Technical Appendix 10.4: Private Water Supply Risk Assessment (PWSRA)

Carn Fearna Wind Farm

Carn Fearna Wind Farm Limited

Prepared by:

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1.0 Introduction

SLR Consulting Ltd (SLR) was commissioned by Carn Fearna Wind Farm Limited (the 'Applicant') to undertake a Private Water Supply (PWS) Risk Assessment for the proposed Carn Fearna Wind Farm (the Proposed Development).

This Technical Appendix (TA) should be read in conjunction with EIA Report **Chapter 10: Geology, Hydrology, Hydrogeology and Peat** 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 the private water supply (PWS) sources within the Study Area which comprises a buffer of 500 m 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.

Following consultation with the Highland Council (THC) data was received for PWS sources within the Study Area. This data was then augmented with Ordnance Survey (OS) 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.

The location of water sources (boreholes, springs, surface abstractions) 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.

The field investigation was completed in July 2024 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 10.4.1** appended.

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 receptors that have a hydraulic linkage (e.g. flow 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 consent be granted, and it is anticipated would be secured by an appropriately worded pre-commencement planning condition.

2.0 Private Water Supply Risk Assessment

Table 1 presents information collected from the PWS survey, returned questionnaires, public consultation events, THC, and desk study. If a source is assessed to have a hydraulic connection (e.g. there is a flow pathway) to the Proposed Development, mitigation measures have been proposed.

The risk assessment has been completed with reference to SEPA's LUPS-31 guidance[1].

The findings from Table 1 can be summarised as follows:

- one confirmed PWS source is potentially at risk from the Proposed Development;
- the distribution pipework associated with one PWS is potentially at risk from the Proposed Development; and
- two properties are not considered to be at risk from the Proposed Development.

Table 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	Tigh Fiodha, White House and surrounding buildings	Site Visit Stream	E 240794 / N 864113 Adjacent to existing track which is scheduled to be upgraded.	Properties have been confirmed to be supplied from a stream abstraction which is located approximately 450m north-east of the properties. Water is gravity fed from the abstraction point in pipework which runs adjacent to the existing track. The pipework is thought to cross the track in three locations.	✓ PWS source potentially at risk	The distribution pipework should be confirmed prior to construction. Controls will be required to safeguard the PWS from the Proposed Development to ensure the stream

[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

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
				It is therefore considered that the PWS source is potentially at risk from the Proposed Development.		source quality and quantity is not impaired. Baseline and confirmatory water quality monitoring should be undertaken to assess the efficacy of these controls (see Section 3).
PWS02	Silverbridge Toilets	THC database Borehole	E 240252 / N 864008 Approximately 190m south-west of existing track which is scheduled to be upgraded.	The council data suggests the public toilets are supplied by a borehole which is adjacent to the Black Water. The toilet area was inaccessible during the site visit so this could not be confirmed. The borehole location is located on the adjacent side of the Black Water to the Proposed Development and therefore it is considered that the Black Water will act as a hydraulic barrier to the PWS source. It is therefore considered that the PWS source is not at risk from the Proposed Development.	× PWS source and pipework not considered to be at risk.	None.
PWS03	Inchbrae Farm and Cottages	Site visit Stream	E 240268 / N 869564 Approximately 320m north-west of the	Properties have been confirmed to be supplied by a stream abstraction which is noted in the forested area to the north-west of	× PWS source and pipework not	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
			proposed Off-site turning circle	the properties. The exact location of the abstraction point was not found during the site visit; however, no development is proposed upstream of the forested area in which the abstraction takes place. It is therefore considered that the PWS source is not at risk from the Proposed Development.	considered to be at risk.	

3.0 Example Monitoring Protocol and Intervention Strategy

Pre-development 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.

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 2 however, shows an example protocol which could be used as a basis to agree a water monitoring protocol with relevant consultees.

Table 2: Example Monitoring Protocol

Location	Frequency	Determinand Suite
• PWS04 • Main watercourses which drain from the site (locations to be confirmed).	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 • COD • TON • Bicarbonate • Ammoniacal nitrogen

Location	Frequency	Determinand Suite
		• 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's "Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water" (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, an investigation and intervention strategy will be implemented. The details of this would be agreed prior to any construction and secured by an appropriately worded pre-commencement planning condition.

3.3.1 Alerting Potentially Affected Properties

Contact details (landline and mobile numbers / email addresses) for PWS users would be maintained by site management at all times.

In the event that monitoring data collected at any PWS 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 the timeframe agreed with THC when the monitoring programme was agreed and finalised.

3.4 Provision of Alternative Water Supplies

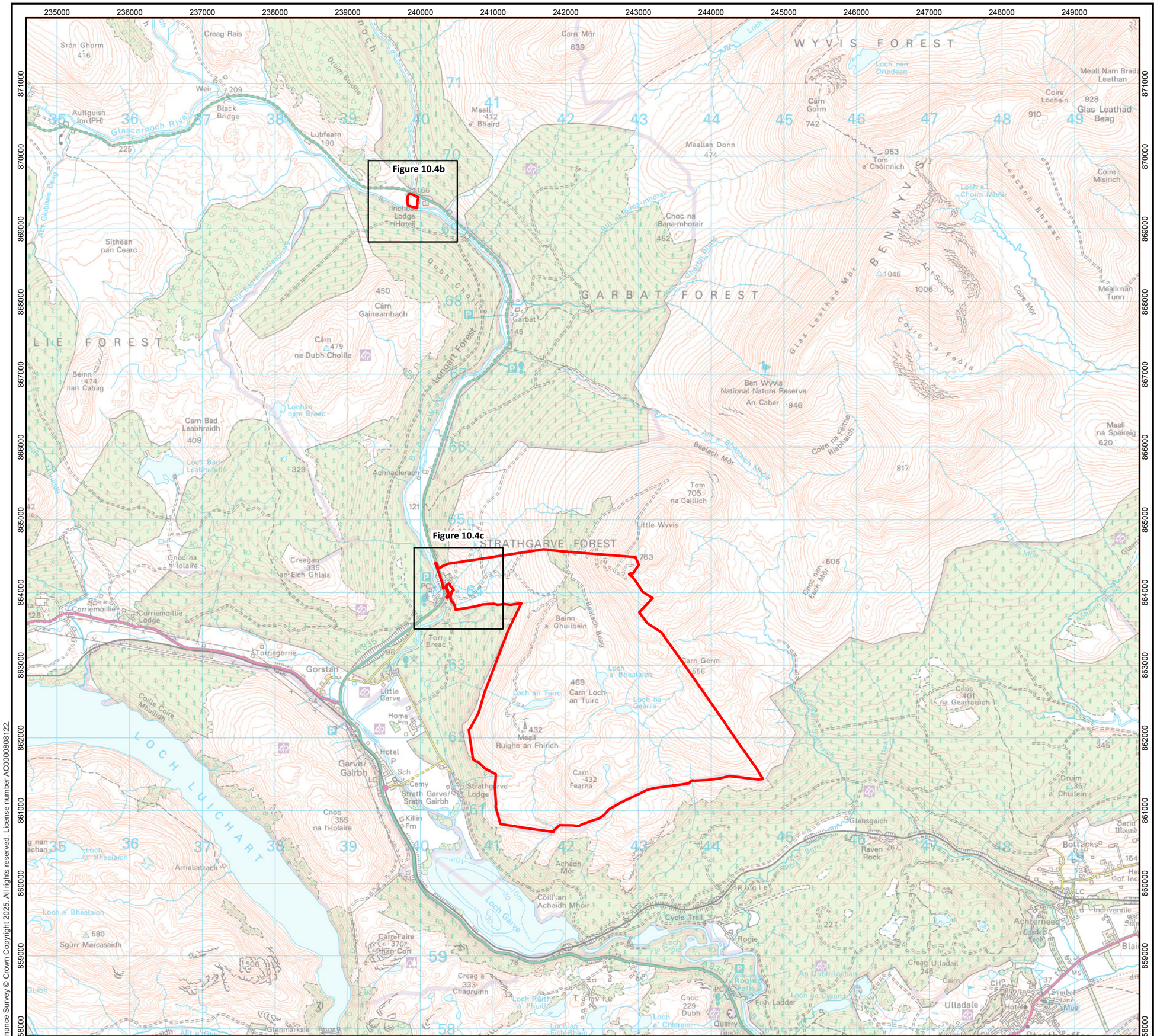
The Applicant commits to maintaining the yield and wholesomeness of water supplies.

The following measures may be deployed in the unlikely event a PWS is adversely impacted 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 event of a permanent impact of a water supply.

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

Figures



Statkraft

N

Site Boundary

1:50,000 on A3

0 1 2 Kilometres

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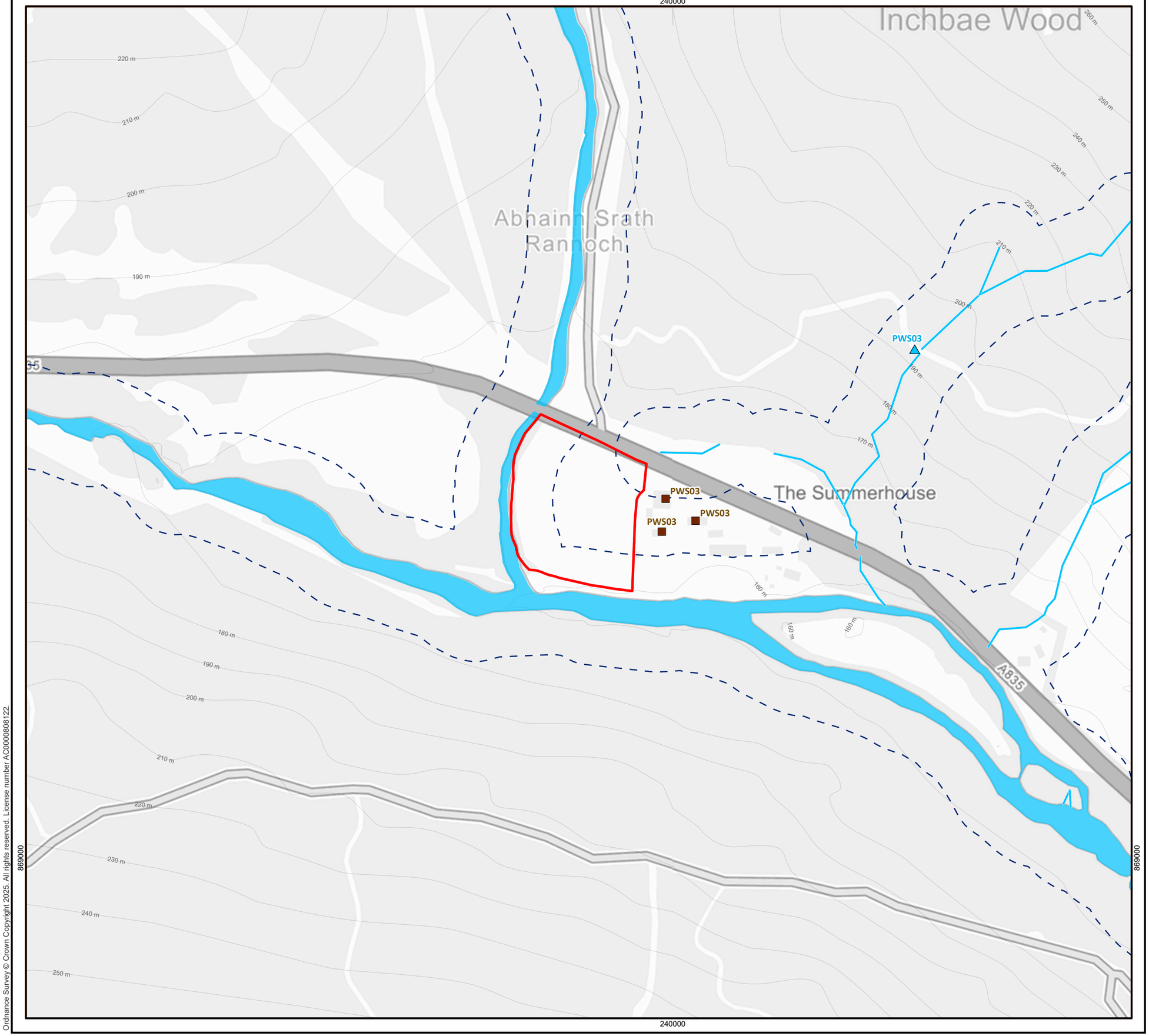
Figure 10.4.1a

Private Water Supply Sources - Overview

Carn Fearna Wind Farm

Environmental Impact Assessment Report



Statkraft

N

- Site Boundary
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)
- Watercourse and Waterbody 50 m Buffer

Private Water Source Type

- Property with PWS
- Stream

1:4,000 on A3

0 100 200 Metres

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Figure 10.4.1b

Private Water Supply Sources - Off-site turning circle

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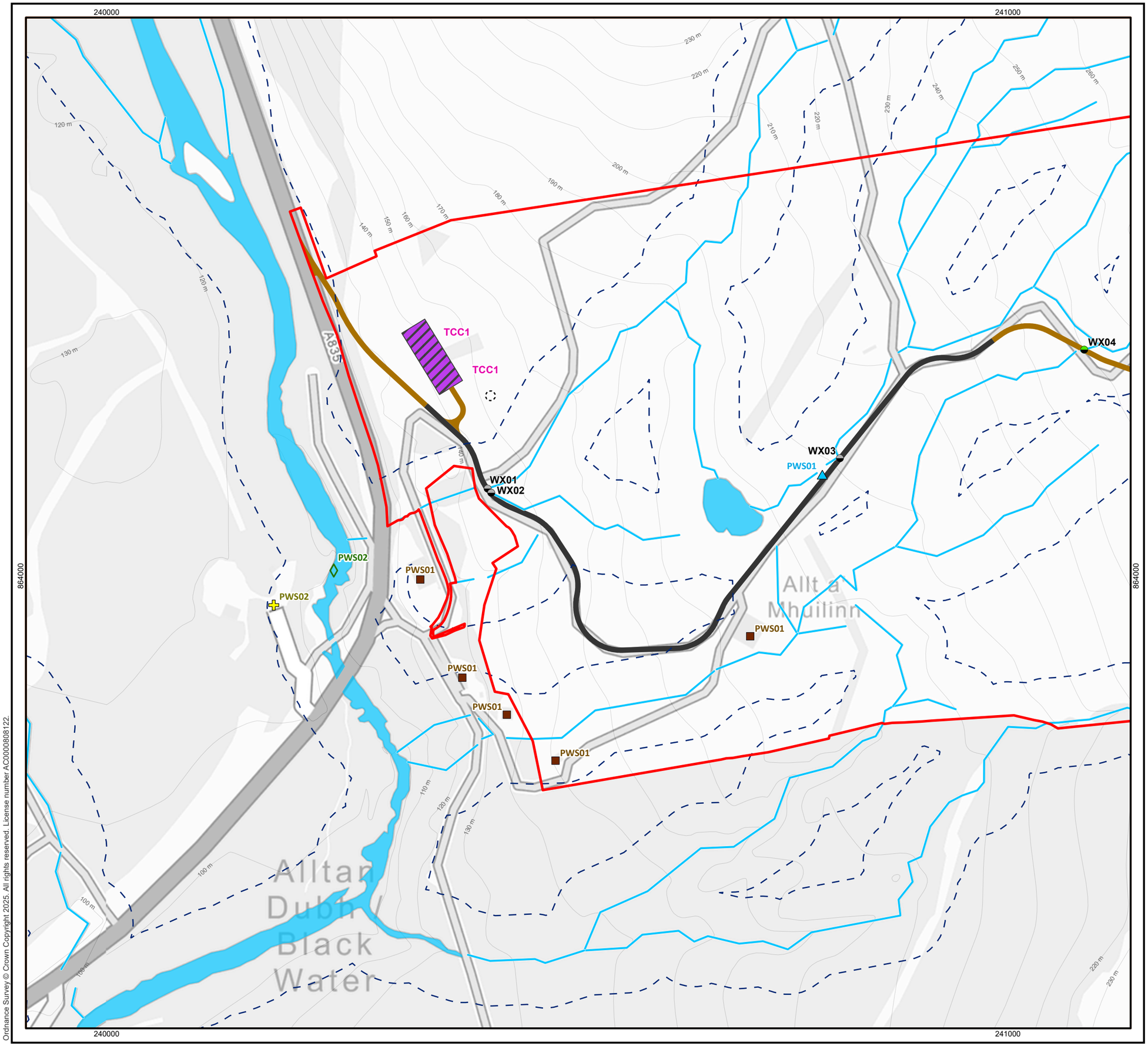

Statkraft

N

- Site Boundary
- Proposed New Access Track
- Proposed Upgraded Access Track
- Proposed Temporary Construction Compound
- Existing Watercourse Crossing
- Proposed Watercourse Crossing
- Watercourse (OS OpenMap Local)
- Waterbody (OS OpenMap Local)
- Watercourse and Waterbody 50 m Buffer

Private Water Source Type

- Property with PWS
- Stream
- Borehole (Unconfirmed)
- Unconfirmed

1:4,000 on A3

0 100 200 Metres

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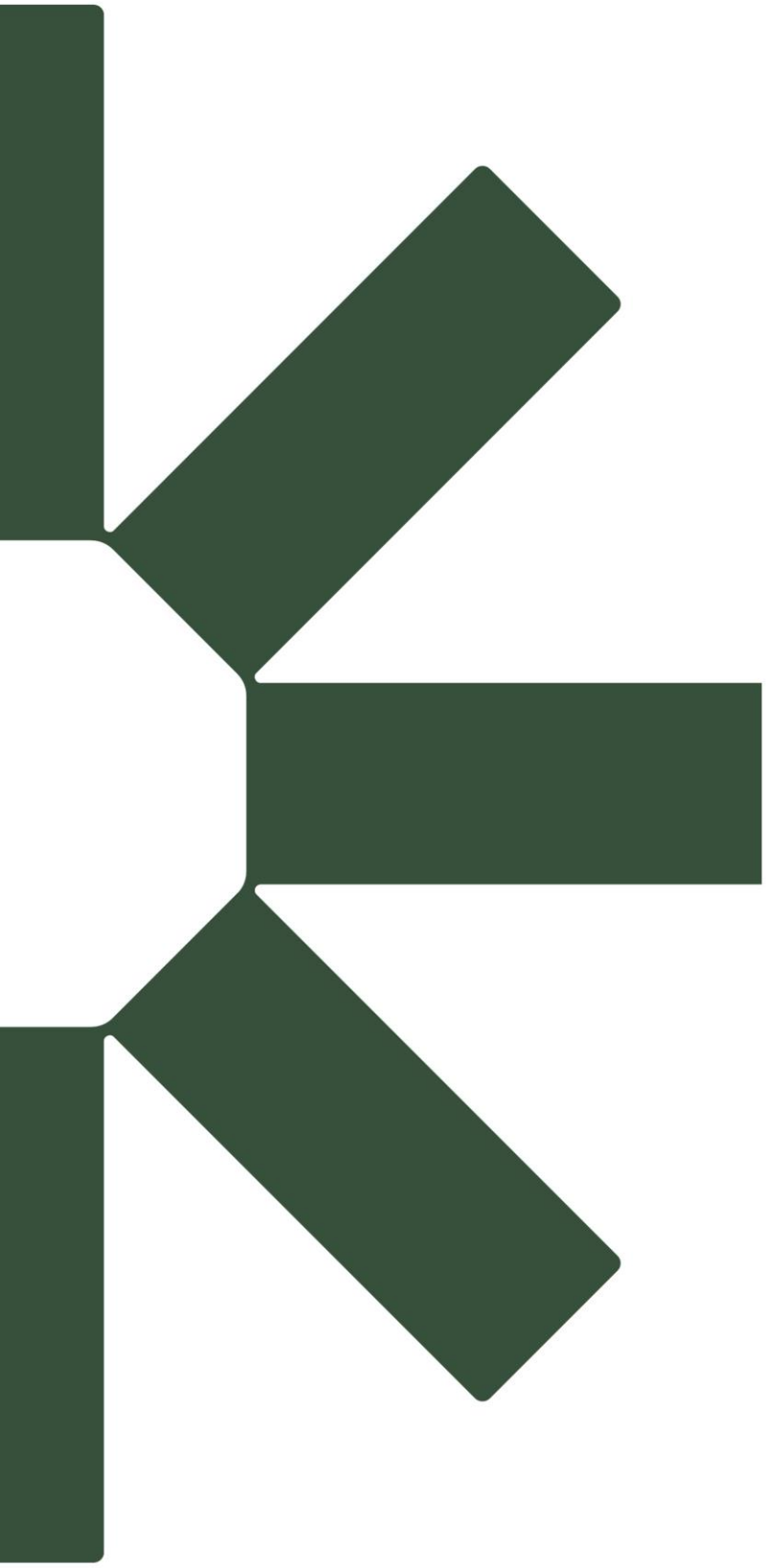
Figure 10.4.1c

Private Water Supply Sources - Wind farm site

Carn Fearna Wind Farm

Environmental Impact Assessment Report



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