Volume 4: Appendix 6.4 – Private Water Supply and Groundwater Abstractions Assessment

Scottish & Southern Electricity Networks

TRANSMISSION

Emmock and Tealing 400 kV Overhead Line Tie-Ins Environmental Impact Assessment Volume 4 | Appendix 6.4

Private Water Supply and Groundwater Abstractions Assessment

September 2025

CONTENTS

LIST OF ABBREVIATIONS

CEMP – Construction Environmental Management Plan
CIRIA – Construction Industry Research and Information Association
ECoW – Environmental Clerk of Works
EIA – Environmental Impact Assessment
EIAR – Environmental Impact Assessment Report
EPZ – Equipotential Zone
GEMP – General Environmental Management Plans
GPP – Guidance for Pollution Prevention
LiDAR – Light Detection and Ranging
m AOD – Metres Above Ordnance Datum
OHL – Overhead Line
PWS – Private Water Supplies
SEPA – Scottish Environment Protection Agency
SuDs – Sustainable Drainage Systems

1. INTRODUCTION

1.1.1 This appendix details the assessment undertaken to identify Private Water Supplies (PWS) and groundwater abstractions that may be affected by the proposed Emmock and Tealing Overhead Line Tie-ins and associated infrastructure (the 'Proposed Development') as described in **Volume 1, Chapter 3: Project Description** of the Environmental Impact Assessment Report (EIAR).

1.1.2 The Proposed Development is located within the administrative boundary of Angus Council. The Site is located in the Tealing area in Angus. The proposed infrastructure spans a distance of approximately 3.5 km between the existing Tealing Substation to the southeast of Balkello Hill. PWS and groundwater abstractions located within a 1 km buffer from the Proposed Development have been identified and potential risk to the source and associated properties assessed based on topography and distance from the proposed infrastructure

1.1.3 Scottish Environment Protection Agency (SEPA) guidance[1] on assessing the effects of developments on groundwater abstractions (including public and private water supplies) states that the relevant buffer zones for groundwater abstractions for all proposed infrastructure, both temporary and permanent are:

- 10 m for all activities;
- 100 m radius of all subsurface activities less than 1 m in depth; and
- 250 m of all subsurface activities deeper than 1 m.

1.1.4 A 250 m buffer was applied to all proposed infrastructure due to uncertainties in excavation depths of the Proposed Development. Excavations for the new towers will be ~4 m deep. It is likely that most access tracks, working areas and towers to be dismantled will require minimal excavations of less than 1 m, however, there may be some areas where more than 1 m of cut is required on access tracks, working platforms and equipotential zone (EPZ) locations, dependent on further detailed design. Given the uncertainty, a conservative approach has been taken, assuming a 250 m buffer from all proposed infrastructure. A 250 m buffer was also used for surface water abstractions to account for potential effects arising through surface water runoff.

1.1.5 The SEPA (2024) guidance[1] provides a matrix which shows how both the scale of the effects (magnitude) and the importance (sensitivity) of the abstraction must be considered when assessing potential impacts. This is shown in **Table 1.1: SEPA matrix to assess effects upon PWS/abstractions**.

Table 1.1: SEPA matrix to assess effects upon PWS/ abstractions

How much is it affected					
		Substantially	**Moderately**	**Slightly**	**Negligibly or not at all**
How Important is it?	High/Important	Major	Major	Medium	Negligible / no effect
	Moderately Important	Major	Medium	Low	Negligible / no effect
	Low Importance	Medium	Low	Low	Negligible / no effect
	Unimportant	Unimportant effect	Unimportant effect	Unimportant effect	Negligible / no effect

[1] SEPA, 2024. *Guidance on Assessing the Impacts of Developments on Groundwater Abstractions*. Available at: https://www.sepa.org.uk/environment/land/planning/guidance-and-advice-notes/

1.1.6 Factors recommended by SEPA (2024) to be considered when assessing potential effects include extent, magnitude, duration, frequency, reversibility, likelihood and cumulative effects.

1.1.7 To assess the potential importance of groundwater abstractions, SEPA suggest:

- Scottish Water abstractions are assessed as being of High importance;
- PWS for human consumption are likely to be of Moderate importance; and
- Other non-potable abstractions are likely to be Low to Moderate importance, depending on the purpose of the abstraction.

1.1.8 SEPA note that if the potential impacts to groundwater abstractions are Low or Unimportant, then no further risk assessment is required.

1.1.9 It should be noted that the data on PWS and abstractions is the best available data at the time of writing and is based on consultation with Angus Council, SEPA and local residents via questionnaire surveys, consultation events and property and source visits.

2. DATA SOURCES AND METHODOLOGY

2.1.1 Angus Council were consulted in July 2023 and provided data from their database of properties and businesses supplied by a PWS within a search area of approximately 1 km from the Proposed Development. It is noted that this data may be incomplete and generally refers to the property (and not source) locations.

2.1.2 Within the search area, Angus Council provided three properties indicated to be served by PWS within 1 km along with supply type (e.g. spring), but no confirmed source locations. SEPA was consulted in September 2023 and again in October 2024. SEPA provided a list of licensed abstractions within the search area. There are three licensed abstractions within the search area, two for surface water and one for groundwater.

2.1.3 A detailed assessment and verification of the data was required to establish the definitive locations of PWS sources, abstractions and supplied properties that may be potentially affected by the Proposed Development.

2.1.4 The online Scottish Water Asset map[2] was consulted to eliminate groups of properties that are shown to be connected to the Scottish Water mains. PWS questionnaires were then posted to all remote properties within approximately 1 km from the Proposed Development, which have the potential of having a PWS to establish whether they were on a PWS or mains connection and to obtain further information on the PWS, if applicable. SSEN Transmission, hereby referred to “The Applicant” also collected PWS information at public consultation events in September and October 2024, providing residents with questionnaires if they had not received them in the post.

2.1.5 In total, 12 individual responses were received from the questionnaires, either via paper, email, consultation events or an online response. A site visit was carried out on 3 April 2025 by hydrologists from Kaya Consulting to North Balluderon Farm to collect additional information regarding the PWS and source location.

2.1.6 Many of the questionnaire respondents noted that their properties were supplied by Scottish Water mains, so these were recorded and discounted from the assessment. Four PWS/abstractions were identified which had sources within 250 m of the Proposed Development. The PWS at Balkemback Farm and Myreton of Claverhouse also have SEPA licences for the abstractions. These are summarised in **Table 2.1** below.

2.1.7 **Volume 3, Figure 6.1: Abstractions and Water Supplies** show the locations of PWS abstraction sources, alongside locations of properties served by PWS. The figures are labelled with information on the supply and property names.

[2] Scottish Water, n.d. Scottish Water Asset Data. Scottish Water GIS Extranet. [Online] Available at: https://sw.cloud.esriuk.com/portal/apps/webappviewer/index.html?id=ee4bc6712ce64290b41b2d998ec7a749.

Table 2.1: PWS sources and abstractions within 250 m of the Proposed Development

ID	Source Name	Source type	Source Easting	Source Northing	PWS Council/ SEPA abstraction reference (if applicable)	Properties supplied and property location	Usage	Distance of source from infrastructure
1	Balkemback Farm	Spring	338550	738750	SEPA Ref: CAR/L/1010489	Balkemback Farm NGR 339175, 738095	Agricultural (other than irrigation)	The spring supply is located approximately 25 m east of an existing track that will be used to dismantle the existing OHL towers.
2	North Balluderon Farm	Spring	337149	738996	N/A	North Balluderon Farm NGR 337601, 738637	General Farm Use, Domestic	The abstraction source is approximately 450 m west of the nearest proposed new tower and 185 m north and upslope of proposed permanent stone track. The source is 70 m northwest of an existing tower with trackway access.
3	Myreton of Claverhouse	Borehole Surface Water (Fithie Burn)	339780 339848	736870 736795	CAR/R/1046216	Myreton of Claverhouse NGR 339690, 736755	Water Resources (Crops)	SEPA data indicates that there are two source locations; one is a groundwater abstraction from a borehole and the other an abstraction from the Fithie Burn (surface water), both abstractions are close to the Fithie Burn. The abstractions are 30 m and 110 m south of a proposed access route (no excavation) and over 400 m south of working areas for proposed new towers TW3 and TE3.
4	Abstraction from Fallaws Burn at Jeanfield	Surface Water (Fallaws Burn)	336583 336450	737128 735520	CAR/L/1004607	The abstraction is for agriculture (irrigation) around South Fallows Farm. The licence holder is Prieston Farm NGR 339251, 738706	Agriculture (irrigation)	The abstraction is from the Fallaws Burn. The upstream location of the abstraction licence is beneath the existing OHL, just north of Jeanfield Farmhouse (**Volume 3, Figure 6.1: Abstractions and Water Supplies)**. The downstream limit of the abstraction is at the confluence of the Fallaws Burn with the Dighty Water. There is no proposed infrastructure associated with the existing OHL. The closest infrastructure to the abstraction is approximately 800 m to the west (trackway and EPZ pulling area). Given the distance from any proposed infrastructure, there will be no effect on the abstraction and this is not considered further in this assessment.

3. PWS ASSESSMENT

3.1 Overview

3.1.1 In the absence of data on groundwater levels and groundwater flow paths, an analysis of topography and surface water flows paths and the type of PWS was used to infer hydrological and hydrogeological connectivity and identify if the Proposed Development could potentially have an effect on a PWS. **Plates 3.1** to **3.3** in this report show the surface water indicative flow paths and topography, along with the nearest infrastructure of the Proposed Development for each PWS.

3.1.2 Flow path analysis was undertaken for sources and properties to assess potential hydrogeological and hydrological connectivity to the Site. Flow routeing was carried out in QGIS software using Light Detection and Ranging (LiDAR) terrain data, where available, or using Ordnance Survey (OS) contour mapping if detailed topographic data was not available.

3.1.3 For PWS and abstractions that are sourced from groundwater (wells and/or springs) this assumes that groundwater flows paths are similar to surface water flows paths (a reasonable inference in the absence of groundwater levels and groundwater flow data). The results of the flow routeing analysis were used to determine the potential effect on PWS and what further environmental protection measures may be required.

3.1.4 The assessment is undertaken assuming that a suite of environmental protection measures is implemented during construction. These plans and documentation will incorporate best practice guidance and recognised industry standards (eg SEPA guidance, including their *Guidance for Pollution Prevention* (GPPs)[3], CIRIA (Construction Industry Research and Information Association) The SuDS (Sustainable Drainage Systems) Manual[4] and CIRIA control of water pollution guidance[5,6,7]). They will comprise a Construction Environmental Management Plan (CEMP) that will comprise, among other requirements, a suite of SSEN Transmission General Environmental Protection Plans (GEMPs) and contractor authored documentation. This will detail general and site-specific measures that will be implemented and effected through planning conditions, construction contract wording or both.

3.1.5 The CEMP will capture all measures required to manage environmental risks in respect of hydrology and water quality in order to comply with relevant legislation. This will be implemented during construction and operation of the Proposed Development. This includes SSEN Transmission's GEMP TG-NET-ENV-512 (Working in or Near Water), TG-NET-ENV-515 (Watercourse Crossings), TG-NET-ENV-519 (Forestry), TG-NET-ENV-518 (Private Water Supplies), TG-NET-ENV-523 (Bad Weather), GEMP: Soil Management and TG-NET-ENV-520 (Dust Management). The implementation and audit of the measures in the CEMP and GEMP will be overseen by an Environmental Clerk of Works (ECoW). Further details are provided in **Volume 4, Appendix 3.4 Outline Construction Environmental Management Plan (CEMP)**.

3.1.6 The following sections describes the assessments of all PWS sources within 250 m of the infrastructure of the Proposed Development (**Table 2.1: PWS sources and abstractions within 250 m of the Proposed Development**).

3.1.7 Given the proximity of the infrastructure of the Proposed Development to three of the PWS sources identified, SSEN Transmission will commit to monitoring the water supplies before, during and after construction. The monitoring strategy will be developed in consultation with SEPA and will follow SEPA (2024)[1] guidance on monitoring. Baseline monitoring will commence at least 12 months ahead of the construction of the Proposed Development and will

[3] Natural Resources Wales (NRW) Northern Ireland Environment Agency (NIEA), SEPA, Guidance for Pollution Prevention (GPPs 1,2,5,6,8,21,22,26) [online]. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/ [Accessed: 20 May 2025].

[4] Woods Ballard, B., Wilson, S., Udale-Clarke, H. et al., (2015) CIRIA: The SuDS Manual (C753). CIRIA.

[5] Masters-William, H. (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532). CIRIA.

[6] Murnane, E, Heap, A, Swain, A (2006) Control of water pollution from linear construction projects. Site guide (C649) CIRIA.

[7] Murnane, E, Heap, A, Swain, A (2006) Control of water pollution from linear construction projects. Technical guide (C648) CIRIA.

continue during the construction phase, and for a minimum of 12 months post-construction. A PWS monitoring plan will be prepared prior to construction.

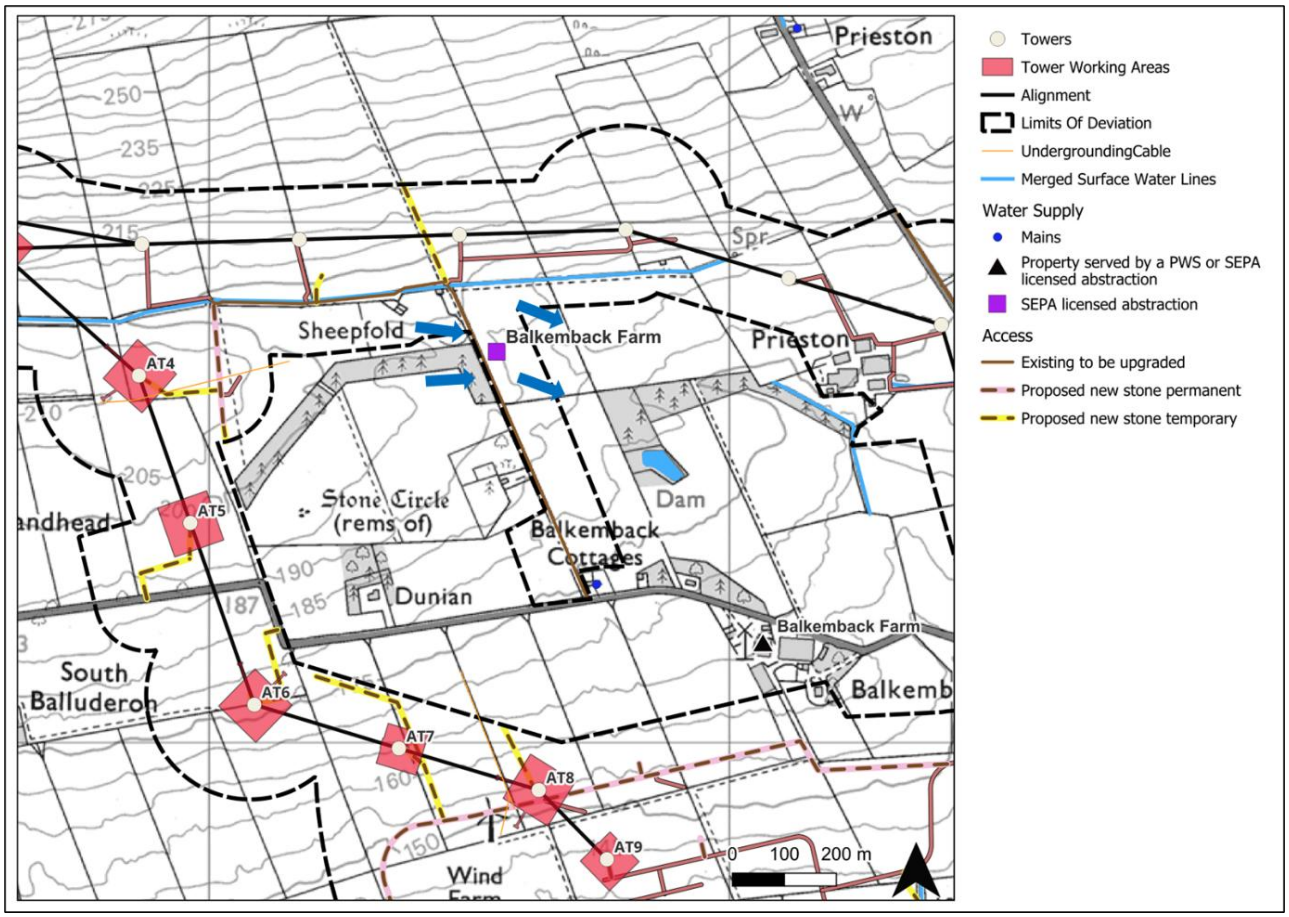
3.2 Balkemback Farm- PWS (SEPA licensed abstraction from groundwater spring)

3.2.1 Balkemback Farm is served by a spring, located around 500 m northwest of the property, shown in **Plate 3.1**. The abstraction rate from the spring is unknown. A resident at the adjacent Balkemback Farm Cottages has confirmed they are served by a Scottish Water Mains supply, so it is likely that Balkemback Farm is also served by a Mains supply for domestic use and that the PWS is utilised for general farm use.

3.2.2 The topography of the Balkemback Farm spring slopes gently downhill to the southeast. The spring sits directly beside what was the previous, natural route of a watercourse which has since been diverted, which is shown clearly in topographic mapping. SEPA flood mapping indicates that this route and the area at the spring are part of a surface water flow pathway, with surface flows draining to the southeast. The nearest proposed new tower (AT4) is sited approximately 690 m west of the spring abstraction location, with the spring sited downslope of the tower. Given the distance, it is considered highly unlikely that construction of tower AT4 will affect the PWS quality and quantity at the spring. There is existing track, which will be used (and upgraded, if required) during construction, approximately 25 m west and upslope of the spring abstraction location (**Plate 3.1**). There is minor potential for construction runoff to affect the PWS quality, although environmental control measures during construction (such as construction SuDS, swales, silt fences etc.) will minimise any risk. As this is an existing track, no excavation will be required during any upgrades and, consequently, there is considered to be no effect on groundwater levels/quantity. As the PWS is understood to be for general farm use it is considered to be of low importance (sensitivity) and the significance of the effect on the spring source is considered to be **negligible**.

3.2.3 Monitoring of the spring will be undertaken before, during and after construction to check there is no contamination of the supply. Monitoring will be undertaken by an ECoW, and monitoring would likely be at the spring abstraction location or the tap. If the water quality deteriorates during construction (eg discoloured, high sediment content, hydrocarbons), or quantity decreases an alternative water supply will be installed, such as using the existing mains supply to the farm or using portable bowsers, to ensure minimal disruption of supply during construction.

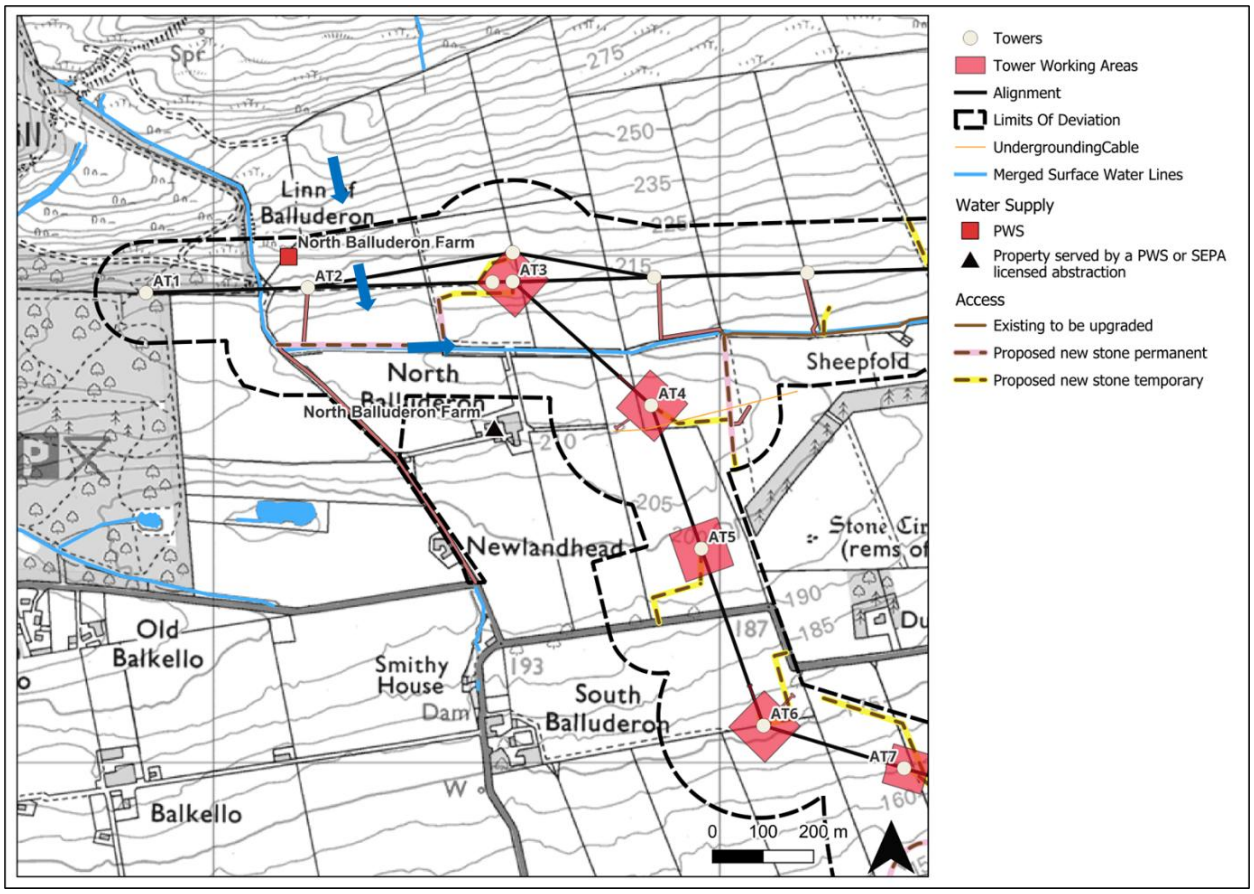
Plate 3.1: Balkemback Farm PWS, topography and indicative surface flow paths (blue arrows)



3.3 North Balluderon Farm PWS (PWS from groundwater spring)

3.3.1 North Balluderon Farm is served by a groundwater spring abstraction which is located approximately 450 m west of the nearest proposed new tower (AT3), 185 m north and upslope of a proposed permanent stone track and 70 m northwest of an existing tower with trackway. This is shown in **Plate 3.2** below, which marks the PWS source abstraction (red square) and supplied property (black triangle). A site visit to North Balluderon Farm confirmed that the property is not served by a Scottish Water Mains connection and that there is a storage tank at the PWS abstraction point for the groundwater spring. The PWS is utilised for both general farm and domestic use.

Plate 3.2 North Balluderon Farm PWS, topography and indicative surface flow pathways (blue arrows)



3.3.2 The topography at the spring abstraction location slopes downhill to the south towards an unnamed tributary of the Tealing Burn. There are no proposed works upslope of the groundwater spring abstraction location and therefore there will be no effect on groundwater quality as a result of construction runoff. There are no proposed excavation works at the existing tower and the nearest proposed tower is approximately 450 m to the west. There is a section of proposed new permanent track approximately 185 m south and downslope of the spring abstraction. Generally, track excavations will be less than 1 m depth. The proposed new track is located at ~210 m Above Ordnance Datum (AOD) and runs parallel to the small watercourse. The spring abstraction is at ~230 m AOD, over 20 m higher than the proposed track. It is therefore considered highly unlikely that minor excavations for the track will impact the groundwater table in the vicinity of the spring abstraction and the amount the PWS source is affected was assessed to be negligible. The importance (sensitivity) of the PWS is considered moderate, as it is for domestic use, and the significance of effect is considered to be **negligible**.

3.3.3 However, further investigation and additional consultation will be required to ascertain the route of the PWS distribution pipework from the abstraction/storage tank location to North Balluderon Farm to ensure that pipework is avoided and protected during construction.

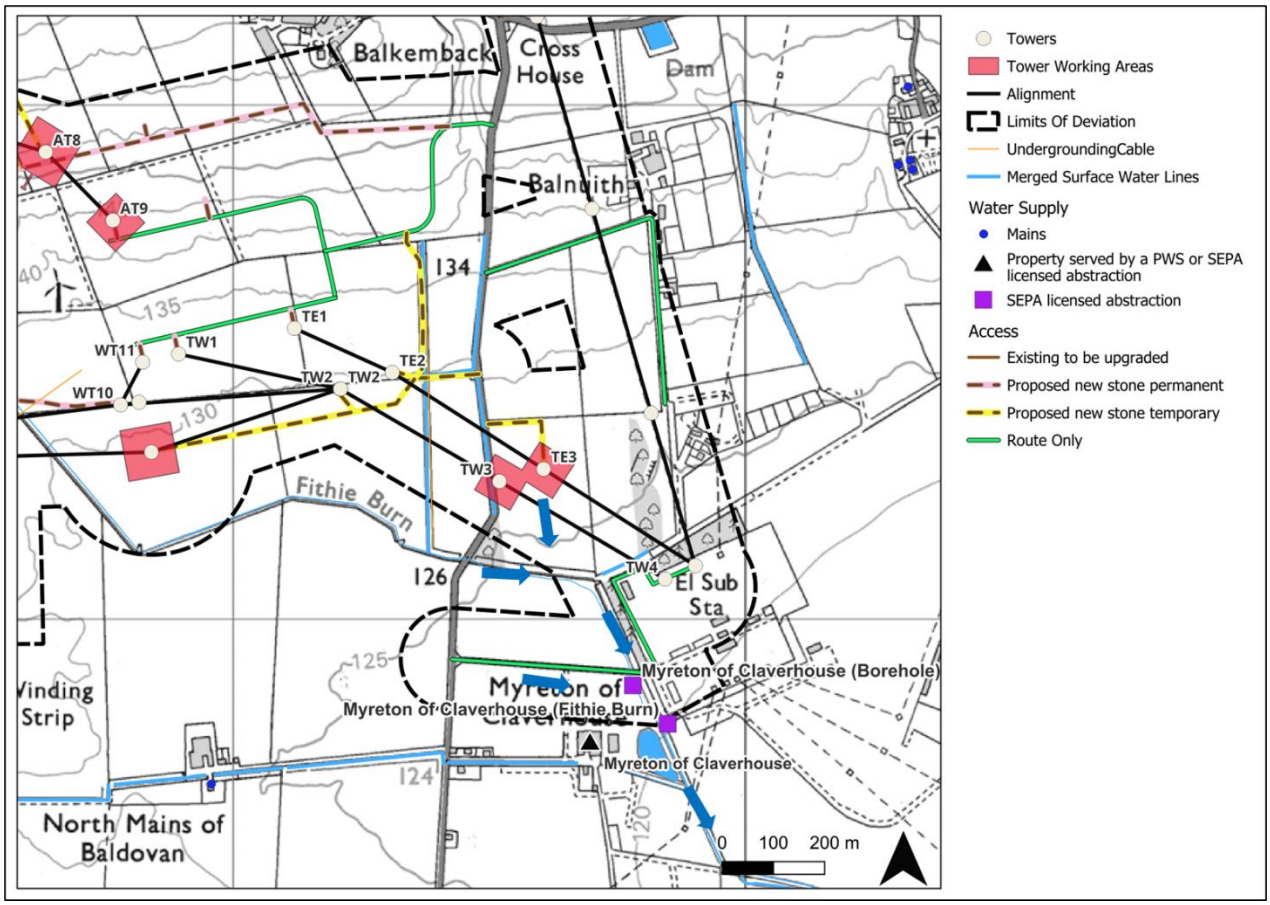
3.3.4 Monitoring of the spring PWS will be undertaken before, during and after construction to check there is no contamination of the supply or change in quantity of supply. Monitoring will be undertaken by ECoW, and monitoring would likely be from the tap at the supplied property location. If the water quality deteriorates during construction (e.g. discoloured, high sediment content, hydrocarbons) or quantity decreases an alternative water supply will be installed at the PWS property, such as portable bowsers, to ensure minimal disruption of supply during construction. In the worst-case scenario, the environmental control measures detailed in the CEMP will include a commitment from the Applicant to provide a new PWS for the property or provide a connection to the Scottish Water mains.

3.4 Myreton of Claverhouse- PWS (SEPA licensed abstraction from groundwater borehole and Fithie Burn)

3.4.1 Myreton of Claverhouse is served by two separate sources, one is a groundwater borehole source and the second is a direct surface water abstraction from the Fithie Burn. Both sources are SEPA licensed abstractions. These are

detailed in **Plate 3.3** below. The abstraction rate from both sources is unknown. The supplies are utilised for agriculture (crops).

Plate 3.3 Myreton of Claverhouse PWS, topography and indicative surface flow pathways (blue arrows)



3.4.2 The topography at both abstraction points slopes very gently downhill to the south and east. The nearest tower excavation working area is approximately 400 m to the north at TW3. There are no proposed works requiring excavation within 250 m of the abstractions and therefore there will be no effect on groundwater quantity as a result of construction activities. The nearest track utilised for the Proposed Development is approximately 30 m and 110 m north of the abstractions, respectively. This track is an access route only with no proposed track upgrades or construction activities. Surface flow pathways from towers TW3 and TE3 drain downslope towards the Fithie Burn. However, the tower working areas are approximately 120 m from the burn and with environmental control measures during construction (such as construction SuDS, swales, silt fences etc.) there is not anticipated to be any effect on water quality at the downstream abstraction from the burn. As there is no excavation which will affect the sources and no likely effect on water quality, the amount that both of the PWS sources is affected is considered to be negligible. The importance (sensitivity) of the PWS is considered low (as it is for agricultural use) and the significance of effect is considered to be **negligible**.

3.4.3 Monitoring of the PWS will be undertaken before, during and after construction to check there is no contamination of the supply. Monitoring will be undertaken by an ECoW, and monitoring would likely be at the supply tap. If the water quality deteriorates during construction (eg discoloured, high sediment content, hydrocarbons), or quantity decreases an alternative water supply will be installed, such as using the existing mains supply to the farm or using portable bowsers, to ensure minimal disruption of supply during construction.

4. SUMMARY AND CONCLUSIONS

4.1.1 This appendix details the assessment undertaken to identify PWS and abstractions that may be affected by the infrastructure of the Proposed Development.

4.1.2 Angus Council and SEPA provided data on PWS and groundwater abstractions within a 1 km buffer of the Proposed Development. The Council data is caveated as the provided information cannot be guaranteed to be fully accurate, up-to-date or comprehensive. Data on PWS was also obtained through consultation with local residents and farms via questionnaires, public consultation events and property visits.

4.1.3 SEPA (2024) guidance on assessing the effects of developments on groundwater abstractions (including public and private water supplies) states that the relevant buffer zones for groundwater abstractions for all proposed infrastructure, both temporary and permanent are:

- 10 m for all activities;
- 100 m radius of all subsurface activities less than 1 m in depth;
- 250 m of all subsurface activities deeper than 1 m.

4.1.4 During design development any known PWS and groundwater abstractions were avoided and buffered appropriately, where possible. Given the existing infrastructure that the Proposed Development will join, and the rural setting of the Site, it was not possible to meet the recommended infrastructure buffers in all cases. This assessment provides a detailed assessment of abstractions and PWS sources that are within 250 m of the Proposed Development. A summary is provided in **Table 4.1: Summary of Effects**. During construction, the Applicant will be cognisant of the locations of PWS sources and abstractions (and associated pipework) and will follow all measures that will be detailed in the CEMP to minimise potential effects, undertake monitoring and provide alternate supplies if a PWS becomes compromised.

4.1.5 The assessment concludes that the effect is **Negligible** for all PWS/ abstractions (see final column in **Table 4.1)**.

Table 4.1: Summary of Effects

PWS/Abstraction Source Name	Environmental Control Measures	SEPA Grading of Potential Effect
Balkemback Farm	Monitoring before, during and after construction.	Negligible
North Balluderon Farm	Investigation and cognisance of the distribution network before, and during construction. Monitoring before, during and after construction; if required, install an alternative water supply, e.g. using portable bowsers.	Negligible
Myreton of Claverhouse	Monitoring before, during and after construction.	Negligible