



Torfichen Wind Farm

Confidential Appendix 10.4 Private Water Supply Risk Assessment

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Basis of Report

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1.0 Introduction

This Appendix should be read in conjunction with Volume 1 Chapter 10: Geology, Hydrology and Hydrogeology of the EIA Report for the proposed Torfichen Wind Farm (hereafter referred to as the Proposed Development) 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 or close to 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 Midlothian Council (MC) and Scottish Borders Council (SBC) data was received for PWS sources in the Study Area. 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.

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 July and 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 10.4.1**, 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 MC, SBC 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.



2.0 Private Water Supply Risk Assessment

Table 2.1 presents information collected from the PWS survey, returned questionnaires, provided by MC, 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);
- seven PWS sources are not at risk from the Proposed Development (highlighted in green); and
- two properties have confirmed to be on mains water supplies.

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	Moorfoot House Moorfoot Farm 1 and 2 Moorfoot Farm Cottages Smithy Cottage	Site Visit Spring	E 329477 / N 651219 Approximately 3.1 km south-west from the nearest element of the Proposed Development (turbine T1).	Residents confirmed that the properties and farm are supplied by a spring source which is located approximately 225 m south-west of Gladhouse Cottage. Water is gravity fed from the source to the properties. The spring is remote from the Proposed Development and located in a different water catchment. The distribution	× PWS source and pipework not considered to be at risk.	N/A

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
	Peggies Cottage Gladhouse Cottage			pipework is not at risk from the Proposed Development.		
PWS02	Huntly Cot	Site Visit Spring and Stream	E 330647 / N 652159 (Spring) E 330784 / N 652374 (Stream) Between 1.5 km and 1.6 km south-west from the nearest element of the Proposed Development (turbine T1).	Resident confirmed that the property is supplied by a spring fed collection tank which is located approximately 760 m south-east of the property. The collection tank is fed by several springs located further upstream on the northern slopes of Huntly Cot Hills. The collection tank is located at E 330229 / N 652490 before it is gravity fed to the property. The farm has an outbuilding which has a separate supply – a stream abstraction which is located approximately 140 m south of the outbuilding. No development is proposed in the same water catchments, nor upstream or within 250 m of the two PWS sources. The distribution pipework is not at risk from the Proposed Development.	× PWS source and pipework not considered to be at risk.	N/A
PWS03	Mauldslie Farm Mauldslie Hill Cottages	MC Spring	E 331554 / N 652075 (unconfirmed) Approximately 980 m from the nearest element of the Proposed	Residents were unavailable during the site visit and the questionnaire has not been returned at the time of reporting. MC data indicates that the farm and properties are served by a spring located approximately 1.2 km south-east of the properties.	× PWS source and pipework not considered to be at risk.	None required however it is recommended that the PWS source is confirmed prior to construction.



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
			Development (turbine T1).	No development is proposed upstream nor within 250 m of the spring. 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.		
PWS04	Howburn Cottage	MC Borehole	E 330858 / N 655169 (unconfirmed) Approximately 1.7 km north-west of the Proposed Development.	Residents were unavailable during the site visit and the questionnaire has not been returned at the time of reporting. MC data indicates that the property is served by a borehole which is located approximately 140 m south-west of the property. The borehole and its distribution pipework is remote from the Proposed Development. 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.	None required however it is recommended that the PWS source is confirmed prior to construction.
PWS05	Outerston Hill	Site visit Well	E 333534 / N 655684 (unconfirmed) Approximately 980 m north-west from the Proposed Development, at its closest extent.	Neighbours confirmed that the property is served by a shallow well which located adjacent to the property, although the exact location of the well is not confirmed. No development is proposed within 250 m of the property and the Proposed Development is unlikely to cross any distribution pipework from the PWS source to the property. 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.	None required however it is recommended that the PWS source is confirmed prior to construction.



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
PWS06	Outerston Farm	Site visit Spring	E 333271 / N 656716 Approximately 1.7 km north-west from the Proposed Development, at its closest extent.	Residents confirmed that the farmhouse and steading cottage is supplied by mains however the farm also benefits from a spring fed source which is located approximately 460 m south-east of the property. No development is proposed within 250m of the spring. 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
PWS07	Esperston Farm	Site Visit Springs	E 333859 / N 656466 (spring 1) E 335124 / N 654698 (spring 2)	Residents confirmed that the farm is supplied by three springs, one of which was not possible to locate during the site visit. The lower farm area and cottages are served by a spring source which is located approximately 550 m south of the property (spring 1). This is located more than 250 m from any element of the Proposed Development, and not considered at risk. The upper farm area is served by a spring source which is located approximately 2.6 km south-east of the property (spring 2), upstream of the proposed infrastructure but near to a proposed borrow pit search area. This spring and the water distribution pipework from this to the property could be at risk from the Proposed Development.	✓ PWS source potentially at risk	Controls will be required to safeguard the PWS from the Proposed Development to ensure the spring 2 and 3 are not impaired. The springs and pipelines will need to be clearly marked and protected. If any borrow pit development is proposed within 250 m of spring 2 then a further risk assessment should be completed to confirm no effect on the spring yield or quality will occur. Baseline and confirmatory water quality monitoring should



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
				The final spring is thought to be located approximately 3 km south of property, west of the quarry (located at E 334404 / N 654104), however no infrastructure was found in this area during the site visit. This spring and the water distribution pipework from this to the property could be at risk from the Proposed Development.		be undertaken to assess the efficacy of these controls (see Section 3).
PWS08	Middleton village	Site Visit Springs	E 336328 / N 655656 (reservoir location) Approximately 140 m north-east of the Proposed Development, at its closest extent.	Residents confirmed that Middleton village is supplied by a total of 15 springs located on the northern slopes of Hunt Law and Ruther Law, to the south of the B7007. The springs are gravity fed to a reservoir which is located near Whitelaw Cleugh Burn. Water from the reservoir is gravity fed to the village. This supply is thought to serve 25 properties and 2 farms. No development is proposed upgradient of any of the springs nor the reservoir, however, given the proximity of the proposed site access track to several of the springs (within 250 m), they are as a worst case considered to be potentially at risk. No borrow pit search areas are located within the 250 m of the springs. The nearest proposed turbine (T18) is located more than 250 m from the nearest spring.	✓ PWS source potentially at risk	Controls will be required to safeguard the PWS from the Proposed Development to ensure the water source is not impaired. The springs, holding tanks and pipelines between these will need to be clearly marked and protected. To mitigate potential risk to the PWS sources it is proposed that no ground excavation (with the exception of shallow soil stripping) is undertaken during construction of the access track and temporary construction compound within 250 m of the springs.



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
						Baseline and confirmatory water quality monitoring should be undertaken to assess the efficacy of these controls (see Section 3).
PWS09	Whitelaw	Site Visit Borehole	E 336327 / N 656398 Approximately 810 m north-east of the Proposed Development, at its closest extent.	Residents confirmed that the property is supplied by a borehole which is located approximately 50 m south-west of the property. No development is proposed within 250 m of the borehole and the Proposed Development is unlikely to cross any distribution pipework from the PWS source to the property. 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
M1	Yorkston	Site Visit Mains	E 331511 / N 656638 (property location)	Residents confirmed that the properties and farm are supplied by mains.	N/A	N/A
M2	1 and 2 Outerston Cottage Thimble Cottage	Site Visit Mains	E 332841 / N 656903 (property location)	Residents confirmed that the properties are supplied by mains.	N/A	N/A



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 MC, SBC 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, MC 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
PWS07 PWS08	Monthly prior to and during construction.	Field Sampling <ul style="list-style-type: none"> • pH • Redox • Conductivity • Dissolved Oxygen • Water Level Extractive Samples <ul style="list-style-type: none"> • 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
		<ul style="list-style-type: none"> • 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 PWS an investigation and intervention strategy would be agreed with MC and SBC. 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 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 MC and SBC within a timeframe agreed with MC and SBC 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 PWS is impaired by the works:



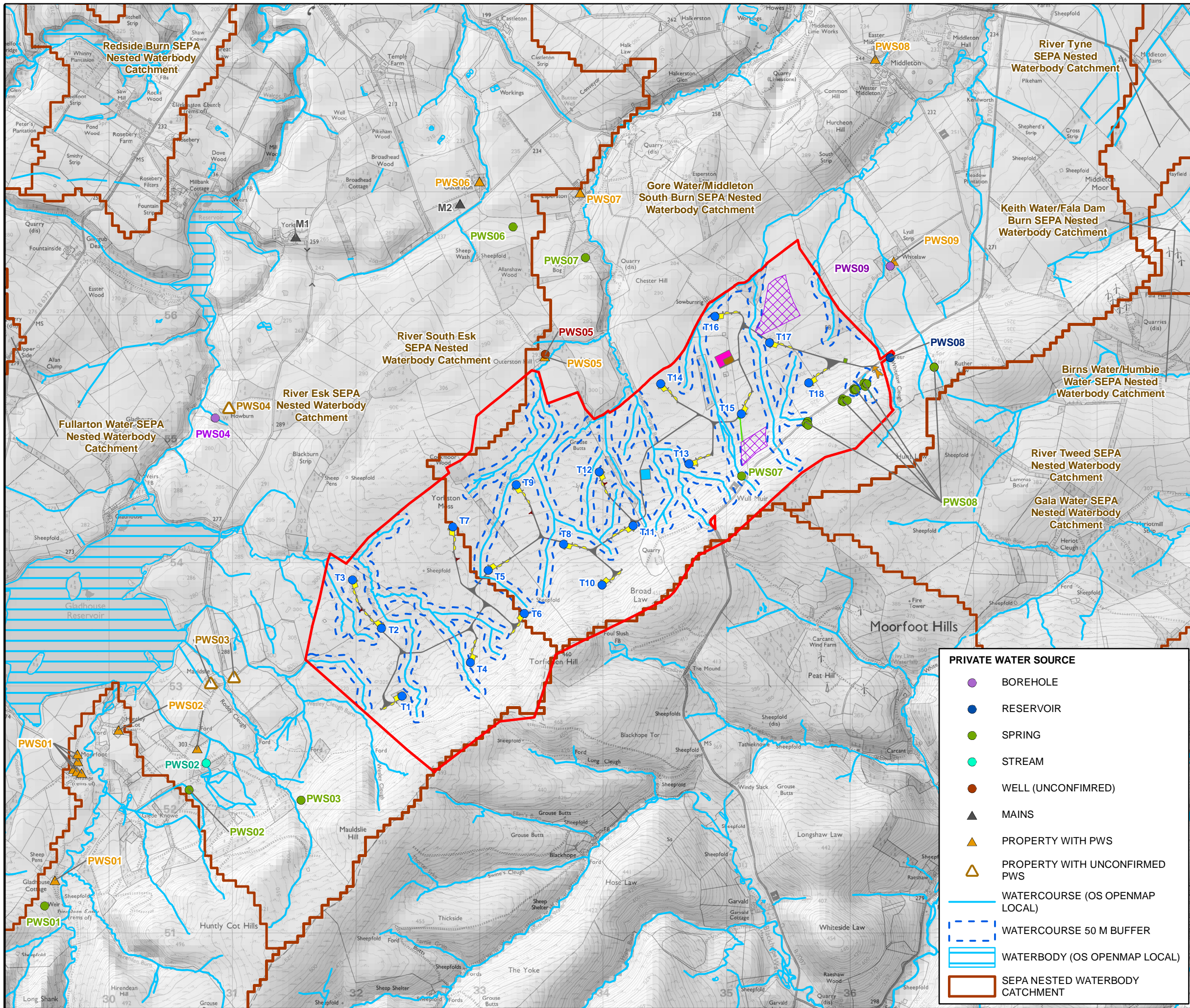
- provision of bottled potable water in the event of a short or transient derogation of a water supply (bottled water would be retained on site ready for quick dispatch to any effected property); and
- provision of an alternative water source (e.g. spring, borehole, alternative surface water abstraction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

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



Figures





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KEY

- SITE BOUNDARY
- PROPOSED TURBINE LOCATION
- PROPOSED HARDSTANDING
- PROPOSED TEMPORARY ENABLING WORKS COMPOUND
- SITE ENTRANCE
- PROPOSED WATERCOURSE CROSSING
- PROPOSED TEMPORARY CONSTRUCTION COMPOUND
- PROPOSED BORROW PIT SEARCH AREA
- PROPOSED BATTERY STORAGE COMPOUND
- PROPOSED TRACK
- PROPOSED CONTROL BUILDING AND SUBSTATION COMPOUND
- PROPOSED TEMPORARY TRACK
- TURNING HEAD

PRIVATE WATER SOURCE

- BOREHOLE
- RESERVOIR
- SPRING
- STREAM
- WELL (UNCONFIRMED)
- MAINS
- PROPERTY WITH PWS
- PROPERTY WITH UNCONFIRMED PWS
- WATERCOURSE (OS OPENMAP LOCAL)
- WATERCOURSE 50 M BUFFER
- WATERBODY (OS OPENMAP LOCAL)
- SEPA NESTED WATERBODY CATCHMENT



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REPORT 2023

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