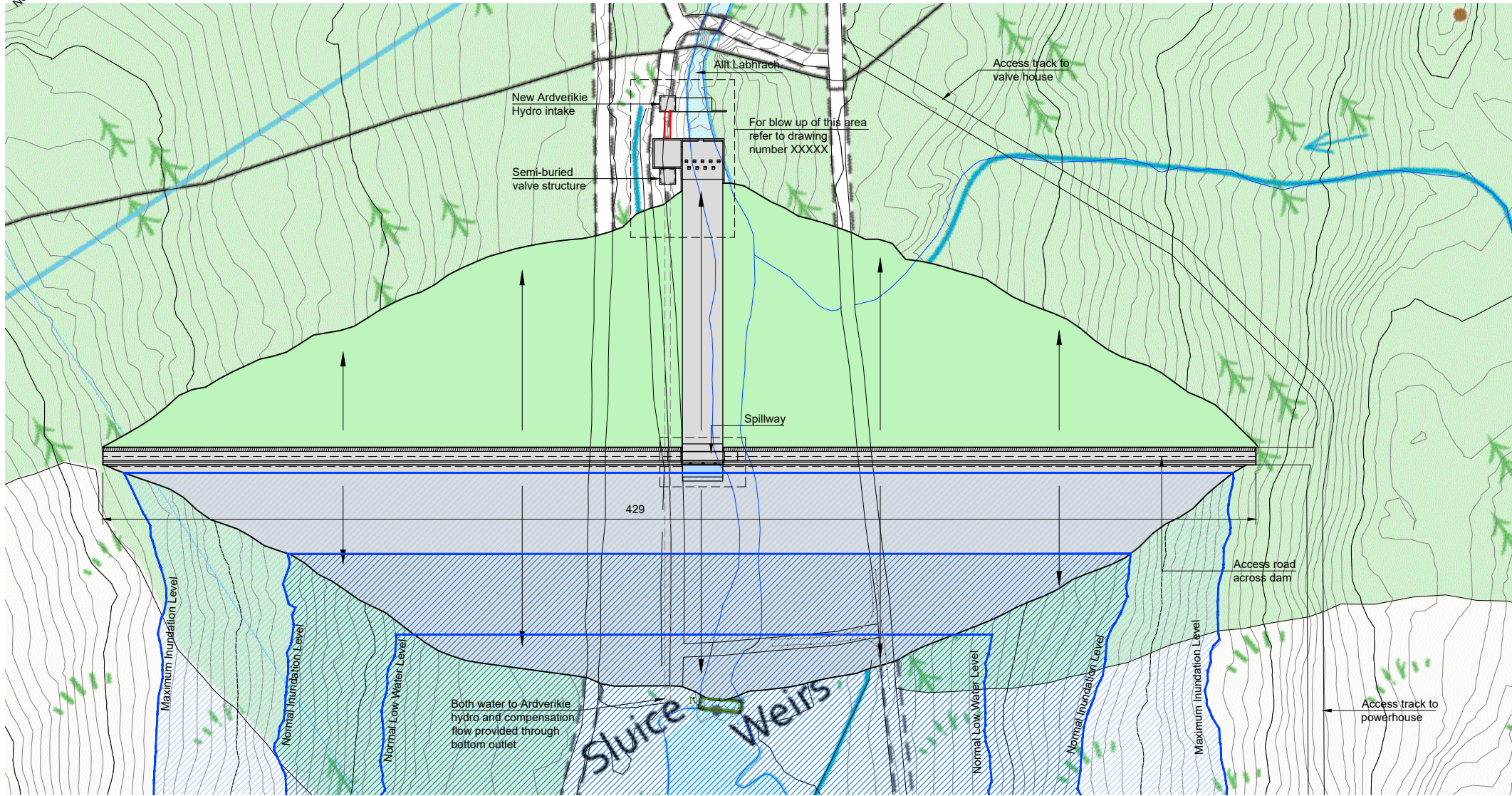
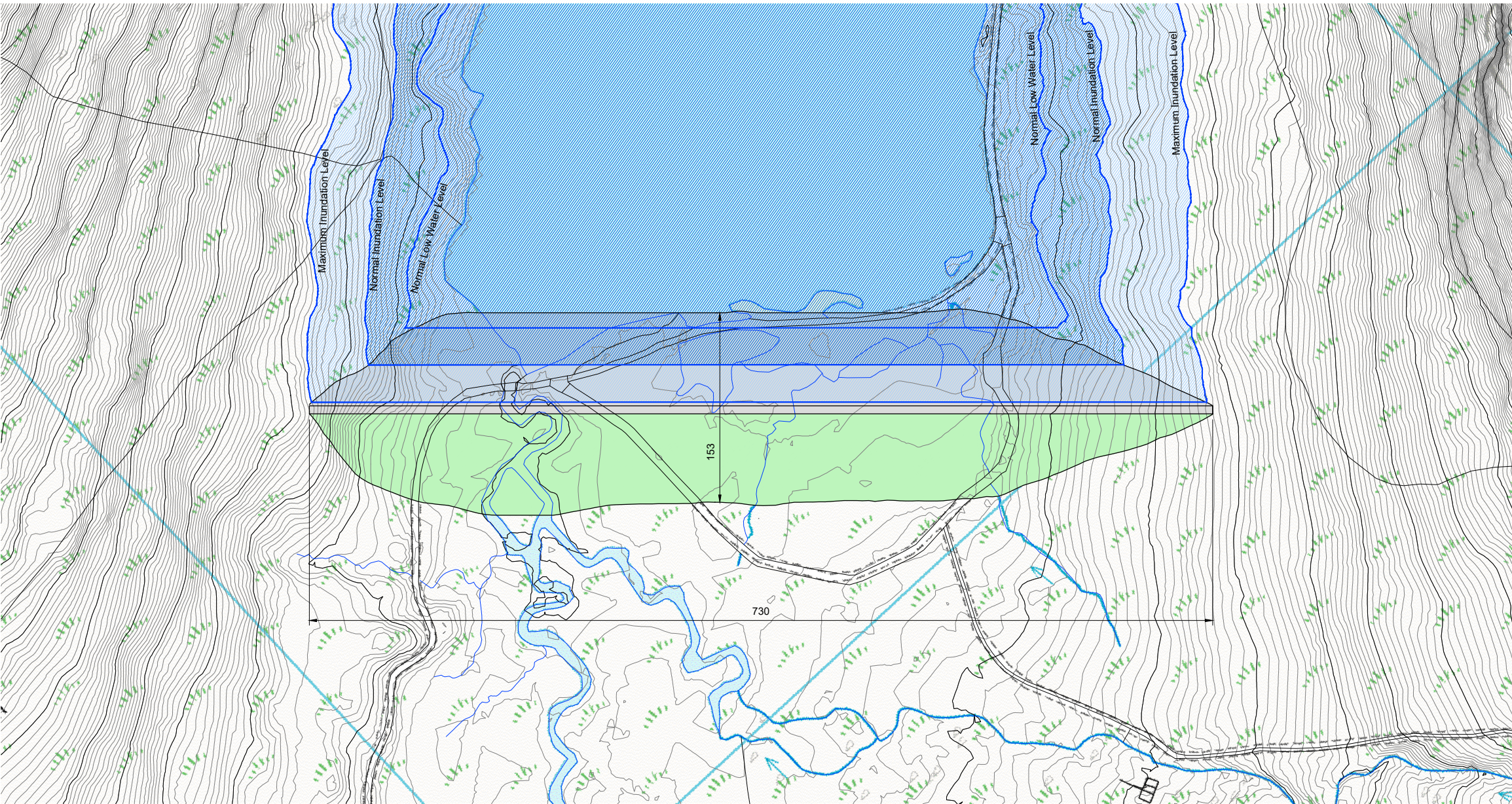


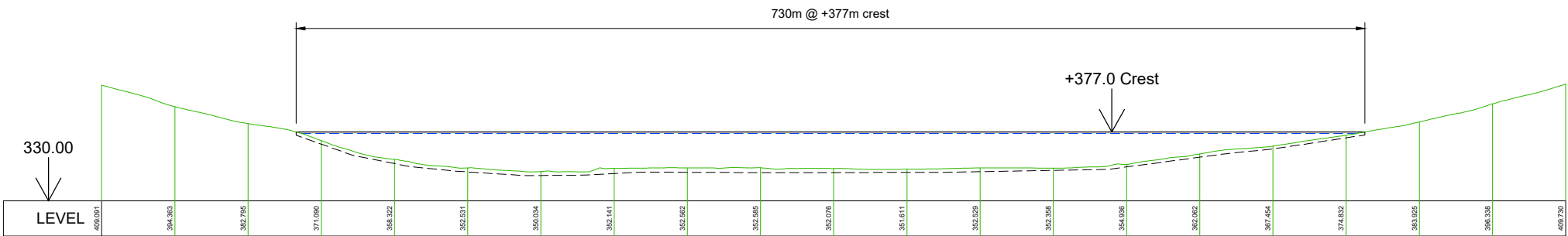
Diagram illustrating a cross-section of a road embankment with a vegetated layer (peat turfs). The diagram shows a road surface profile with a peak at +376.00 and a secondary peak at +377.00. The vegetated layer is shown below the road surface, with a dashed line indicating the ground level. The slopes are indicated as 1:3 on both sides. A table at the bottom provides elevation data for various points.

LEVEL	340.010	340.010	340.240	340.800	347.950	346.195	344.697	347.130
330.00								

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Plan
1:2000 @ A1, 1:4000 @ A3

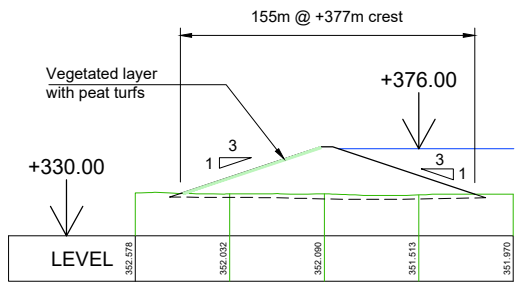


Downstream Elevation
Horiz. 1:2000, Vert. 1:2000 @ A1
Horiz. 1:4000, Vert. 1:4000 @ A3

IF IN DOUBT - ASK

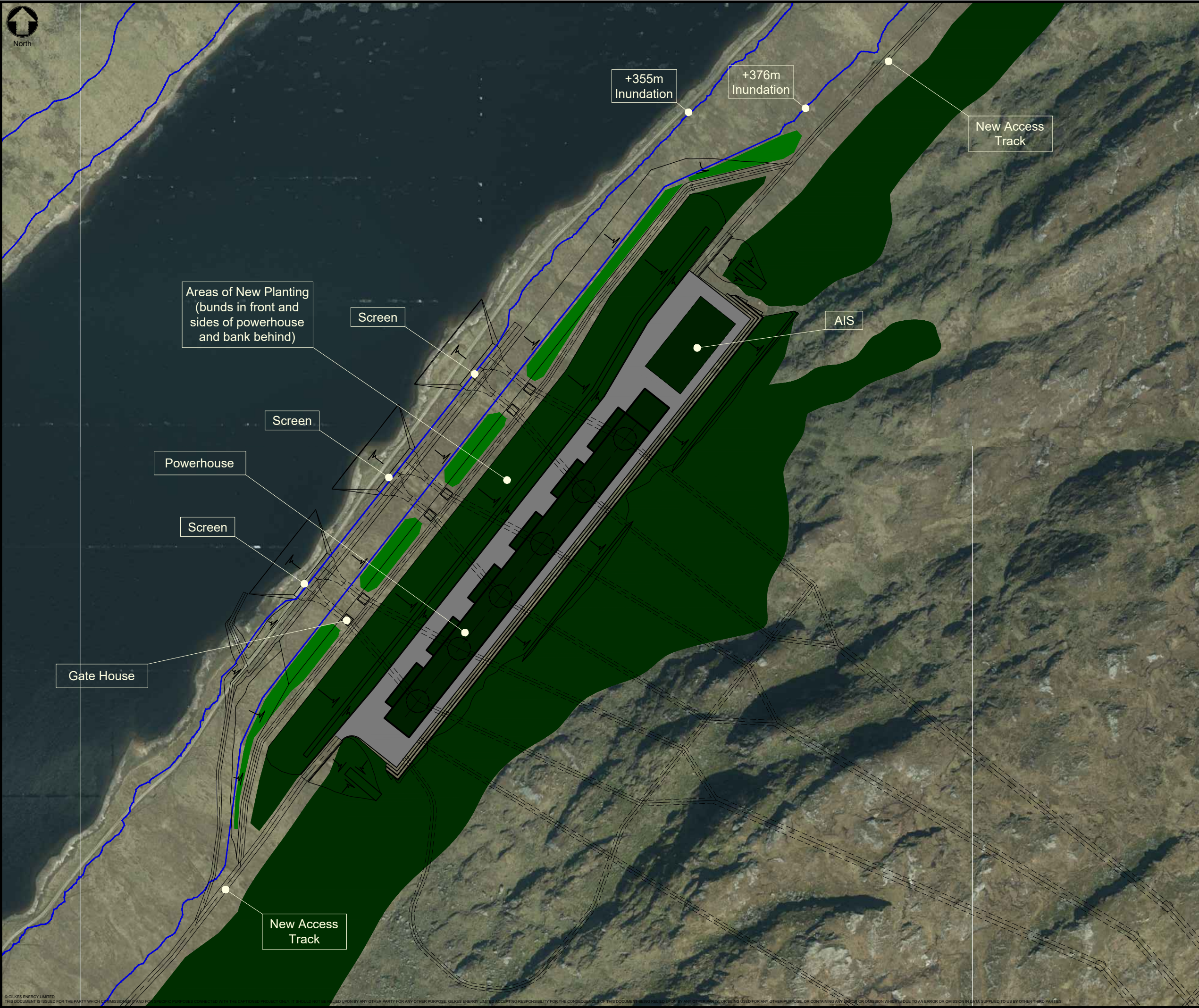
NOTES

- All levels are in metres above ordnance datum (mAOD).
- All dimensions are in metres unless otherwise noted.



Dam Cross Section
Horiz. 1:2000, Vert. 1:2000 @ A1
Horiz. 1:4000, Vert. 1:4000 @ A3

P1	-	MH	FOR PLANNING	DT	GMcG
REV	DATE	DRAWN	NOTES	CHK'D	APP'D
			FESTIVAL HOUSE 177 WEST GEORGE STREET GLASGOW G2 2LB UNITED KINGDOM T: 01539 720 028 E: info@gilkesenergy.com W: www.gilkesenergy.com		
CLIENT					
					
PROJECT					
EARBA PSH					
TITLE					
SHUAS DAM GENERAL ARRANGEMENT SHEET 1					
SIZE	SCALE AT A1		SCALE AT A3	STATUS	
A1	1:2000		1:4000	PLANNING	
DRAWING NUMBER				REVISION	
EAR/GEL/				P1	



IF IN DOUBT - ASK

NOTES

New Planting Areas

P1	04.08.23	MH	Preliminary	GMcG	GMcG
REV	DATE	DRAWN	NOTES	CHK'D	APP'D

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PROJECT

EARBA PSH

DRAWING TITLE

POWERHOUSE
SITE PLAN / AERIAL VIEW
LOW WATER LEVEL

SCALE AT A1 (ORIGINAL SHEET SIZE)

1:2000

0

100m

200m

DRAWING NUMBER/REFERENCE

EAR/GEL/400

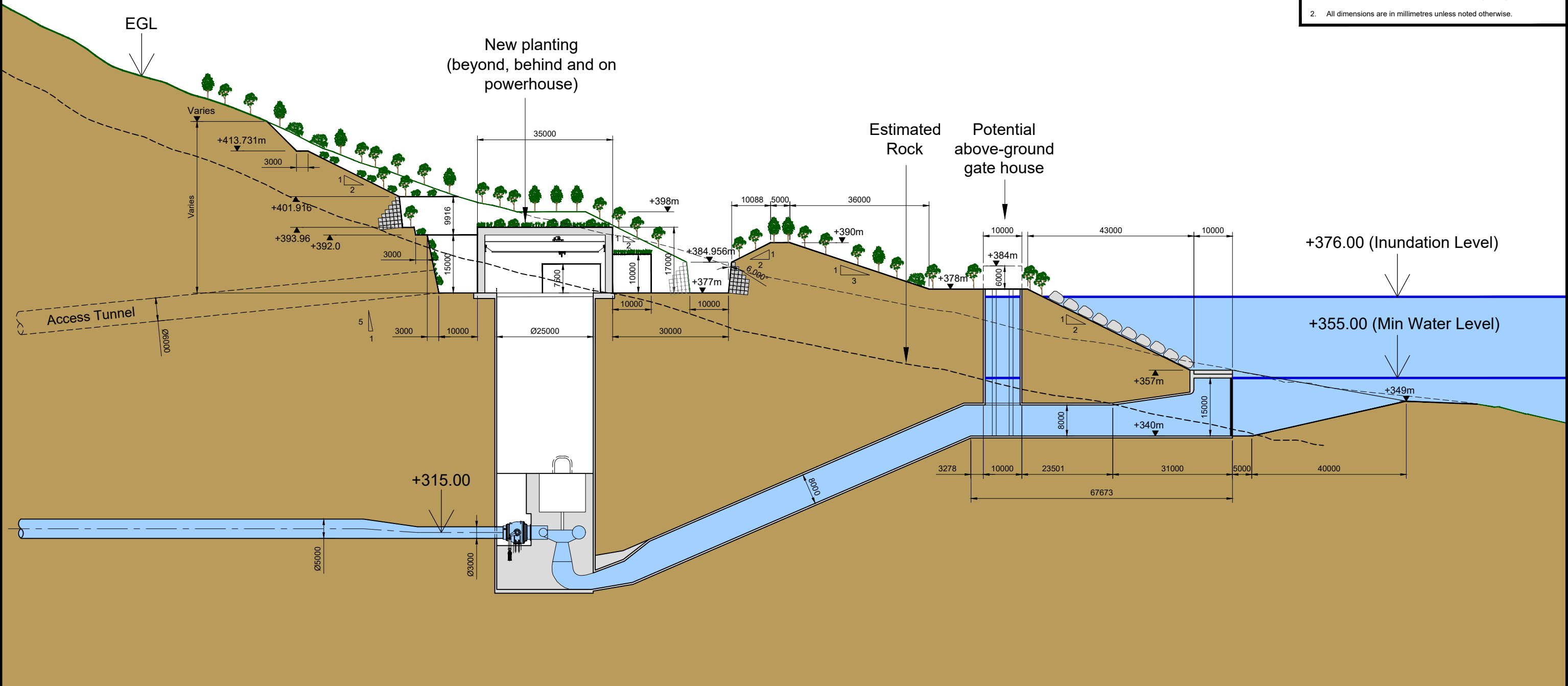
DRAWING STATUS

PRE

IF IN DOUBT - ASK

NOTES

1. All levels are in metres above ordnance datum (mAOD).
2. All dimensions are in millimetres unless noted otherwise.



Powerhouse Section

1:500 @ A1

P1	16.08.23	MH	Preliminary	GMcG	GMcG
REV	DATE	DRAWN	NOTES	CHK'D	APP'D
				177 WEST GEORGE ST. GLASGOW G2 2LB UNITED KINGDOM T: 0141 242 0090 E: info@gilkesenergy.com W: www.gilkesenergy.com	
CLIENT					
PROJECT					
EARBA PSH					
DRAWING TITLE					
POWERHOUSE TYPICAL SECTION					
SCALE AT A1 (ORIGINAL SHEET SIZE)					
1:500 0 25m 50m					
DRAWING NUMBER/REFERENCE				DRAWING STATUS	
EAR/GEL/402				PRE	