

EARBA STORAGE

A GILKES ENERGY COMPANY

Earba Pumped Storage Hydro Scheme EIA Report

Appendix 12.5: Private Water Supply Risk Assessment (PWSRA)

February 2024



Quality Information

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Revision History

Revision

01

Revision Date

February 2024

Details

Issue to ECU

Authorised

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Earba Pump Storage Scheme

Appendix 12.5 Private Water Supply Risk Assessment

Earba Storage

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SLR Project No.: 428.013028.00001

22 February 2024

Revision: 02

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	23 October 2023	K Rainford	G Robb	G Robb
02	22 February 2024	K Rainford	G Robb	G Robb
	Click to enter a date.			
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Basis of Report

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1.0 Introduction

This Appendix should be read in conjunction with **Chapter 12: Geology, Soils and Water** of the EIA Report which contains a detailed description of the local hydrology and hydrogeology, flow mechanisms and hydraulic properties of the soils and geology, the embedded mitigation incorporated in the development design, and an assessment of impacts on groundwater and surface water flows and quality.

It considers the potential effects of the Proposed Development on the quality and quantity of water at Private Water Supply (PWS) sources within the study area. To complete the assessment a conceptual site model is presented which uses a source-pathway-receptor linkage to assess the risk to each PWS. Where necessary mitigation is proposed.

Following consultation with The Highland Council (THC) data was received for PWS sources in the study area. This data was then augmented with Ordnance Survey mapping and aerial photography to locate properties which might not be recorded by THC. Additional properties, and potential water users, were also identified following a programme of site-specific field investigation that involved visiting the properties, enquiring about their water use and source, and mapping water abstraction locations.

The location of water sources (boreholes, springs, surface abstractions etc.) and holding tanks etc. were recorded using a handheld GPS. When residents were unavailable on the days that the survey was conducted questionnaires were left at properties requesting details of their water source or PWS.

The field investigation was completed in August 2023 by the author of this report. The results of the PWS survey and assessment are presented in Section 2 of this report.

The location of PWS sources is shown on **Figure 10.5.1**, in this report.

Section 3 of this report gives detail of a potential water monitoring schedule and parameter list that could be used to monitor water quality at PWS sources that have a hydraulic linkage (e.g. pathway) to the Proposed Development. The monitoring frequency, parameter list and reporting programme would be subject to agreement with THC and the Scottish Environment Protection Agency (SEPA) should planning permission be granted, and it is expected would be secured by an appropriately worded pre-commencement planning condition.

As discussed in **Chapter 12: Geology, Soils and Water** of the EIA Report the Ardverikie Estate utilise a PWS which is taken from the existing hydro power water supply pipe from Loch Earba. Whilst the take-off point for the PWS supply is out with the study area the water source (e.g. Loch Earba) is part of the Proposed Development. Controls will be required to safeguard the Ardverikie Estate water supply but this is not assessed in this report as the PWS source and distribution pipework is managed and owned by the Estate and are party to the Application.



2.0 Private Water Supply Risk Assessment

Table 2-1 presents information collected from the PWS survey, returned questionnaires, provided by THC, and gathered during the desk study. If a source is assessed to have a hydraulic connection (e.g. there is a pathway) to the Proposed Development, mitigation measures have been proposed.

The risk assessment has been completed with reference to SEPA's LUPS-31 guidance¹.

Review of Table 2-1 confirms the following:

- two PWS sources are potentially at risk from the Proposed Development (highlighted in red); and
- one PWS source is not at risk from the Proposed Development (highlighted in green).

Table 2-1: Private Water Supply Risk Assessment

PWS ID (Figure 10.4.1)	Property Name	Data Source and PWS Source Type	Location of PWS Source and Distance from proposed development	Details	Potential Complete Source – Pathway – Receptor Linkage	Mitigation and Monitoring
PWS01	Moy Lodge	Site Visit Stream	E 244005 / N 783669 Approximately 700 m north east of the proposed site entrance off the A86.	Residents confirmed that the property is supplied by a stream source which is located approximately 180 m north west of the property. The stream abstraction is located in a different water catchment to the Proposed Development. The distribution pipework is also not at risk from the Proposed Development.	× PWS source and pipework not considered to be at risk.	None Required.
PWS02	Luiblea Cottage	Site Visit Borehole	E 243397 / N 782740	Residents confirmed that the property is supplied by a borehole located approximately 75 m north of the property. The borehole is 39 m deep and water is	✓ PWS source potentially at risk	Controls will be required to safeguard the PWS from the Proposed Development

¹ SEPA (2017) Land Use Planning System, SEPA Guidance Note 31, Guidance on Assessing the Impacts on Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, Version 3, September 2017



PWS ID (Figure 10.4.1)	Property Name	Data Source and PWS Source Type	Location of PWS Source and Distance from proposed development	Details	Potential Complete Source – Pathway – Receptor Linkage	Mitigation and Monitoring
			Approximately 170 m west of the Proposed Development, at its closest extent.	pumped from the borehole to the property. BGS borehole records indicate that the borehole is screened between a depth of 30 and 39 m. The borehole is located downstream and within 250m of the Proposed Development. Water in the borehole is likely to be in hydraulic continuity with the Abhainn Ghuilbinn. Works within 250 m of the borehole will be above the water table. Good practice measures, as outlined in Chapter 12 of the EIA Report, will ensure that water quality which supplies the PWS source is protected. However, as a worst case given the proximity of the development to the borehole, the PWS is considered to be at risk.		to ensure the water source is not impaired. Water quality monitoring should be undertaken to confirm the efficacy of these controls (see Section 3).
PWS03	Torgulbin	THC Stream	E 243458 / N 782422 (property location) Approximately 340 m west of the Proposed Development, at its closest extent.	Residents confirmed that the property is supplied by a stream abstraction from the Abhainn Ghuilbinn. The exact location of the abstraction was not confirmed; however it is thought it might be to the north of the property. Elements of the Proposed Development are located upstream of the property (and the assumed abstraction point) and therefore the PWS source is considered to be at risk.	✓ PWS source potentially at risk	It is recommended that the PWS source is confirmed prior to construction. Controls specified in the EIA Report will be required to safeguard the PWS and ensure the water source is not impaired. Water quality monitoring should be undertaken to confirm the efficacy of these controls (see Section 3).



3.0 Example Monitoring Protocol and Intervention Strategy

As identified in Section 2 monitoring is proposed at properties that maintain a PWS source and where there is a potential source-pathway-receptor linkage to the Proposed Development.

Pre-development monitoring data can be used to establish baseline water levels and quality and assessment or trigger values to which routine monitoring data collected during construction can be compared against.

The monitoring suite, monitoring locations, monitoring frequency and intervention strategy would be agreed with THC and SEPA prior to any works being undertaken. It is anticipated that this would be secured by an appropriately worded pre-commencement planning condition agreed between the Applicant, THC and SEPA. Table 3-1 however, shows an example protocol which could be used as a basis to agree a water monitoring protocol with relevant consultees.

Table 3-1: Example Monitoring Protocol

Location	Frequency	Determinand Suite
PWS02 PWS03 Ardverikie Estate Water Supply	Monthly prior to and during construction.	Field Sampling • pH • Redox • Conductivity • Dissolved Oxygen • Water Level Extractive Samples • pH • Alkalinity (total and bicarbonate) • Suspended solids • Colour • Organic carbon (total and dissolved) • Electrical conductivity • Chloride • Orthophosphate • Sulphate • Nitrate, nitrite and ammonium • Hydrocarbons • Aluminium (total + dissolved) • Calcium (total + dissolved) • Iron (total + dissolved) • Copper (total + dissolved) • Magnesium (total + dissolved) • Manganese (total + dissolved) • Potassium (total + dissolved) • Sodium (total + dissolved) • BOD



Location	Frequency	Determinand Suite
		• COD • TON • Bicarbonate • Ammoniacal nitrogen • Total Coliforms (PWS only) • E Coli (PWS only) • Enterococci (PWS only)

* Monitoring locations, suite and frequency to be agreed with Statutory Consultees

3.1 Monitoring and Reporting Personnel

The monitoring and reporting would be undertaken by appropriately experienced and trained staff.

3.2 Monitoring Methodology

Water samples would be collected following guidance within SEPA, July 2003, Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water, v2 (specifically Section 9 thereof).

Prevailing weather conditions, qualitative flow conditions as well as other visual indicators would be recorded in order to aid the sample reporting.

The water samples would be placed directly into appropriate sterile bottles, which would be labelled and dispatched to a UKAS accredited laboratory, under chilled conditions and accompanied by the relevant chain of custody documentation.

3.3 Example Intervention Strategy

In the unlikely event that the routine monitoring data recorded potential pollution at a private water supply an investigation and intervention strategy would be agreed with THC. Again, the details of which would be agreed prior to any construction and be secured by an appropriately worded pre-commencement planning condition.

3.3.1 Alerting Potentially Affected Properties

Contact details (land and mobile numbers / email addresses) for private water supply users would be maintained by site management at all times.

In the event that monitoring data collected at any private water supply is above the baseline monitoring record and above prescribed regulatory standards then property owners would be advised and repeat water sampling undertaken (if agreed with the property owners). Property owners would be advised within 24 hours of receipt of monitoring results. Repeat water sampling would be undertaken as soon as reasonably practicable and within 72 hours.

Details of any affected property would be reported to THC within a timeframe agreed with THC when the monitoring programme is agreed and finalised.

3.4 Provision of Alternative Water Supplies

The Applicant commits to maintaining the yield and wholesomeness of water supplies. The following measures may be deployed in the unlikely event a private water supply is impaired by the works:



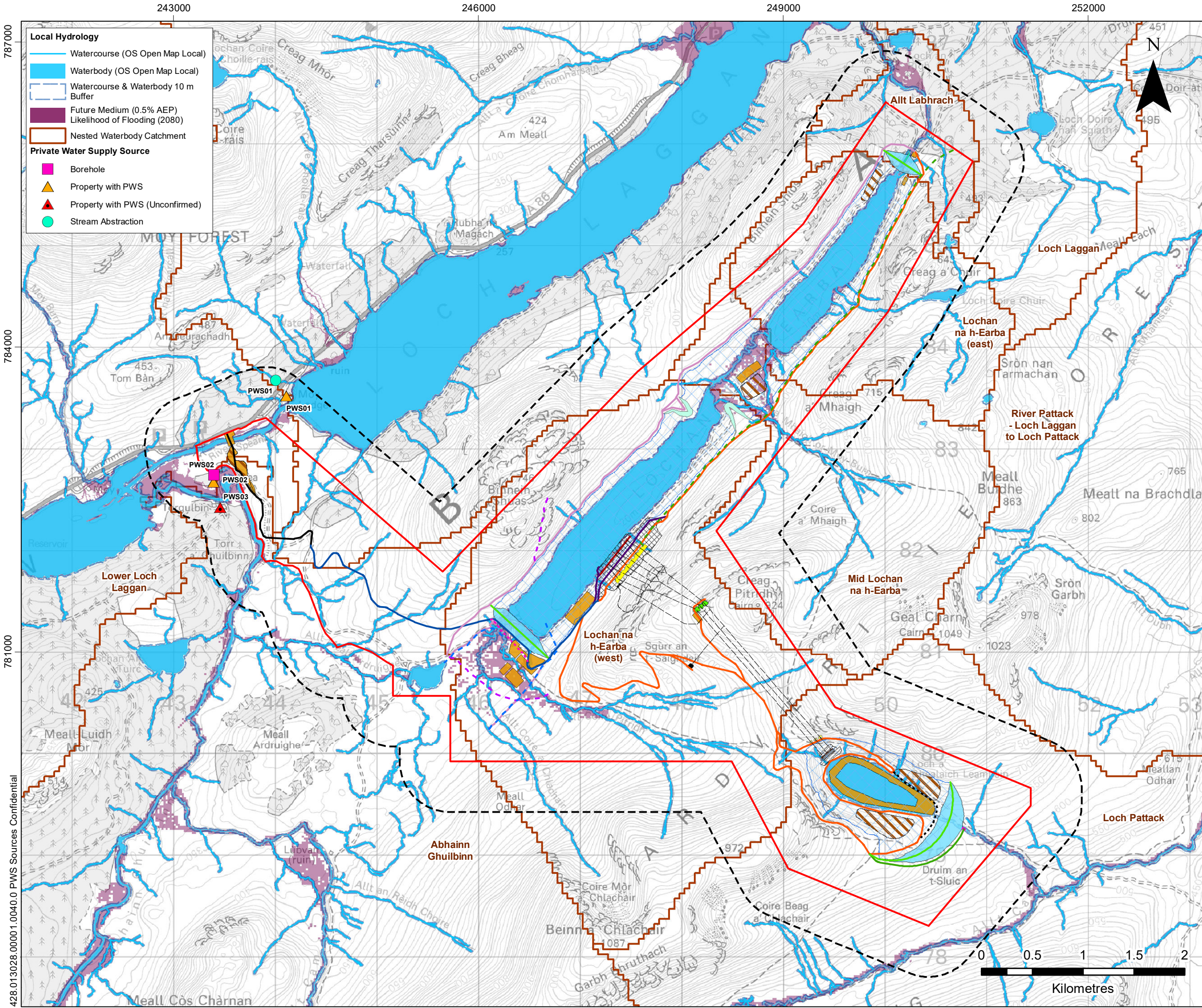
- provision of bottled potable water in the event of a short or transient derogation of a water supply (bottled water would be retained on site ready for quick dispatch to any effected property); and
- provision of an alternative water source (e.g., spring, borehole, alternative surface water abstraction location) in the very unlikely event of a permanent derogation of a water supply.

In the event of an alternative water source being implemented THC would be advised as soon as is practical.



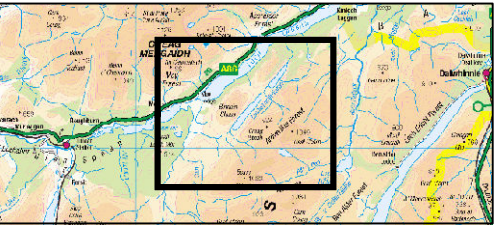
Figures





- Local Hydrology**
- Watercourse (OS Open Map Local)
 - Waterbody (OS Open Map Local)
 - Watercourse & Waterbody 10 m Buffer
 - Future Medium (0.5% AEP) Likelihood of Flooding (2080)
 - Nested Waterbody Catchment
- Private Water Supply Source**
- Borehole
 - Property with PWS
 - Property with PWS (Unconfirmed)
 - Stream Abstraction

- LEGEND**
- Site Boundary
 - Site Boundary 500 m Buffer
 - Tunnel
 - Aqueduct
 - Grid Connection (Subject to Separate)
 - Proposed Footpath - 1m Width
 - Temporary Track - Construction Width: 6 m / Operational Width: 4 m
 - Temporary Track - Construction Width: 8 m / Operational Width: 6 m
 - Proposed Track - Construction Width: 3 m / Operational Width: 3 m
 - Proposed Track - Construction Width: 3.5 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 5 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 3.5 m
 - Proposed Track - Construction Width: 6 m / Operational Width: 4 m
 - Proposed Track - Construction Width: 8 m / Operational Width: 6 m
 - Proposed Track - Construction Width: 10 m / Operational Width: 4 m
 - Existing Track - Upgraded to 8m Construction Width / 6m Operational Width
 - Powerhouse
 - Peninsula
 - Inundation
 - Adit
 - Surge Shaft
 - Intake
 - Intake Structure
 - Proposed Shias Valve House and Fish Pool
 - Proposed Leamhain Upper Gate House
 - Proposed Leamhain Lower Valve House
 - Valve House Earthworks
 - Dam
 - Intake Earthworks
 - Powerhouse Earthworks
 - Borrow Pit
 - Site Compound



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EARBA STORAGE
GEOLOGY, SOILS AND WATER
PRIVATE WATER SUPPLY SOURCES

FIGURE 12.5.1

Scale 1:35,000 @ A3 Date FEBRUARY 2024



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