



# Clune Wind Farm

## Appendix 9.4

### Private Water Supply Risk Assessment

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# 1 Introduction

- 1.1.1 This Technical Appendix should be read in conjunction with **Chapter 9** 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, including potential impacts on private water supplies.
- 1.1.2 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 which comprises a buffer of 500m from the Site. 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.

## 2 Methodology

- 2.1.1 PWS sources within the study area were identified from The Highland Council (THC) private water supply database<sup>1</sup>. This data was then augmented with Ordnance Survey mapping and aerial photography. 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.
- 2.1.2 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 day that the survey was conducted questionnaires were left at properties requesting details of their water source or PWS.
- 2.1.3 The field investigation was completed in May 2024 by SLR Consulting Ltd. The results of the PWS survey and assessment are presented in **Section 3** of this report.
- 2.1.4 The location of PWS sources is shown on **Figure 9.4.1**, in this report.
- 2.1.5 **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. flow or pollution 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.
- 2.1.6 The risk assessment has been completed with reference to SEPA's LUPS-31 guidance<sup>2</sup>.

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<sup>1</sup> The Highland Council, Private Water Supply Database, available online at <https://map-highland.opendata.arcgis.com/datasets/ded172bbade24650bb2c1baec5e0d318> [Accessed September 2024]

<sup>2</sup> SEPA (2017) Land Use Planning System, SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, Version 3.

## 3 Private Water Supply Risk Assessment

- 3.1.1 **Table 3.1** presents information provided by THC, collected from the PWS survey, returned questionnaires, 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.
- 3.1.2 Review of **Table 3.1** confirms the following:
- two PWS sources are potentially at risk from the Proposed Development, although one is unconfirmed (highlighted in red);
  - four PWS sources are not at risk from the Proposed Development (highlighted in green); and
  - two properties are confirmed to be on mains water supplies.
- 3.1.3 Mitigation embedded into the design of the Proposed Development has been considered to prevent impacts to surface and groundwater across the Site, including those which PWS are hydrologically connected to.
- 3.1.4 Embedded mitigation specific to PWS, included:
- Maintaining SEPA 100m buffer for infrastructure with excavations shallower than 1m, and 250m buffer for infrastructure with excavations deeper than 1m.

**Table 3.1: Private Water Supply Risk Assessment**

PWS ID (Figure 9.4.1)	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	Main house and larder of Dalmagavie Estate.	Site Visit Spring	E 275592 / N 823310 Approximately 1.8km north-west from the nearest element of the Proposed Development (track towards turbine T25).	Residents confirmed that the properties are supplied by a spring fed source which is located approximately 220m south-east of the house. Water is gravity fed from the source to the properties.  The source is remote from the Proposed Development (>250m from the Proposed Development) and no development is located upstream of the source. Therefore, it is considered that the PWS source is not hydraulically connected to the Proposed Development nor at risk from 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.
PWS02	Dalmagavie Estate Cottage	Site Visit Spring	E 275670 / N 822874 Approximately 1.5km north-west from the nearest element of the Proposed Development (track towards turbine T25).	Resident confirmed that the property is supplied by a spring fed source which is located approximately 480m south-east of the property. Water is gravity fed from the source to the property.  No development is proposed in the same surface water catchment, or within 250m of the PWS source. The distribution pipework is also not at risk from the Proposed Development.	× PWS source and pipework not considered to be at risk.	None.

PWS ID (Figure 9.4.1)	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
PWS03	N/A	THC Stream	E 277900 / N 824170 Approximately 1.1km south of the proposed substation.	<p>Residents were unavailable during the Site visit and a questionnaire has not been returned at the time of reporting. THC data indicates that the property is served by a stream abstraction from the Allt Lathach approximately 130m south-east of the property.</p> <p>The abstraction is located downstream of the central section of the Proposed Development which includes the proposed substation, BESS and 11 turbines. It is therefore considered that the PWS source is potentially at risk from the Proposed Development.</p> <p>No development is proposed between the source and the property, so the distribution pipework is unlikely to be affected.</p>	<p>✓ PWS source potentially at risk.</p>	<p>It is recommended that the PWS source location is confirmed prior to construction.</p> <p>Controls will be required to safeguard the PWS from the Proposed Development to ensure the stream source quality and quantity is not impaired.</p> <p>Baseline and confirmatory water quality monitoring should be undertaken to assess the efficacy of these controls (see Section 3).</p>

PWS ID (Figure 9.4.1)	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
PWS04	Knockandhu Farm and houses	Site Visit Spring	E 279087 / N 825196 Approximately 1.9km north of the proposed access track.	Resident confirmed both properties and the farm are supplied by spring fed source which is located approximately 160m east of the properties. No development is proposed within 250m of the spring source or upstream of the PWS source. It is therefore considered that the PWS is not at risk from the Proposed Development. No development is proposed between the source and the properties, so the distribution pipework is also unlikely to be affected.	× PWS source and pipework not considered to be at risk.	None.
PWS05	Clune Farmhouse, Clune Lodge and neighbouring property.	Site Visit Spring	E 279986 / N 825483 Approximately 1.2km west of the proposed access track.	Resident confirmed that the properties are supplied by a spring fed source which is located approximately 390 m south of Clune Lodge. No development is proposed within 250m of the spring and the Proposed Development is unlikely to cross any distribution pipework from the PWS source to the properties. Therefore, the PWS source is not considered to be at risk from the Proposed Development.	× PWS source and pipework not considered to be at risk.	N/A



PWS ID (Figure 9.4.1)	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
PWS06	Press House	Unknown	E 280770 / N 826166 (Property location) Approximately 710m north-west of the proposed access track.	<p>The property is a holiday let. The owners were unavailable during the Site visit and a questionnaire has not been returned at the time of reporting.</p> <p>The property is not identified in the THC database however, until such time as the source is confirmed, it is assumed on a precautionary basis that the property is supplied by a PWS.</p> <p>No development is proposed within 250m of the property; however, development is proposed upgradient of the property. On a precautionary basis it is assumed that the PWS source is potentially at risk from the Proposed Development.</p>	<p>✓ PWS source potentially at risk (unconfirmed).</p>	<p>It is recommended the source location be confirmed prior to commencement of works.</p> <p>If the PWS source is confirmed to be at risk from the Proposed Development, baseline and confirmatory water quality monitoring would be undertaken to assess the efficacy of these controls (see Section 3).</p>

PWS ID (Figure 9.4.1)	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
M1	Clune Estate Properties	Site Visit Mains	E 281011 / N 826708 (Properties)	Gamekeeper confirmed during Site visit that properties belonging to Clune Estate are on mains supply.	N/A	N/A
M2	Balnagordonach	Returned Questionnaire Mains	E 281074 / N 827055 (Property)	Resident confirmed through a returned questionnaire that the property is on mains supply.	N/A	N/A

## 4 Example Monitoring Protocol and Intervention Strategy

- 4.1.1 Pre-construction monitoring data can be used to establish baseline water levels and quality and assessment or trigger values against which routine monitoring data collected during construction can be compared.
- 4.1.2 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, as discussed in full in Chapter 9 of the EIA Report.
- 4.1.3 **Table 3.1** however, shows an example protocol which could be used as a basis to agree a water monitoring protocol with relevant statutory consultees.

**Table 3.1: Example Monitoring Protocol**

Location	Frequency	Determined Suite
PWS03 PWS06 (to be confirmed) Main watercourses which drain the Site (locations to be confirmed)	Monthly prior to and during construction.	Field Sampling <ul style="list-style-type: none"> <li>• pH</li> <li>• Redox</li> <li>• Conductivity</li> <li>• Dissolved Oxygen</li> <li>• Water Level</li> </ul> Extractive Samples <ul style="list-style-type: none"> <li>• pH</li> <li>• Alkalinity (total and bicarbonate)</li> <li>• Suspended solids</li> <li>• Colour</li> <li>• Organic carbon (total and dissolved)</li> <li>• Electrical conductivity</li> <li>• Chloride</li> <li>• Orthophosphate</li> <li>• Sulphate</li> <li>• Nitrate, nitrite and ammonium</li> <li>• Hydrocarbons</li> <li>• Aluminium (total + dissolved)</li> <li>• Calcium (total + dissolved)</li> <li>• Iron (total + dissolved)</li> <li>• Copper (total + dissolved)</li> </ul>

Location	Frequency	Determined Suite
		<ul style="list-style-type: none"> <li>• Magnesium (total + dissolved)</li> <li>• Manganese (total + dissolved)</li> <li>• Potassium (total + dissolved)</li> <li>• Sodium (total + dissolved)</li> <li>• BOD</li> <li>• COD</li> <li>• TON</li> <li>• Bicarbonate</li> <li>• Ammoniacal nitrogen</li> <li>• Total Coliforms (PWS only)</li> <li>• E Coli (PWS only)</li> <li>• Enterococci (PWS only)</li> </ul>

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

## 4.2 Monitoring and Reporting Personnel

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

## 4.3 Monitoring Methodology

4.3.1 Water samples will be collected following SEPA “Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water”, v2 (specifically Section 9 thereof) July 2003.

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

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

## 4.4 Example Intervention Strategy

4.4.1 In the unlikely event that the routine monitoring data recorded potential pollution at a PWS an investigation and intervention strategy will be implemented. The details of that strategy will be agreed prior to any construction and be secured by an appropriately worded pre-commencement planning condition.

## Alerting Potentially Affected Properties

- 4.4.2 Contact details (land and mobile numbers / email addresses) for PWS users will be maintained by Site management at all times.
- 4.4.3 In the event that monitoring data collected at any PWS is above the baseline monitoring record and above prescribed regulatory standards then property owners will be advised and repeat water sampling undertaken (if agreed with the property owners). Property owners will be advised within 24 hours of receipt of monitoring results. Repeat water sampling will be undertaken as soon as reasonably practicable and within 72 hours.
- 4.4.4 Details of any affected property would be reported to THC within a timeframe agreed with THC when the monitoring programme is agreed and finalised.

## 4.5 Provision of Alternative Water Supplies

- 4.5.1 The Applicant commits to maintaining the yield and wholesomeness of water supplies. The following measures may be deployed in the unlikely event a PWS is impaired by the works:
- provision of bottled potable water in the event of a short or transient impact on a water supply (bottled water would be retained on-Site ready for quick dispatch to any affected 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 impact of a water supply.
- 4.5.2 In the event of an alternative water source being implemented THC would be advised as soon as is practical.



# CLUNE WIND FARM EIA REPORT

## FIGURE 9.4.1

### PRIVATE WATER SUPPLY LOCATIONS

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- Site Boundary
  - Site Boundary 500 m Buffer
  - Proposed Turbine Location
  - Proposed Substation Compound
  - Proposed Hardstanding
  - Proposed Temporary Construction Compound
  - Proposed Borrow Pit Search Area
  - Proposed Gatehouse Compound
  - Proposed Passing Place
  - Proposed Batching Plant
  - Proposed Battery Energy Storage System (BESS)
  - Proposed Floated Track
  - Proposed Site Track
  - Existing Site Track to be Upgraded
  - Nested Waterbody Catchment
  - Watercourse (OS OpenMap Local)
  - Waterbody (OS OpenMap Local)
  - Watercourse & Waterbody 50 m Buffer
  - Future River Flood Plain (2080)
- Private Water Source Types**
- Mains
  - Property with PWS
  - Property with PWS (Unconfirmed)
  - Spring
  - Stream (Unconfirmed)
  - Unconfirmed

LAYOUT DWG: NA T-LAYOUT NO: PSCOCLU041

DRAWING NUMBER  
**405.064807.00001.0030.1**

SCALE - 1:35,000 @ A3

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