APPENDIX 12.1: PRIVATE WATER SUPPLY RISK ASSESSMENT (PWSRA)

1. INTRODUCTION

1.1 Overview

1.1.1 A Private Water Supply Risk Assessment (PWSRA) has been conducted for water supplies that may be affected during the construction and operation of Greens Substation ("the Proposed Development"). The Proposed Development is located in Aberdeenshire near New Deer, as shown on **Volume 3, Figure 1.1: Site Boundary** and described in **Volume 2, Chapter 3: Project Description** of the Environmental Impact Assessment (EIA) Report. The Proposed Development is situated within Aberdeenshire Council (AC) area. This appendix should be read in conjunction with **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils** of the EIA Report and Private Water Supply (PWS) locations are shown in **Volume 3, Figure 12.1: Hydrological Features**.

1.2 Scope

1.2.1 The purpose of this assessment is to ascertain the potential risk to the identified PWS within 1 km of the Proposed Development Site (hereafter referred to as 'the Site'), as these could potentially be affected due to construction and / or operation of the Proposed Development. The assessment adopts a phased approach to evaluate risk through the formulation of a Source-Pathway-Receptor (SPR) conceptual model. Where appropriate, the assessment provides recommendations for potential mitigation measures.

1.2.2 The PWSRA also identifies any groundwater abstractions and where necessary provides a detailed qualitative and / or quantitative Risk Assessment. The PWSRA was produced in accordance with the Scottish Environment Protection Agency (SEPA): Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions[1].

1.3 Legislation, Policy, and Guidance

1.3.1 Legislation, policy, and guidance relating to good practice during the construction of the Proposed Development in the preparation of this document is outlined in **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils**.

[1] SEPA, (2024). Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions [Accessed November 2024].

2. METHODOLOGY

2.1 Overview

2.1.1 The PWSRA has been undertaken based on the following methodology:

- completion of a desktop assessment to put the hydrological and hydrogeological setting of the Proposed Development into context (available in **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils** of the EIA Report) including the development of a site-specific conceptual site model (CSM);
- a review of Ordnance Survey (OS) mapping and available aerial imagery to identify any potentially unregistered PWS;
- consultation with AC and PWS users (where necessary) to confirm the location and nature of each supply;
- based on the information provided, screening out supplies that are considered unlikely to be affected by the Proposed Development. For PWS with a plausible hydrological / hydrogeological connection to the Proposed Development, written consultation or a site visit to verify the location and nature of their supply has been undertaken;
- preparation of a risk assessment to determine the potential effects of the Proposed Development on the quality and quantity of the water serving the supply; and
- identification of any additional measures, which are included as part of the EIA Report and Risk Assessment, to avoid and mitigate against any potential adverse effects resulting from the Proposed Development.

2.2 Conceptual Site Model

2.2.1 A desktop assessment has been used to compile a CSM and was supported using the following secondary data sources:

- geological and hydrogeological information obtained from the British Geological Survey (BGS)[2];
- monthly precipitation and climate data from the Met Office[3];
- Scotland's Environment map[4];
- SEPA River Basin Management Plans[5]; and
- other information published online concerning details of PWS within the vicinity of the Site.

2.2.2 Details of the existing site conditions can be found detailed in **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils**. The CSM has also been supported by site specific walkover surveys which were carried out by appropriately qualified professionals. These included visits to specific PWS, as well as the wider catchment areas.

2.3 PWS Screening

2.3.1 Consultation with AC was undertaken, collating PWS records within a 1 km buffer of the Site, as described in **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils**. The requested PWS data was provided by AC in February 2024. Following this, an initial screening was conducted to determine which properties required direct consultation.

2.3.2 The screening exercise served to exclude properties where hydrological or hydrogeological connectivity was judged implausible. These were determined considering the following:

- PWS abstraction types and relative position to the Site;

[2] BGS, (2021). Geology of Britain viewer [online]. Available at: https://www2.bgs.ac.uk/groundwater/datainfo/hydromaps/home.html [accessed November 2024].
[3] Met Office, UK climate maps and data [online]. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data [accessed November 2024].
[4] Scotland's Environment map [online]. Available at: https://environment.gov.scot/ [accessed November 2024].
[5] SEPA, (2021) The River Basin Management Plan for Scotland 2021 – 2027 [online]. Available at: https://www.sepa.org.uk/environment/water/river-basin-management-planning [Accessed November 2024].

- surface water catchment boundaries, channel networks and surface water flow paths, particularly for surface abstractions within 500 m of the Site;
- underlying aquifer properties, including groundwater flow pathways, specifically including any groundwater abstractions within 250 m of the Site;
- topography; and
- dominant land uses.

2.3.3 PWS with no plausible pathway between the Proposed Development infrastructure and their source zone were screened out of further assessment, with justification provided in **Table 4-1**.

2.4 Consultation

2.4.1 Where a plausible connection was identified in the screening of PWS, users were contacted to obtain more information regarding their supply. This process involved the WSP Land Team sending residents a letter along with a questionnaire as shown in **Annex A**. The purpose and contents of these documents are outlined below:

- the letter explained the nature of the works and the purpose of the assessment;
- the brief questionnaire asked residents to provide details on their supply (e.g. supply type, usage etc.), and asked permission to undertake an inspection should further information be needed; and
- a map showing the location of the property was also included, with residents asked to indicate the location of their supply.

2.4.2 The information obtained from consultation / site walkover survey (**Annex B**) was used to develop the CSM and risk assessment.

2.4.3 Where no information was provided, assessment was based on other information available including AC data, desktop reviews of geology and topography, and PWS information provided by other residents / PWS users, and recommendation was made for further investigation, as required.

2.5 Risk Assessment

2.5.1 A methodology for risk assessment of PWS is contained within Section 4 of the Private Water Supplies Technical Manual[6], published by the Drinking Water Quality Regulator for Scotland. When assessing supply compliance with the PWS regulations, local authorities are required to consider factors, such as, proximity of the supply to livestock, and wildlife, historical and current land use, and historical maintenance conducted on the supply. Such factors are useful for understanding the baseline qualities of a supply. However, due to the specific nature of works being conducted for the Proposed Development, it was not considered relevant or practical to directly apply the methodologies set out in this guidance.

2.5.2 The Proposed Development involves unique characteristics and potential impacts that require a tailored approach. Standard methodologies may not fully address the specific risks associated with the construction and operation of the substation. Therefore, the assessment relies on professional experience and judgment to address site-specific conditions and risks more effectively. This approach allows for a more nuanced and context-specific evaluation, incorporating best practices and mitigation measures most relevant to the circumstances of the Proposed Development.

2.5.3 The methodologies adopted within the assessment are based on professional experience and taking account of the above guidance to establish the various factors which influence risk to the supplies. The Risk Assessment considered the types of hazards associated with the Proposed Development, including potential contaminant release, and potential magnitude and severity of impact. The SPR concept model was used as the underlying model to assess the risk posed by the development activities. In this model:

- source refers to the source of the potential hazard (not to be confused with PWS source);

[6] DWQR, (2006). Available at: pws-technical-manual-section-4-risk-assessment-for-private-water-supplies.pdf (dwqr.scot) [Accessed November 2024].

- pathway refers to the mechanisms by which the hazard is transmitted to the receptor; and
- receptor refers to anything or anyone that could be adversely affected by the hazard (including the source of water supplying the abstraction and associated infrastructure).

2.5.4 Where hydrological / hydrogeological connectivity exists between a potential contamination source and the receptor by means of a pathway, then a 'pollutant linkage' and associated risk exists. Where there is no pollutant linkage, there will be no associated risk. For any PWS it must first be established if there is a risk to mitigate and then, if necessary, introduce mitigation measures to reduce the risk. Such risks are often sufficiently reduced through embedded design and good practice mitigation. In the event a risk remains after these, then additional mitigation may be required to sufficiently reduce residual risks.

2.5.5 The Risk Assessment considers the type of hazard associated with the Proposed Development, based on the probability and magnitude of change occurring. In addition to contamination, there is also the possibility that supply continuity could be affected through water quantity reduction.

2.5.6 Where risk or uncertainty is identified and further protection or mitigation is appropriate, this should ensure the PWS is:

- adequately preserved in terms of both water flow and water quality; and / or
- replaced by an alternative process whereby potable water is made available on a temporary or permanent basis, as appropriate.

2.5.7 Whilst they may be of low national or regional importance in EIA terminology, individual PWS are clearly very sensitive features to PWS users. In accordance with definitions presented in **Table 12-2, Sensitivity of Receptor Criteria** in **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils**, PWS for domestic use are considered of High Sensitivity.

Significance Criteria

2.5.8 The potential impact on PWS has been assessed by evaluating the likelihood of an impact occurring and the magnitude of any such event on the receiving environment. The receiving environment refers to the natural and built surroundings that could be affected by the Proposed Development, including water sources, land, and ecosystems. The probability of an impact has been classified as high, medium, low, or negligible based on criteria outlined in **Table 2-1**. The likelihood of impacts on the quality and quantity of water serving the PWS is influenced by the type of supply and its source abstraction location within the catchment in relation to the Proposed Development activities.

Table 2-1 Probability of impact

Probability	Definition	Examples
High	There is pollutant linkage, an event is likely in the short-term and very likely in the long-term.	The Site overlies point of abstraction or is immediately upgradient (<100 m). Proposed infrastructure footprint occupies >25% of indicative source zone catchment area.
Medium	There is pollutant linkage, it is possible that an event shall occur in short term, likely over the long-term.	The Site is upgradient and within the vicinity of point of abstraction (>100 m to 250 m). Proposed infrastructure footprint occupies 5-25% of indicative source zone catchment.
Low	There is pollutant linkage. However, it is very unlikely an event would occur in short term, rising to unlikely in the long term.	The Site is within the same catchment area and upgradient but >250 m to 500 m from point of abstraction.

		Proposed infrastructure footprint occupies <5% of indicative source zone catchment area.
Negligible	There is a plausible pollutant linkage, but circumstances are such that it is improbable to occur in any timeframe.	The Site is within the same catchment area and upgradient but >500 m from point of abstraction. Proposed infrastructure footprint occupies <5% of indicative source zone catchment area.

2.5.9 As outlined above, potential impacts on PWS have been assessed taking account of the type of supply and possible connection to the source through the presence / absence of pollutant linkages. The magnitude of potential change to that supply is defined below in **Table 2-2**.

Table 2-2 Magnitude of change

Magnitude	Examples
Major	Major change to the hydrological / hydrogeological conditions resulting in temporary or permanent change. Complete disruption to operation of supply, impacting on quality and quantity available in long-term.
Moderate	Detectable change to the hydrological / hydrogeological conditions resulting in non-fundamental temporary or permanent change. Partial disruption to the operation of the supply, impacting on quality and quantity.
Minor	Detectable but minor change to the hydrological / hydrogeological conditions, returning to previous condition in short-term. Minor degradation in the operation of the supply in terms of quantity and or quality.
Negligible	No perceptible change to the hydrological / hydrogeological conditions.

Impact Significance Matrix

2.5.10 The likelihood and magnitude of the potential impacts are combined to define the significance of the impact, as shown in **Table 2-3**. This table provides a guide to assist in the decision making but should not be considered a substitute for professional judgement and interpretation. In some circumstances, the magnitude of change may be unclear and professional judgement, including precautionary considerations where data is uncertain, has been applied to identify the potential significance.

2.5.11 The significance of the risk considers the successful implementation of the good practice environmental management practices that will be adopted throughout the works. Should the supply still be considered at risk, further details on specific mitigation and monitoring recommendations are provided, with an associated residual risk outcome.

Table 2-3 Risk matrix

Probability of Impact	Magnitude of Change			
	Major	Moderate	Minor	Negligible
High	Very High	High	Medium	Medium / Low
Medium	High	Medium	Medium / Low	Low
Low	Medium	Medium / Low	Low	Negligible
Negligible	Medium / Low	Low	Negligible	Negligible

2.5.1 Very High or High risks are likely to constitute Major or Moderate effects and therefore significant, as defined in **Table 12-4 Significance Matrix** of **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils**.

3. CONCEPTUAL SITE MODEL

3.1.1 For a pollutant linkage to exist, sources, pathways and receptors must align in a manner that facilitates the transmission of a pollutant (or harm) to a receptor. The main impacts that can be imparted upon a PWS receptor is degradation in water quality or a reduction in quantity.

3.1.2 Information concerning the environmental setting of the Site and the surrounding area is presented in **Volume 2, Chapter 12: Hydrology, Hydrogeology, Geology and Soils**. Based on the assessment, the following CSM is presented that will be used to support the assessment of potential risks to PWS.

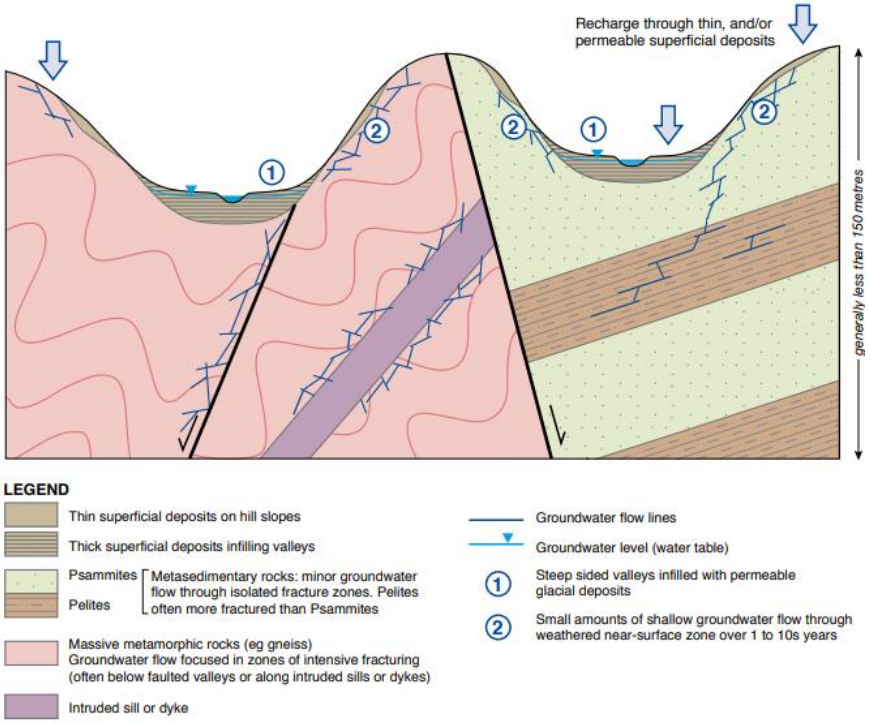
3.1.3 According to BGS GeoIndex Onshore Hydrogeology 1:625,000 mapping[7], the Study Area is underlain by Southern Highland Group, low productivity aquifer, which typically maintain small amounts of groundwater near the surface weathered zone and secondary fractures. The desktop assessment indicates the presence of two main groundwater systems:

- steep sided valleys infilled with permeable glacial deposits (1); and
- a shallow system that is largely dependent on surface water runoff and shallow throughflow (2) (**Plate 3-1**).

3.1.4 Based on site observations and professional judgement, the Site has been categorised as being within system 2 (**Plate 3-1**) due to the lack of steep valleys. Supplies obtaining water from the underlying bedrock will be limited by the nature and extent of tectonic features or fractures, with the intergranular permeability being practically zero. Under such circumstances, the upper weathered margins of the bedrock will be a preferential flow pathway, typically extending hundreds of metres, but recharge via infiltration will be limited by the permeability of overlying soils. As a result of these characteristics, and with the exception of tectonic features, surface water catchments will provide a reasonable proxy for modelling groundwater. In the cases of the PWS considered, it is possible that recharge to abstraction points may be via a combination of surface / shallow superficial deposits and bedrock systems.

[7] BGS GeoIndex Onshore Viewer for Hydrogeological map of Scotland (2020). [online] Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSHydroMap&_ga=2.59199725.1532853921.1644263485-96331536.1635767367 [Accessed November 2024]

Plate 3-1 Cross-sectional illustration of the CSM for the Site and underlying groundwater (Hydrogeological conceptual model for Schematic cross-section of the hydrogeology of Precambrian aquifers in Scotland[8])



[8] BGS, Scotland's aquifers and groundwater bodies (2015) OR15028.pdf (nerc.ac.uk) [Accessed September 2024].

4. SCREENING

4.1 Overview

4.1.1 A request was submitted in February 2024 to AC Environmental Health department for a copy of the register of PWS. The register identified 17 PWS sources within the 1 km Study Area. A site walkover (**Annex B**) was undertaken at the Site by WSP engineers on 19 September 2023 which confirmed the presence of an additional PWS within the Site, which is not recorded in AC's PWS data.

4.1.2 **Table 4-1** presents information collected from the AC PWS register, returned questionnaires, and the conceptual model.

4.1.3 The findings from **Table 4-1** can be summarised as follows:

- 11 PWS sources are unlikely to be impacted by the Proposed Development, primarily due to intervening distance, or are connected to Scottish Water mains supply with no connection to any PWS, and require no further assessment (screened-out);
- 6 PWS sources are unconfirmed (two of which are located within the Site) and potentially at risk from the Proposed Development, and require further risk assessment; and
- 1 confirmed groundwater sourced PWS is potentially at risk from the Proposed Development, and requires further risk assessment.

4.2 Site Inspection

4.2.1 Where further assessment was applicable, as further details were sought after receipt of the posted questionnaires (or for non-responses), site surveys were undertaken to obtain more information on local hydrology, PWS abstraction and / or the location of infrastructure (**Annex B**).

4.2.2 Surveys comprised visual inspection of infrastructure and source zones, including investigations to determine the precise route of infrastructure between the abstraction and property it serves. No intrusive works were undertaken as part of these surveys. Site surveys were undertaken with express permission of the landowners and no land was entered without prior permission.

4.2.3 The surveys were undertaken on 19 September 2023 and on 12-13 June 2024 by experienced hydrological and hydrogeological surveyors. The weather during the surveys was dry.

4.2.4 The topography of the Site is low gradient, with gentle undulations – sloping typically from north-west to south-east. At the time of surveys, the land use observed was generally arable and livestock farming. The results of the surveys are presented within **Section 5**.

Table 4-1 Screening assessment of identified PWS within 1 km of the Site

PWS ID	Property Name	Source / Abstraction Type	Abstraction National Grid Reference	PWS / Property from nearest Infrastructure	Potential complete Source-Pathway-Receptor link?	Details	Risk Assessment Required?
1	Borderside	Groundwater – Well	383177, 846650	Property, ~120 m south	Yes – PWS source and pipework are unknown, potentially at risk due to property's distance from proposed infrastructure and assessed as having a potential hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. It is assumed the abstraction is within the vicinity of the property, or it shares another nearby abstraction. Due to the proximity of the PWS to the Site and infrastructure a further assessment will be required.	Yes
2	Inchgreen Cottage	Groundwater - Well	383044, 846492	Property, ~320 m south	No – due to distance from proposed infrastructure and being assessed as not having a hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. It is assumed that the abstraction is close to the property and uses the same abstraction as Inchgreen Farm, which is located 400 m south of the nearest proposed infrastructure. The intervening distance between the PWS and the nearest infrastructure has led to this supply being screened out.	No
3	Inchgreen Farm	Groundwater - Well	383029, 846414	Well, ~400 m south	No – any PWS source and pipework are not considered to be at risk due to distance from proposed infrastructure and being assessed as not having a hydrological connection.	PWS survey confirmed that abstraction is a ~7 m deep well located 320 m west of the property and 400 m south of the nearest proposed infrastructure. The intervening distance between the PWS and the nearest infrastructure has led to this supply being screened out.	No
4	Latchfold Croft	Unknown	381406, 847003	Property, ~330 m southwest	Yes – PWS source / pipework potentially at risk due to distance from proposed infrastructure and assessed as having a potential hydrological connection.	Details of this PWS abstraction are unknown due to no site visit and / or feedback from questionnaire. It is assumed the abstraction is within the vicinity of the property, or it shares another nearby abstraction. Due to the proximity	Yes

PWS ID	Property Name	Source / Abstraction Type	Abstraction National Grid Reference	PWS / Property from nearest Infrastructure	Potential complete Source-Pathway-Receptor link?	Details	Risk Assessment Required?
						of the PWS to the Site and infrastructure a further assessment will be required	
5	Meadowside	Unknown	404003, 847152	Property, ~940 m southwest	No – any PWS source and pipework are not considered to be at risk due to distance from infrastructure and being assessed as not having a hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. It is assumed that the abstraction is situated within the vicinity of the property, or it shares another nearby abstraction. As the property is located >250 m from the nearest infrastructure, the intervening distance between the PWS and the nearest proposed infrastructure has led to this supply being screened out.	No
6	Mains of Greens Bungalow	Unknown	382563, 846840	Property, ~180 m southwest	Yes – PWS source / pipework potentially at risk due to distance from proposed infrastructure and assessed as having a potential hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. Further assessment is required.	Yes
7	Mill of Allathan	Unknown	383529, 847454	Property, ~770 m northeast	No – any PWS source and pipework are not considered to be at risk due to distance from infrastructure and being assessed as not having a hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. It is assumed that the abstraction is situated within the vicinity of the property, or it shares another nearby abstraction. As the property is located > 250 m from the nearest proposed infrastructure and on the east side of the B9170 road, the intervening distance between the PWS and nearest proposed infrastructure has led to this supply being screened out.	No
8	Ivy Cottage	n/a	404123, 845417	Property, ~750 m south	No - confirmed no connection to PWS.	The questionnaire confirmed that the property is served by Scottish Water mains supply with no	No

PWS ID	Property Name	Source / Abstraction Type	Abstraction National Grid Reference	PWS / Property from nearest Infrastructure	Potential complete Source-Pathway-Receptor link?	Details	Risk Assessment Required?
						connection to any PWS and is therefore screened out.	
9	Parkhill	Unknown	382565, 846162	Property, property ~700 m south	No – any PWS source and pipework are not considered to be at risk due to distance from proposed infrastructure and being assessed as not having a hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. As the property is very close to Ivy Cottage served by Scottish Water mains supply, it is assumed not to use a PWS. However, if there is a PWS, it is assumed that the abstraction is situated within the vicinity of the property, or it shares another nearby abstraction. As the property is located > 250 m from the nearest proposed infrastructure, the intervening distance between the PWS and nearest infrastructure would result in this supply being screened out.	No
10	Mill Of Greens	Groundwater - Well	383853, 845920	Property, ~1 km southeast	No – any PWS source and pipework are not considered to be at risk due to distance from infrastructure and being assessed as not having a hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. It is assumed that the abstraction is situated within the vicinity of the property, or it shares another nearby abstraction. As the property is located > 250 m from the nearest proposed infrastructure, the intervening distance between the PWS and nearest infrastructure has led to this supply being screened out.	No
11	Greenfield	Groundwater - Well x 3	(1) 382038, 846636; (2) 381898, 846771; and	Well 1, ~265 m southwest; well 2, ~275 m southwest; and	No – any PWS source and pipework are not considered to be at risk due to distance from infrastructure and being	PWS survey confirmed that the abstractions are wells situated in fields as below: • well 1 ~460 m west, well 2 ~445 m west and well 3 ~310 m southwest of the property; and	No

PWS ID	Property Name	Source / Abstraction Type	Abstraction National Grid Reference	PWS / Property from nearest Infrastructure	Potential complete Source-Pathway-Receptor link?	Details	Risk Assessment Required?
			(3) 381879, 846782	well 3, ~280 m southwest	assessed as not having a hydrological connection.	• well 1 ~265 m, well 2 ~275 m and well 3 ~280 m southwest of the nearest infrastructure. The intervening distance (> 250 m) between the wells and the nearest infrastructure has led to these supplies being screened out.	
12	Oldtown	Groundwater - Well	382849, 847164	Well, ~50 m east	Yes – PWS source / pipework potentially at risk due to distance from proposed infrastructure and assessed as having a potential hydrological connection.	PWS survey confirmed that the abstraction is a well and located 290 m southwest of the property and 50 m east of the nearest infrastructure. There is a collection tank which is situated 130 m northwest of the property, 365 m northeast of the abstraction and 325 m northeast of the nearest infrastructure.	Yes
13	Newton Of Northburn	Unknown	382689, 847555	Property, ~20 m north	Yes – PWS source / pipework potentially at risk due to distance from proposed infrastructure and assessed as having a potential hydrological connection.	Details of this PWS abstraction are unknown. Further assessment is required.	Yes
14	Mains Of Greens	Unknown	382599, 846859	Property, ~140 m southwest	Yes – PWS source / pipework potentially at risk due to distance from proposed infrastructure and assessed as having a potential hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. Further assessment is required.	Yes
15	Netherlea	Groundwater -Spring	383388, 845786	Property, ~1 km southeast	No – any PWS source and pipework are not considered to be at risk due to distance from infrastructure and being	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. It is assumed that the abstraction is situated within the vicinity of the	No

PWS ID	Property Name	Source / Abstraction Type	Abstraction National Grid Reference	PWS / Property from nearest Infrastructure	Potential complete Source-Pathway-Receptor link?	Details	Risk Assessment Required?
					assessed as not having a hydrological connection.	property, or it shares another nearby abstraction. As the property is located > 250 m from the nearest infrastructure, the intervening distance between the PWS and the nearest proposed infrastructure has led to this supply being screened out.	
16	Northburn	Unknown	381119, 847812	Property, ~470 m northwest	No – any PWS source and pipework are not considered to be at risk due to distance from proposed infrastructure and being assessed as not having a hydrological connection.	Details of this PWS abstraction are unknown as a site visit was not possible and / or no feedback from questionnaire. It is assumed that the abstraction is situated within the vicinity of the property, or it shares another nearby abstraction. As the property is located > 250 m and upslope from the nearest infrastructure, the intervening distance between the PWS and nearest proposed infrastructure has led to this supply being screened out.	No
17	Tall Trees	Borehole	381588, 846437	Borehole, ~680 m southwest	No – PWS source and pipework are not considered to be at risk due to distance from proposed infrastructure and being assessed as having a hydrological connection.	The questionnaire confirmed the abstraction is a borehole and located close to the property. The property does not share the abstraction with other properties. The intervening distance (> 250 m) between the PWS and the nearest proposed infrastructure has led to this supply being screened out.	No
18	Unregistered property	Underground water collection tank	381534, 847532	Adjacent to infrastructure	Yes – PWS source / pipework potentially at risk due to distance from proposed infrastructure and assessed as having a potential hydrological connection.	The underground water collection tank is adjacent to a proposed access track. There is a water collection system to the northwest of the water supply tank, assumed to be a cuboid trench filled with gravel or other	Yes

PWS ID	Property Name	Source / Abstraction Type	Abstraction National Grid Reference	PWS / Property from nearest Infrastructure	Potential complete Source-Pathway-Receptor link?	Details	Risk Assessment Required?
						permeable material, to collect the surface runoff during wet weather.	

5. RISK ASSESSMENT

5.1 General

5.1.1 The Proposed Development poses potential risks to PWS, primarily through the reduction of water volume or adverse changes in water quality. Understanding and managing these risks is crucial to ensure the continued safety and reliability of these water sources.

5.1.2 Effective risk management involves addressing the components of the Source-Pathway-Receptor chain. By breaking actual or potential pollutant linkages, we can eliminate hazards. Where residual risks remain, implementing management controls and contingency plans will minimise these risks to acceptable levels.

5.1.3 The risk assessment process evaluates the probability of impacts and the likely magnitude of changes at the receptor, assuming successful implementation of embedded and good practice mitigation measures. This detailed assessment, based on the CSM presented in **Section 3**, ensures that any elevated risks are identified and addressed with additional mitigation strategies.

5.2 Hazards

5.2.1 Hazards introduced by construction can affect the source of water recharging a PWS (surface water, groundwater, or both); and can also affect PWS delivery infrastructure through accidental damage.

5.2.2 Rainfall increases the risk of pollution and damage to the surface and groundwater environment. Rainfall derived surface runoff during construction works can mobilise and transport pollutants such as sediment, oils, chemicals, and building materials (e.g. concrete wash) into the surface and groundwater environment.

5.2.3 Key hazards acting as potential sources of pollution were identified as activities undertaken during the construction of the Proposed Development. These will be associated with:

- enabling works, site clearance and demolitions;
- platform earthworks and creation of a level platforms;
- bund / screening earthworks;
- construction of access roads, perimeter and site drainage, including SuDS;
- construction and installation of the buildings;
- installation of electrical plant;
- commissioning; and
- reinstatement and planting.

5.2.4 The completion of the construction elements listed above will require additional activities to be undertaken which may also lead to potential impacts. These activities include:

- surface water drainage;
- sub-surface de-watering;
- transport, storage and handling of fuels and oils;
- use of machinery and plant;
- wastewater management; and
- concrete washout management.

5.3 Standard Good Practice Mitigation

5.3.1 There are nine General Environmental Management Plans (GEMPs) relevant to this chapter, all of which are listed below, and can be found in **Volume 4, Appendix 3.1: GEMPs and SPPs** of the EIA Report:

- Working in or Near Water;
- Working in Sensitive Habitats;

- Watercourse Crossings;
- Contaminated Land;
- Private Water Supplies;
- Soil Management;
- Oil and Storage Refuelling;
- Working with Concrete; and
- Bad Weather.

5.4 Additional Measures

Further Investigation and Demarcation

5.4.1 To ensure the utmost protection of PWS during the construction phase, the Principal Contractor and Applicant will undertake comprehensive investigations prior to commencing any activities. These investigations will prioritise non-intrusive methods, such as cable avoidance technology (CAT) scanners, ground-penetrating radar (GPR), and other geophysical surveys, to accurately locate and assess PWS infrastructure. Where necessary, systematic trial pit surveys will be conducted by hand to minimise disruption. This proactive approach will help identify any potential risks early on, allowing for the implementation of effective mitigation measures to safeguard water quality and supply continuity.

5.4.2 Following the completion of further investigation, it may be necessary to implement additional measures to safeguard PWS quality and quantity; these include:

- demarcation, or fencing off the PWS intake and / or storage tank to avoid accidental damage;
- demarcation of the supply distribution route on the ground using wooden pegs (or similar) to avoid accidental damage; and
- making site operatives aware of PWS and the sensitivity of the catchment through toolbox talks and site induction.

Suitable Engineering Solution

5.4.3 Following further investigation, it may be confirmed that there is the potential for the PWS infrastructure to be impacted through planned construction works. Should this be the case, an assigned contractor will prepare specific construction or working methods to ensure the continuity of the PWS. These methods include refining the engineering design and a general arrangement drawing for crossing pipework.

5.4.4 Appropriate communication between PWS users and the Principal Contractor will be agreed and established between the Principal Contractor and SSEN to ensure the appropriate communication of construction programmes.

5.4.5 Engineering solutions will be discussed with AC and SEPA post-consent.

5.4.6 PWS abstraction locations and associated infrastructure shall be communicated to construction personnel via the provision of detailed mapping and / or toolbox talks conducted by the Principal Contractor.

Alternative Water Supply

5.4.7 There is a high probability of detriment impact to the PWS at the properties of Borderside (ID: 1), Oldtown (ID: 12), Newton of Northburn (ID: 13), and unregistered property (ID: 18). If the Proposed Development is granted planning permission, then prior to the commencement of construction, the owners of PWS which will be affected by the Proposed Development, would be provided with a suitable alternative supply. The Applicant will cover the costs of providing alternative supplies.

5.5 PWS Monitoring Plan

5.5.1 A PWS Monitoring Plan (PWSMP) will be prepared by the Principal Contractor prior to construction. This will detail all mitigation measures to be delivered to secure the quality, quantity, and continuity of water supplies (which may be affected by the Proposed Development). The PWSMP will be provided to the PWS user, prior to construction and will contain contact information for the Construction Site Manager (or similar). PWS Users will be informed of any planned works that may affect their supply.

Monitoring Arrangements

5.5.2 Prior to construction a PWSMP will be prepared detailing all mitigation measures to be delivered to secure the quality, quantity, and continuity of water supplies (which may be affected by the Proposed Development).

5.5.3 A water level and quality monitoring programme will be undertaken prior to any construction and during construction. The PWSMP will include water quality sampling methods and shall specify abstraction points. Post-construction monitoring would also be completed to ensure there is no long-term impact on water quality or quantity, which could be associated with the Proposed Development.

5.5.4 The PWS water monitoring programme will be aligned with the Construction Environment Management Plan (CEMP). For example, sampling frequency, and analysis suite are matched at the surface water monitoring locations. The PWSMP would also outline any site-specific additional mitigation outlined in this assessment.

5.5.5 The monitoring arrangements would be discussed and agreed with AC and SEPA post-consent. An example monitoring strategy is included in **Annex C**.

Contingency Arrangements

5.5.6 The PWSMP will include a pollution response plan and contingency measures, detailing responsibilities, and lines of communication between the Principal Contractor, PWS users, and stakeholders. Contact details (land and mobile numbers / email addresses) for PWS users would be maintained by the Principal Contractor at all times.

5.5.7 In the event of an unforeseen impact on the existing PWS arising from the construction and operational impact of the Proposed Development, contingency measures will be implemented. These will include provisions to provide alternative water supplies on a temporary and permanent basis, including:

- 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 affected property);
- provision of mobile potable water bowser or tanker water deliveries to an existing storage vessel, for short-medium term contingency, whilst engineering activities are occurring locally and increasing risk to supply (or if an event has occurred which has adversely affected the PWS); and
- provision of an alternative PWS source (e.g. spring, borehole, alternative surface water abstraction location) or public water supply connection in the event of a permanent derogation of a water supply.

5.5.8 In the event of an alternative water source being implemented, SEPA and AC would be advised as soon as practicable.

5.6 Risk Assessment Summary

5.6.1 A Risk Assessment has been provided for those PWS identified as being plausibly at risk of impact from the Proposed Development. The Risk Assessment is presented in **Table 5-1** and should be read in conjunction with **Table 2-1**, **Table 2-2** and **Table 2-3**.

Table 5-1 Risk assessment of PWS sources that could be impacted by the Proposed Development

PWS ID	PWS Name	Abstraction Type	Risk Assessment Assuming Implementation of Standard Good Practice			Additional Mitigation Required?	Residual Risk
			Probability of Impact	Magnitude of Change	Risk		
1	Borderside	Groundwater - Well	Medium	Moderate	Medium	Yes	Negligible
4	Latchfold Croft	Unknown	Negligible	Minor	Negligible	Yes	Negligible
6	Mains of Greens Bungalow*	Unknown	Medium	Moderate	Medium	Yes	Medium (no change)
12	Oldtown	Well	High	Major	Very High	Yes	Negligible
13	Newton of Northburn	Unknown	High	Major	Very High	Yes	Negligible
14	Mains of Greens*	Unknown	Medium	Moderate	Medium	Yes	Medium (no change)
18	Unregistered property**	Underground water collection tank	High	Major	Very High	Yes	Very High (no change)

5.6.2 *The properties identified will require demolition during the construction phase of the Proposed Development. As outlined in Section 6.2.3, the limited information available does not confirm whether these supplies serve other properties. However, if the Proposed Development proceeds, these properties will be acquired and demolished by the principal contractor, rendering them non-operational.

5.6.3 **The supply identified will require demolition during the construction phase of the Proposed Development. As outlined in Section 6.2.3, the limited information available does not confirm whether these supplies serve other properties. However, if the Proposed Development proceeds, this supply will be acquired and demolished by the principal contractor, rendering it non-operational.

Borderside PWS (ID:1)

5.6.4 **Assessment notes**: Based on AC records, the abstraction at **Borderside** (383177, 846650) is a well. It is assumed that is situated close to the property. The property is situated 120 m from the nearest section of anticipated earthworks requiring an excavation >1 m and bisected by road B9170.

5.6.5 According to the CSM, the underlying bedrock is a low productivity aquifer, with groundwater flow pathways constrained to weathered zones or fractures. The property is slightly downgradient, and the intervening distance between the well and the nearest infrastructure resulting in the probability being **Medium**, with the magnitude of change in water quality or quantity **Moderate**, and a consequential risk of **Medium**.

5.6.6 **Additional Mitigation:** This PWS and its network will require further investigation by the Principal Contractor prior to construction. If it is confirmed that the abstraction is close to the property, this may include the demarcation of supply, and appropriate design of standard good practice mitigation to avoid the potential for impact on pipeline and source. In addition, a site-specific monitoring plan should be provided (SEPA, 2024)[1] (see **Annex C**) or to provide a suitable alternative supply i.e. provision of a new borehole, connection to Scottish Water mains supply or provision a bowser, prior to works commencing on site.

5.6.7 **Residual Risk**: Based on the assumption that:

- the implementation of good practice measures provides good quality and quantity monitoring results on the PWS abstraction; or
- the implementation of contingency measures (as described in **Section 5.5**) in the event of an unforeseen impact on the existing PWS arising from the construction and operational impact of the Proposed Development; or
- the implementation of a suitable alternative supply.

5.6.8 the probability is reduced to **Negligible**, with the magnitude of change on water quality or quantity reducing to **Minor**, and a consequential residual risk reducing to **Negligible**.

Latchfold Croft PWS (ID: 4)

5.6.9 **Assessment notes**: Based on AC records, the abstraction at **Latchfold Croft** (381406, 847003) is unknown. The property is situated ~ 330 m south of the nearest section of anticipated earthworks requiring an excavation >1 m. It is assumed that the abstraction is close to the property.

5.6.10 According to the CSM, the underlying bedrock is a low productivity aquifer, with groundwater flow pathways constrained to weathered zones or fractures. The intervening distance between the abstraction and the nearest earthworks means the probability of impact is **Negligible**, with the magnitude of change on water quality or quantity **Minor**, and consequential risk of **Negligible**.

5.6.11 **Additional Mitigation**: This PWS and its network will require further investigation by the Principal Contractor prior to construction. If it is confirmed that the abstraction is close to the property, no further mitigation is required.

5.6.12 **Residual Risk**: The residual risk remains **Negligible**.

Mains Of Greens Bungalow (ID: 6)

5.6.13 **Assessment notes**: Based on AC records, the abstraction at **Mains of Greens Bungalow** (382563, 846840) is unknown. The property is situated ~ 180 m southwest of the nearest section of anticipated earthworks requiring an excavation >1 m. It is assumed that the abstraction is close to the property.

5.6.14 According to the CSM, the underlying bedrock is a low productivity aquifer, with groundwater flow pathways constrained to weathered zones or fractures. Intrusive Site Investigation (**Volume 4, Appendix 12.6: Geotechnical Interpretative Report** by TonyGee and partners has also been undertaken within the Site and identified a typical water table depth of approximately 0.6 m to 3.3 m below ground level (bgl) with an average depth of 2.3 m bgl. There is no noticeable trend with depth observed regarding groundwater strikes. However,

the locations of the exploratory holes where groundwater strikes occurred are typically found in the east side of the Site. It should also be noted that limited groundwater strikes do occur in other areas of the Site.

5.6.15 Due to intervening distance between the abstraction and the nearest infrastructure the resulting probability is **Medium**, with the magnitude of change in water quality or quantity **Moderate**, and a consequential risk of **Medium**.

5.6.16 **Additional Mitigation:** This PWS and its network will require further investigation by the Principal Contractor prior to construction. If it is confirmed that the abstraction is close to the property, this may include the demarcation of supply, and appropriate design of standard good practice mitigation to avoid the potential for impact on pipeline and source. In addition, a site-specific monitoring plan should be provided (SEPA, 2024)[1] (see **Annex C**) or to provide a suitable alternative supply i.e. provision of a new borehole, connection to Scottish Water mains supply or provision a bowser prior to works commencing on site.

5.6.17 **Residual Risk**: It is understood that if consented, SSEN Transmission will purchase this property, and the building associated with this PWS will be demolished. Assuming the implementation of decommissioning the residual risk is assessed as **Medium** (no change).

Oldtown PWS (ID:12)

5.6.18 **Assessment notes**: Based on AC records, the abstraction at **Oldtown** (382849, 847164) is a well and located 290 m southwest of the property. The PWS is situated 15 m east of the Burn of Greens and 50 m east and slightly upslope of the nearest section of anticipated earthworks requiring an excavation >1 m and there may be a hydrological connection between the well and the Burn of Greens. The water depth of the well is approximately 9 mbgl and is used for domestic and livestock purposes. There is a collection tank which is situated 130 m northwest of the property, 365 m northeast of the abstraction and 325 m northeast of the nearest infrastructure.

5.6.19 According to the CSM, the underlying bedrock is a low productivity aquifer, with groundwater flow pathways constrained to weathered zones or fractures. The abstraction is slightly upgradient, and the intervening distance between the well and nearest earthworks requiring an excavation >1 m results in the probability being **High**, with the magnitude of change on water quality or quantity **Major**, and consequential risk of **Very High**.

5.6.20 **Additional mitigation:** This PWS and its network will require further investigation by the Principal Contractor prior to construction. This may include the demarcation of supply, and appropriate design of standard good practice mitigation to avoid potential for impact on pipeline and source. In addition, a site-specific monitoring plan should be provided (SEPA, 2024)[1] (see **Annex C**) or to provide a suitable alternative supply i.e. provision of a new borehole, connection to Scottish Water mains supply or provision a bowser prior to works commencing on site.

5.6.21 **Residual Risk**: Based on the assumption that:

- the implementation of good practice measures provides good quality and quantity monitoring results on the PWS abstraction; or
- the implementation of contingency measures (as described in **Section 5.5**) in the event of an unforeseen impact on the existing PWS arising from the construction and operational impact of the Proposed Development; or
- the implementation of a suitable alternative supply.

5.6.22 the probability is reduced to **Negligible**, with the magnitude of change on water quality or quantity reducing to **Minor**, and a consequential residual risk reducing to **Negligible**.

Newton Of Northburn (ID: 13)

5.6.23 **Assessment notes**: Based on AC records, the abstraction at **Newton of Northburn** (382689, 847555) is unknown. The property is situated ~ 20 m north of the nearest section of anticipated earthworks requiring an excavation >1 m. It is assumed that the abstraction is close to the property.

5.6.24 According to the CSM, the underlying bedrock is a low productivity aquifer, with groundwater flow pathways constrained to weathered zones or fractures. The property is on the same elevation as the nearest infrastructure, it is considered that the abstraction is also at the same elevation, and the intervening distance between the abstraction and nearest earthworks requiring an excavation >1 m resulting in the probability being **High**, with the magnitude of change on water quality or quantity **Major**, and consequential risk of **Very High**.

5.6.25 **Additional mitigation:** This PWS and its network will require further investigation by the Principal Contractor prior to construction. If it is confirmed that the abstraction is close to the property, this may include the demarcation of supply, and appropriate design of standard good practice mitigation to avoid the potential for impact on pipeline and source. In addition, a site-specific monitoring plan should be provided (SEPA, 2024)[1] (see **Annex C**) or to provide a suitable alternative supply i.e. provision of a new borehole, connection to Scottish Water mains supply or provision a bowser prior to works commencing on site.

5.6.26 **Residual Risk**: Based on the assumption that:

- the implementation of good practice measures provides good quality and quantity monitoring results on the PWS abstraction; or
- the implementation of contingency measures (as described in **Section 5.5**) in the event of an unforeseen impact on the existing PWS arising from the construction and operational impact of the Proposed Development; or
- the implementation of a suitable alternative supply

5.6.27 the probability is reduced to **Negligible**, with the magnitude of change on water quality or quantity reducing to **Minor**, and a consequential residual risk reducing to **Negligible**.

Mains Of Greens (ID: 14)

5.6.28 **Assessment notes**: Based on AC records, the abstraction at **Mains of Greens** (382599, 846859) is unknown. The property is situated within the Site, ~ 140 m southwest of the nearest section of anticipated earthworks requiring an excavation >1 m. It is assumed that the abstraction is close to the property.

5.6.29 According to the CSM, the underlying bedrock is a low productivity aquifer, with groundwater flow pathways constrained to weathered zones or fractures. Intrusive Site Investigation (**Volume 4, Appendix 12.6: Geotechnical Interpretative Report** by TonyGee) has also been undertaken within the Site and identified a typical water table depth of approximately 0.6 m to 3.3 m below ground level (bgl) with an average depth of 2.3 m bgl. There is no noticeable trend with depth observed regarding groundwater strikes. However, the locations of the exploratory holes where groundwater strikes occurred are typically found in the east side of the Site. It should also be noted that limited groundwater strikes do occur in other areas of the Site.

5.6.30 Due to intervening distance between the abstraction and the nearest infrastructure the resulting probability is **Medium**, with the magnitude of change in water quality or quantity **Moderate**, and a consequential risk of **Medium**.

5.6.31 **Additional Mitigation:** This PWS and its network will require further investigation by the Principal Contractor prior to construction. If it is confirmed that the abstraction is close to the property, this may include the demarcation of supply, and appropriate design of standard good practice mitigation to avoid the potential for impact on pipeline and source. In addition, a site-specific monitoring plan should be provided (SEPA, 2024)[1] (see **Annex C**); or to provide a suitable alternative supply i.e. provision of a new borehole, connection to Scottish Water mains supply or provision a bowser prior to works commencing on site.

5.6.32 **Residual Risk**: It is understood that if consented, SSEN Transmission will purchase this property and the building associated with this PWS will likely be demolished. Assuming the implementation of decommissioning the residual risk is assessed as **Medium** (no change).

Unregistered property (ID: 18)

5.6.33 **Assessment notes**: Based on the site survey, there is an underground water collection tank (381534, 847532) within the Site, that serves a property which is located 490 m southwest of the tank. The underwater water collection tank is adjacent to the infrastructure requiring an excavation >1 m.

5.6.34 According to the CSM, the underlying bedrock is a low productivity aquifer, with groundwater flow pathways constrained to weathered zones or fractures. There is a water collection system to the northwest of the water supply tank, assumed to be a cuboid trench filled with gravel or other permeable material, to collect the surface runoff that flows out of the trees during wet weather.

5.6.35 The underground water collection tank is adjacent to the nearest infrastructure excavation >1 m resulting in the probability being **High**, with the magnitude of change on water quality or quantity **Major**, and consequential risk of **Very High**.

5.6.36 **Additional mitigation**: Due to the need for extensive excavation in the vicinity of the PWS, the mitigation required would be to provide a suitable permanent alternative supply i.e. provision of a new borehole, connection to Scottish Water mains supply or provision of a bowser.

5.6.37 **Residual Risk**: It is understood that SSEN Transmission would like to provide an alternative supply to this property. Assuming the implementation of the alternative supply the residual risk is assessed as **Very High** (no change).

6. CONCLUSION

6.1.1 A PWSRA has been conducted for PWS that may be affected during the construction and operation of the Proposed Development. The formation of this report has included a desk review of baseline information as well as data returns provided by AC on identified PWS within a 1 km buffer of the Site, consultation with selected residents, OS mapping data, and site visits.

6.1.2 The risk assessment was undertaken using the Source-Pathway-Receptor model to establish the likelihood of a potential pollutant linkage existing between the Proposed Development and the supply of the identified PWS. Factors taken into consideration in the risk assessment include the proximity of the Site to the PWS source, layout of PWS infrastructure and pipework, the type of works being undertaken, the likely presence of pathways between the Proposed Development and the source, the local topographic conditions, hydrological conditions, and the underlying geology.

6.1.3 The PWS have been evaluated based on the information provided to determine the risks based on the prescribed matrix scenarios. To minimise the risk of construction activities (potentially impacting any PWS supply), mitigation measures have been outlined in **Section 5** which will be implemented by the Principal Contractor.

6.1.4 Standard good practice mitigation has been outlined in **Section 5** of this assessment and will be included within a CEMP which will be prepared by the Principal Contractor prior to construction. In addition to this mitigation, a PWSMP will be prepared (prior to construction) and will detail all relevant mitigation, management measures, monitoring requirements and contingency plans relevant to PWS considered within this assessment and those listed in **Chapter 12**.

6.1.5 Additional mitigation measures have been recommended for PWS at:

- Borderside (ID:1);
- Mains of Greens Bungalow (ID: 6);
- Oldtown (ID: 12);
- Newton of Northburn (ID: 13);
- Mains of Greens (ID: 14); and
- Unregistered property (PWS ID:18)

6.1.6 Mitigation measures should be agreed with owner / occupier and SEPA prior to works commencing.

6.1.7 An alternative new main connection supply has been recommended for PWS at unregistered property (ID:18), so the residual risk is assessed as **Very High** (no change).

6.1.8 It is understood that SSEN Transmission plan to purchase properties within the Site, including the buildings associated with Mains of Greens Bungalow (ID: 6) and Mains of Greens (ID: 14), which will likely be demolished, so the residual risk is assessed as **Medium** (no change).

6.1.9 For Borderside (ID: 1), Oldtown (ID: 12) and Newton of Northburn (ID: 13) Assuming:

- the implementation of good practice measures provides good quality and quantity monitoring results on the PWS abstraction; or
- the implementation of contingency measures (as described in **Section 5.5**) in the event of an unforeseen impact on the existing PWS arising from the construction and operational impact of the Proposed Development; or
- the implementation of a suitable alternative supply

6.1.10 the consequential residual risk is reduced to **Negligible**.

6.1.11 In the event that further information on PWS is obtained, this risk assessment should be updated to ensure that PWS are appropriately safeguarded.

6.2 Disclaimers and Limitations

6.2.1 This report has been prepared by WSP with all reasonable skill, care, and diligence for SSEN, for the specific purpose of assessing the risk to PWS posed from the construction and operation of the Proposed Development.

6.2.2 This report details the findings of the risk assessment considering information provided by AC, the relevant landowners and PWS users and is therefore, as accurate as this information will allow. This document should be considered live and as such, changes will be made should new information come to light.

6.2.3 Due to restricted property access and the limited return of completed questionnaires, WSP encountered constraints in the assessment process. To address these limitation's, WSP used professional experience in conjunction with a comprehensive desktop study to provide the most accurate and detailed information feasible.

6.2.4 WSP accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by WSP beforehand. Any such party relies upon the report at their own risk. WSP disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the services.

6.2.5 Owing to the inherent complexity of the subsurface, it is rarely possible to determine the mechanics of any hydrological system with absolute certainty. In this regard, investigations as part of this assessment will strive to determine the circumstances of each supply based on the evidence available to support this assessment. Where uncertainty exists associated with understanding the details of a PWS, or in accurately conceptualising the subsurface, this will be stated, and risks and assessment considered conservatively in accordance with the precautionary principle. Whilst the assessment assesses relative risk, no detailed quantitative risk assessment has been completed.

ANNEX A: PWS QUESTIONNAIRE

PRIVATE WATER SUPPLY QUESTIONNAIRE

Your details

Name: .....

Property name and address: .....

.....

Telephone number and/or email address: .....

If you are a tenant, please also provide your landlord's contact details:

Name: .....

Address: .....

Telephone number and/or email address: .....

Supply source type *(Please tick or specify if other)*

Borehole (please indicate approx. depth below) ☐ Well ☐ Spring ☐ River ☐

Lake ☐ Pond ☐ Stream ☐ Surface water ☐ Mains (Scottish Water) ☐

Other: .....

Supply source location

Source of supply known and marked on enclosed map? Yes ☐ No ☐

Approximate grid coordinates of source of supply: .....

Is water fed into a storage tank or reservoir prior to distribution? Yes ☐ No ☐

If yes, please provide grid coordinates for location of storage tank: .....

Supply uses *(Please tell us what the water is used for at your property – please tick as appropriate and tell us any other uses not listed)*

Domestic use ☐ Holiday let ☐ B&B/Hotel ☐ Catering ☐

Dairy farm ☐ Brewery ☐ Residential care home ☐ Tenanted property ☐

Livestock drinking water ☐

Other: .....

WSP
7th Floor, 110 Queen Street, Glasgow, G1 3BX, United Kingdom

ANNEX B: SITE PWS PHOTOGRAPHS

Borderside PWS (ID: 1)

No Photos due to no permission to view PWS at the time of survey.

Inchgreen Farm (ID: 3)

Photograph 1. Well (383029, 846414), 400 m south of the nearest infrastructure.

Mains Of Greens Bungalow (ID: 6)

No Photos due to not identifying the source of the PWS.

Mains Of Greens (ID: 14)

No Photos due to not identifying the source of the PWS.

Greenfield (ID: 11)

Photograph 2. Well 1 (382038, 846636), 265 m southwest of the nearest infrastructure.

Photograph 3. Well 2 (381898, 846771), 275 m southwest of the nearest infrastructure.

Photograph 4. Well 3 (381879, 846782), 280 m southwest of the nearest infrastructure.

Oldtown (ID: 12)

Photograph 5. Well (382849, 847164), 50 m east of the nearest infrastructure.

Photograph 6. Tank (383073, 847449), 325 m northeast of the nearest infrastructure.

Newton Of Northburn (ID: 13)

No Photos due to no permission to view PWS.

Unregistered PWS (ID: 18)

Photograph 7. Underground water supply tank (381534, 847532) within the Site (by walkover survey on 19 September 2023).

ANNEX C: EXAMPLE MONITORING STRATEGY

Introduction

PWS Monitoring is recommended at properties that maintain a PWS source and where there is a source-pathway-receptor linkage to the Proposed Development.

Preconstruction monitoring 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. These can be used to benchmark the effectiveness of pollution mitigation.

The final monitoring arrangements including the analytical suite, locations, frequency and escalation procedure will be outlined in the PWSMS and will be in agreement with SEPA and AC and is expected to be secured by way of planning condition.

Methodology

PWS Monitoring would be undertaken by an appropriately qualified and experienced contractor.

Monitoring methods will include visual and extractive, with the former comprising of pictures and notes on water conditions, weather, pollution, etc. The latter involves the collection of a water sample from the abstraction with analysis at a suitably accredited laboratory. All samples will be dispatched to the laboratory, under chilled conditions accompanied with the relevant chain of custody documentation. All samples will be dispatched to the laboratory within 24 hours of being collected.

An example analytical suite along with trigger values (assessment criteria) against which water quality results should be benchmarked is provided below.

Table B-1 – Example Monitoring Analytical Suite

Parameter	Units	Limit of Detection**	Method	Assessment Criteria*
pH	-	-	Probe	6.5-9.5
Colour	Pt/Co	1	Colorimetric	20
Electrical Conductivity	uS/cm	10	Potentiometric	2500
Alkalinity (as CaCO3)	mgCaCO3/L	3	Discrete Analyser	-
Calcium (dissolved)	mg/L	0.012	ICP-OES	-
Magnesium (dissolved)	mg/L	0.005	ICP-OES	-
Potassium (dissolved)	mg/L	0.025	ICP-OES	-
Sodium (dissolved)	mg/L	0.01	ICP-OES	200
Sulphate as SO4	mg/L	0.045	ICP-OES	250
Chloride	mg/L	0.15	Discrete Analyser	250
Orthophosphate (as PO4)	µg/L	62	Discrete Analyser	-

Nitrate (as N04)	mg/L	0.05	Colorimetric	50
Aluminium (dissolved)	µg/L	1	ICP-MS	200
Selenium (dissolved)	µg/L	0.6	ICP-MS	10
Iron (dissolved)	µg/L	0.004	ICP-OES	200
Manganese (dissolved)	µg/L	0.05	ICP-MS	50
Zinc (dissolved)	µg/L	0.5	ICP-MS	5000
Copper (dissolved)	µg/L	0.5	ICP-MS	10
Suspended Solids	mg/L	2	Gravimetric	-
Turbidity	NTU	1	Spectrophotometry	4
Dissolved Organic Carbon (DOC)	mg/L	0.1	TOC Analyser	-
TPH CWG inc BTEX & MTBE	µg/L	1 - 10	GC/MS	10
Total coliforms	MPN/100ml	0	-	0
E.coli	MPN/100ml	0	-	0
Enterococci	cfu/100mls	0	-	0
**PCV values taken from Statutory Instrument No. 209 - The Private Water Supplies (Scotland) Regulations 2006. Available at https://www.legislation.gov.uk/ssi/2006/209/pdfs/ssi_20060209_en.pdf (accessed November 2024).* *Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG) PCV value taken from Statutory Instrument No. 2790 – The Private Water Supplies Regulations 1991 (revoked). Available at http://www.legislation.gov.uk/uksi/1991/2790/made (accessed November 2024).*				
***Actual LOD may vary and can be confirmed with the nominated laboratory if required by the LPA*				

Frequency and Duration

During the baseline (pre-construction) at least 6 monitoring visits should be undertaken across a minimum of 6 months and ideally capture a variety of flow and weather conditions. During the construction phase, monitoring should be monthly, but additional ad-hoc monitoring may also be required in the event of a spurious result or pollution incident. A period of post-construction monitoring should be undertaken with the frequency and duration subject to consultation with SEPA and AC.

Reporting

Reports summarising the results of water monitoring should be provided following the completion of each phase. Additional reporting requirements during the construction phase may be subject to consultation with SEPA and AC.

Trigger Levels and Escalation Procedures

Trigger levels refer to actions which must be taken in the event of an environmental incident that may affect a PWS. Trigger level actions could be required following the reporting of an incident by the Principal Contractor. In the event of a potential incident the Principal Contractor and the Environmental Clerk of Works (ECoW) would undertake a preliminary assessment to decide whether an incident requires an immediate stop to works. This should be undertaken as soon as possible following an incident being reported. In the event of a stop to works, a proportionate investigation should be undertaken to determine the cause for the impact and complete actions to minimise / mitigate any effects. Communication of any incident potentially affecting a PWS should be undertaken by the Project Manager or delegated representative as soon as possible. Depending on the scale of the incident, AC and SEPA may also need to be notified.

It is not proposed that the results of monitoring would trigger suspension of the construction works unless the results of the above assessment indicated a high risk to water quality if work is continued. Where exceedances have been recorded, a re-test of the samples may be requested, or confirmatory samples collected for confirmation of water quality degradation. This protocol should be included to avoid unnecessary cessation of site works on the basis of single results. Should works be suspended as a result of the monitoring values, the source of the problem would be investigated with emergency monitoring being undertaken and will continue whilst mitigation measures are being implemented. The duration of emergency monitoring will be determined based on the severity of the incident and following consultation with the Principal Contractor and the ECoW, and works would resume following consultation and approval with AC and SEPA.