# Technical Appendix 8.2

# Private Water Supply Risk Assessment

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# Private Water Supply Risk Assessment

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# 1 Private Water Supply Risk Assessment

## 1.1 Introduction

1.1.1 SLR Consulting (Ltd) were commissioned by 3R Energy Solutions Ltd (3R Energy) to undertake a Private Water Supply Risk Assessment (PWSRA). This Appendix will assess the potential risk to Private Water Supply (PWS) from Hagshaw Energy Cluster - Western Expansion: Phase 1 (the Proposed Development). The Proposed Development will consist of a northern development area of 18 turbines with associated infrastructure including new and upgraded access tracks, and a southern development area of Solar PV modules, Short Duration Energy Storage, Long Duration Energy Storage, substation, with associated infrastructure, refer to **Chapter 3** of the Environmental Impact Assessment (EIA) Report for further details.

## 1.2 Background

### *Scope of Report*

1.2.1 The scope of the report is to identify PWS in the surrounding area and to determine whether they would be affected by the Proposed Development.

1.2.2 The desk study and assessment has comprised identification of PWS within the 2 km study area through consultation with South Lanarkshire Council (SLC), East Ayrshire Council (EAC) and residents, followed by assessment, risk rating, and identification of any additional mitigation required.

### *Private Water Supplies*

1.2.3 PWS are private supplies which are not regulated by Scottish Water, SLC or EAC, and are operated and maintained by the resident. PWS can vary in scale from supplying one property to supplying several. They consist of a source, any interconnecting tanks and pipework which is distributed to a supply, as defined below:

- Source – where the water is abstracted or collected;
- Supply – the properties which are supplied by the source;
- Tank – where the water is stored prior to being used at the supply; and
- Pipework – the connecting pipework used to distribute water collected from source to supply.

1.2.4 PWS can source their water from surface water, groundwater or a combination of both. Source types can include springs, stream abstractions, boreholes and wells.

### *Study Area*

1.2.5 A PWS study area of 2 km from the site boundary has been used to undertake council consultation, identify and assess PWS within the surrounding area. The study area of 2 km is based on professional judgement that there are unlikely to be effects to surface water or groundwater at distances greater than 2 km from infrastructure. This study area and methodology has been previously approved by Scottish Environmental Protection Agency (SEPA) as suitable for similar wind farm developments.

1.2.6 Due to changes in the site boundary, a 2 km study area was used to undertake initial consultation with SLC, EAC and letters to local residents in 2022 and 2023. Following design changes in 2023, this study area has been revised to the new site boundary. This PWSRA summarises consultation undertaken since 2022, but assessment has only been undertaken on PWS that are within the current 2 km study area.

### *Baseline*

1.2.7 The Proposed Development comprises a total area of c.965 hectares (ha), divided into two development areas. The 18 wind turbines and associated infrastructure, including one of two options

for the site substation and Short Duration Energy Storage, are located within the northern development area. The solar, Long Duration Energy Storage, and the other (principal) option for the site substation and Short Duration Energy Storage are located within the southern development area. The northern development area is located within Dungavel Forest, within South Lanarkshire, while the southern development area is located in East Ayrshire, approximately 1.4 km north of Muirkirk.

1.2.8 The northern development area primarily comprises commercial forestry across several hills, including Dungavel Hill (458 m, Above Ordnance Datum (AOD)) in the west of the site, Auchengilloch (462 m AOD) in the east, and Regal Hill (428 m AOD) to the south. The southern development area is located on the south facing lower slopes of Middlefield Law, north of the Greenock Water, comprising primarily agricultural fields.

1.2.9 The northern development area is primarily underlain by superficial deposits of peat, with Devensian till, alluvium and glaciofluvial deposits mapped along on-site watercourses, as shown in **TA8.2 Figure 3.** The southern development area is primarily underlain by Devensian till deposits with areas of alluvium and glaciofluvial deposits largely associated with on-site watercourses.

1.2.10 The northern development area is predominantly underlain by Silurian Plewland Sandstone Formation and Middlefield Conglomerate Formation of the Dungavel Group, as shown in **TA8.2 Figure 4.** A rare isolated intrusion of the South of Scotland Granitic Suite of the Caledonian Supersuite, is present in the west of the northern development area. The Logan Formation, consisting of sandstone, siltstone and mudstone, of the Waterhead Group underlies the north-east of the northern development area. The Swanshaw Sandstone Formation of the Lanark Group underlies the north-west of the northern development area. The northern development area is heavily faulted with 11 inferred faults mapped.

1.2.11 The west of the southern development area is underlain by Devonian Kinnesswood Formation, consisting of sandstone, and the Carboniferous Ballagan Formation, consisting of argillaceous rock, dolostone and sandstone, both of the Inverclyde group. The centre and east of the site is underlain predominantly by Silurian Ponesk Burn Formation, and in the north by the Patrick Burn Formation, Castle Formation, Blaeberry Formation and Dunside Formation, all of the Hagshaw Group, consisting of greywackes, sandstones, siltstones and mudstones. The southern development area is also faulted, with eight inferred faults mapped.

### *Legislation and Guidance*

1.2.12 The following Scottish Government legislation has been reviewed to inform the assessment methodology of this PWSRA, to ensure comprehensive assessment and any protective measures required are implemented.

- Private Water Supplies (Scotland) Regulations 2006;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017; and
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011.

1.2.13 To inform the assessment methodology of this PWSRA, the following guidance regarding PWS has been reviewed.

- Drinking Water Quality Regulator for Scotland (DWQR) Guidance for Local Authorities on The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017;
- Scottish Environment Protection Agency (SEPA) A Practical Guide to The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (Version 9.2) 2022; and
- SEPA Land Use Planning System Guidance Note 31 (SEPA LUPS GU31) Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (Version 3) 2017.
- SEPA Guidance on Assessing the Impacts of Developments on Groundwater Abstractions 2024.

### *Assessment Methodology*

1.2.14 The assessment methodology for this PWSRA has been developed based on SEPA guidance, including previous SEPA-LUPS-GU31 and the updated Guidance on Assessing the Impacts of Developments on Groundwater Abstractions. These provide detailed guidance on assessing impacts to groundwater abstractions and therefore PWS which are fully or partly fed by groundwater.

1.2.15 In accordance with this guidance, this assessment identifies any existing groundwater abstractions present within the study area. This includes implementing the following detailed infrastructure buffers and identifying any PWS within them:

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

1.2.16 Following identification of existing groundwater abstractions, these informed the iterative design, and where practicable these infrastructure buffers have been implemented. Where buffers between the Proposed Development and groundwater abstractions cannot be maintained, a detailed risk assessment and site-specific Conceptual Site Model (CSM) is required. This qualitative assessment considers the importance of the source abstraction and the following potential effects:

- Extent;
- Magnitude;
- Duration, frequency and reversibility;
- Likelihood; and
- Cumulative effects.

1.2.17 Where potential impacts to groundwater abstractions are considered likely following the qualitative CSM, in some cases further quantitative monitoring to inform the CSM may be required.

1.2.18 These site-specific assessments would be accompanied by mitigation and best practice to prevent impacts to surface water and groundwater, likely to include monitoring of the PWS during pre-construction, construction and post-construction phases of the Proposed Development.

1.2.19 The assessment methodology for finding the significant or not significant impacts to PWS is outlined in **Chapter 8** of the EIAR.

### *Approach to Scoping PWS for Further Assessment*

1.2.20 Initial desk-based assessment identified registered PWS through consultation with SLC and EAC Environmental Health Officers (EHOs). A desk-based spatial assessment of the surrounding area using AddressBase and OS mapping was then undertaken to identify any additional properties within the 2 km study area.

1.2.21 Identified properties and registered PWS were then assessed and scoped out with consideration to the following aspects:

- bedrock and superficial geology;
- hydrogeology;
- surface water catchments;
- topography and drainage pathways; and
- distance from the Proposed Development (within 2 km study area).

1.2.22 The following resources were used to complete the desk-based assessment to determine potential hydrological connectivity to the site.

- Ordnance Survey (OS) 1:25k and 1:50k Map (Digital);
- Scottish Government Scotland's Environment Map;
- British Geological Survey (BGS) GeoIndex Onshore Map Viewer;
- BGS Geological Survey of Scotland 23 Hamilton 1979 Solid Map (1:63,360);
- BGS Geological Survey of Scotland 23 Hamilton 1951 Drift Map (1:63,360);
- BGS Geological Survey of Scotland 15 Sanquhar 1976 Solid Map (1:63,360); and
- BGS Geological Survey of Scotland 15 Sanquhar 1950 Drift Map (1:63,360).

1.2.23 Identified properties with potential to be PWS and hydrologically connected were then scoped into further assessment. Letters were initially issued to residents and landowners, to confirm the presence of a PWS supplying the property. The initial consultation comprised the following:

- A summary of the Proposed Development and what assessment would be undertaken as part of the PWSRA.
- A questionnaire to gather information on the source type, any pipework or treatment and supply points.
- A map of the property and the surrounding area for the resident to mark the location of the source any associated infrastructure.

1.2.24 Where residents confirmed their properties to be supplied by PWS, and the PWS source location to be within 2 km of the Proposed Development these were scoped into further assessment. An additional desk-based assessment was undertaken to confirm whether the PWS source was likely hydrologically connected. Site visits were then undertaken to PWS considered to be potentially connected to confirm and ground truth the residents information and provide further understanding. Where no responses were received from a resident by letter, email or at public exhibitions, further attempts to make contact were undertaken by door knocking during the site visit. In the absence of residents, a final letter was delivered to the property during the site visit.

1.2.25 Every PWS source was then assessed to provide a risk rating of potential impacts from the Proposed Development. Following implementation of embedded design and good practice mitigation measures, the residual effects to each PWS were assessed.

## 1.3 Baseline

### *Desk-based Assessment*

**Identification of PWS**

1.3.1 Consultation was undertaken with SLC and EAC to gather information on registered PWS within the 2 km study area. Based on the site boundary in 2022, a Freedom of Information (FOI) request was issued to SLC and EAC in November 2022. Responses were received in December 2022 and January 2023, providing names and locations of registered PWS.

1.3.2 Following design iterations and updates to the site boundary, a second FOI request was issued to SLC and EAC on 7 November 2023, to account for any possible changes to council records. Responses were received in November and December 2023. The two FOI requests from each council were reviewed and compared. There was found to be no change to the records within the study area between the two FOI requests being made.

1.3.3 The combined list of registered PWS were assessed and scoped out if outwith the current study area following the Scoping Update. Registered PWS were also scoped out if not considered to have potential hydrological or hydrogeological connectivity to the site. From this, 21 properties were scoped into assessment from the council EHO registers, consisting of seven SLC properties, and 14 EAC properties.

1.3.4 To identify any unregistered PWS within the study area, a desk-based review of additional properties from AddressBase data, OS mapping and Royal Mail postcode records was undertaken. Properties which were considered to be remote, located away from main roads or in an area surrounded by other PWS were scoped in. From this search an additional four properties were identified from AddressBase, one from OS mapping and one from Royal Mail postcode records.

**Resident and Landowner Consultation**

1.3.5 Where consultation between the Applicant and landowners were underway, details regarding PWS were supplied and assessed where available. Details were supplied from the landowner of Netherwood Farm in November 2022, and details were also provided of the supplies to Greenockdyke, Bibblon, Burnfoot, Forkings Cottage, Forkings Lodge, Middlefield Farm, Linburn, Blackside, Upper Hall and Laigh Hall. Consultation was also undertaken with and a site visit undertaken to the PWS at Lightshaw Farm in January 2023. A response from the residents of Laigh Hall was also received in November 2023.

1.3.6 The first letter consultation to residents was issued in March 2024 to all 27 properties identified. The letters included an accompanying questionnaire and map for the residents to fill in and return. A summary of responses to the letters issued are outlined in **Annex 3**. The responses received confirmed the properties to be supplied by PWS.

1.3.7 Where no further follow up consultation with residents was required, these PWS were scoped out of site visits.

**Scottish Woodlands Consultation**

1.3.8 Following consultation and an on-site visit at Glengavel House, it was identified that there had been previous data collected on the PWS when an existing forestry track was upgraded by Scottish Woodlands in Dungavel Forest. Consultation was undertaken with Scottish Woodlands in June 2024, to identify any source locations, or records of associated infrastructure during works on the existing forestry track which crosses the PWS pipework.

1.3.9 Scottish Woodlands confirmed no alterations had been made to the existing supply, and no pipework had been identified downslope beyond the crossing point on the track. A grid reference for the location of Glengavel House water tank was supplied (267020, 635451). Scottish Woodlands confirmed there had been no issues with the supply notified by the residents.

## *Site Based Assessment*

1.3.10 Site visits were arranged with residents where responses to letter consultation had been received or contact could be established through landowners prior to the site visit. Where contact could not be established prior to the visit, door knocking was undertaken.

1.3.11 Site visits were undertaken in April, May and September 2024, and a summary of visits is provided in **Table 1** in **Annex 3**. The location of sources were mapped during the site visit using ArcGIS Field Maps and are shown in **TA8.2 Figure 2**.

1.3.12 Following the results from the site visit and desk-based assessment, as outlined in **Annex 3 Table 2**, some of the PWS were scoped out of further assessment, by being in separate sub-catchments or outwith 10 m, 100 m and 250 m infrastructure buffers. PWS scoped out of further assessment include:

- PWS01 Waterhead;
- PWS02 Middlefield;
- PWS04 Burnside;
- PWS05 Netherwood;
- PWS06 Greenockdyke;
- PWS07 Plewland;
- PWS09 Templelands;

- PWS10 Geil Mill;
- PWS11 Bankend;
- PWS12 Stoneyhill;
- PWS14 Lightshaw;
- U1 Laigh Plewland;
- U2 Peelhill Farm;
- M1 Peelhill Farm Cottage; and
- M2 Barnock House.

1.1.1 Supplies to properties were labelled as 'PWS' where a private source was confirmed, 'M' where supplied by mains, and 'U' where the supply type was unconfirmed during consultation.

## 1.4 Primary Mitigation

1.4.1 Mitigation embedded into the design of the Proposed Development has been considered to prevent impacts to surface and groundwater across the site, including those which PWS are hydrologically connected to.

1.4.2 Embedded mitigation specific to PWS, included:

- Proposed Development infrastructure located outwith 50 m watercourse buffers where practicable, excepting solar PV modules within the southern development area, and where watercourse crossings are required.
- Solar PV modules within the southern development area located outwith 10 m watercourse buffers where practicable.
- Proposed Development infrastructure located outwith defined PWS source catchments.
- Maintaining recommended buffers from SEPA guidance for the Proposed Development, including 10 m for all activities, 100 m for all subsurface activities less than 1 m depth, and 250 m for all subsurface activities greater than 1 m depth.

1.4.3 All SEPA infrastructure buffers for PWS groundwater sources have been maintained, excepting the source tank for PWS08 Glengavel which is located within the 250 m infrastructure buffer of T2.

### *Committed Mitigation*

1.4.4 Committed mitigation including best practice guidance will be implemented across the site to prevent potential impacts to water quantity or quality. To prevent impacts to water quality, best practice mitigation will include:

- Implementation of silt management measures, including, but not limited to, silt traps, silt fencing and settlement lagoons to prevent and trap sedimentation within surface water run-off. This includes measures outlined within a Pollution Prevention Plan (PPP).
- Implementation of careful drainage design including, but not limited to, trackside ditches to direct flow of surface water and check dams will be used within the ditches to slow the flow of water, decreasing erosion and sedimentation. Regular cross drainage or culverting will be designed to ensure hydrological connectivity is maintained upslope and downslope of hardstanding. This may include upgrades to drainage present on existing tracks.
- Implementation of watercourse crossings as outlined in **Technical Appendix 8.1: Schedule of Watercourse Crossing** of the EIA Report, following further detailed design. Any construction will only take place following and in line with any relevant CAR authorisations.

- Implementation of geotextiles and track design materials to create an impermeable layer lining the foundation of the new construction track, and prevent leaching.
- No fuel, chemicals, vehicles, or plant will be stored within 10 m of watercourses. An emergency response plan will be implemented in the event of any fuel or chemical spills. This will be included within the Construction Environmental Management Plan (CEMP) and verified by the on-site Environmental Clerk of Works (EnvCoW). The emergency response plan will likely include confirmatory water quality or soil testing following clean-up of spills.
- Regular visual monitoring at watercourses downstream of the Proposed Development by the EnvCoW during construction. In addition to this a Water Quality Monitoring Plan (WQMP) will be enacted throughout construction to confirm this, as outlined in **Chapter 8** of the EIA Report.

## 1.5 Risk Assessment

1.5.1 A summary of the identified PWS sources and whether these have been assessed to be at risk from the Proposed Development following embedded mitigation is outlined in **Annex 2, Table 2.**

1.5.2 The Proposed Development has the potential to have an impact on PWS03, PWS08 and PWS13, therefore further assessment has been undertaken below.

### *PWS03*

1.5.3 Following consultation with the landowner of Linburn Farm prior to and during the site visit, it was confirmed that the property and Blackside House are supplied by a spring. The spring is confirmed to be located at a source tank at NGR 268343 629821. As shown in **Annex 3 Table 3**, the tank is brick lined with a steel top, with pipes into the surrounding hillside. The supply is then piped downhill and supplies Linburn Farm and Blackside House, approx. 1.2 km and 1.7 km downslope, where it is used for drinking, domestic and livestock purposes. The approximate route of the pipework from the tank to the properties was outlined by the landowner of Linburn Farm during the site visit, as shown in **TA8.2 Figure 5**. The supply pipework crosses into the site at approximately NGR 268544, 299695.

1.5.4 Underlying bedrock consists of sandstone of the Leaze Formation, with no mapped underlying superficial deposits, although till deposits are present immediately upslope. The spring source is underlain by low productivity bedrock aquifer of Silurian Rocks (Undifferentiated). Groundwater within the bedrock aquifer is described to be limited with flow through fractures or present in near-surface weathered zone.

1.5.5 Due to its infrastructure and surrounding geology, it is likely to be predominantly supplied by near-surface groundwater that will largely follow topography, with minimal deeper groundwater influence.

1.5.6 As shown in **TA8.2 Figure 5**, the spring is located approximately 160 m upslope from the nearest Proposed Development infrastructure, and is located outwith SEPA groundwater abstraction 10 m, 100 m and 250 m infrastructure buffers. The supply pipework is however considered likely to be located within these buffers and underlying Proposed Development infrastructure in areas. Embedded mitigation has been implemented as far as practicable through the iterative design of the Proposed Development, and infrastructure has been sited as far as practicable from the PWS source and supply pipework, while considering other constraints.

1.5.7 It is considered that the supply pipework of PWS03 is at increased potential risk during construction of the solar panels, security fence and new tracks associated with the southern development area. The location of the pipe between the source tank and the properties supplied, was not visible during the site walkover. It may cross under the current Proposed Development, however, this has not been confirmed and is based on approximate locations provided by the landowner of Linburn Farm.

1.5.8 Taking account of embedded and committed best practice mitigation measures, the magnitude of impact is assessed as low, on a high sensitivity receptor. There is therefore potential for an indirect, temporary, short-term effect of **moderate** significance, which is considered to be **significant** in terms of the EIA Regulations.

### *PWS08*

1.5.9 Following consultation with the resident prior to and during the site visit, it is confirmed that the property is supplied by a spring source. The spring source tank is located at NGR 265673, 633257, with the source located upslope of this. As shown in **Annex 3 Table 3**, there is a steel tank with plastic blue pipes into the surrounding hillside. The supply is then gravity fed and piped approx. 630 m downhill and supplies the property, where it is used for drinking and domestic purposes.

1.5.10 The approximate route of the pipework from holding tank to property was outlined by the resident during the site visit, with the approximate location of the supply pipework shown in **TA8.2 Figure 5**.

1.5.11 The spring is underlain by the low productivity bedrock aquifer of the Silurian Rocks (Undifferentiated), where there is limited groundwater present in near-surface weathered zone and flow is largely through fractures and discontinuities. The spring is within sandstone bedrock of the Plewland Formation, with a fault present approx. 100 m to the north-west. The spring is located on slopes with no mapped superficial deposits, immediately upslope of till deposits. Upslope on Dungavel Hill to the east, deposits of peat and deep peat are present.

1.5.12 There is a minor surface watercourse in close proximity to the source which flows downslope from the steep forested slopes of Dungavel Hill. PWS08 is located within the same sub-catchment as the Proposed Development, Bught Burn which is a tributary of Glengavel Water. PWS08 is located upslope of all Proposed Development infrastructure within the same catchment, and there is no infrastructure within its source catchment, as shown in **TA8.2 Figure 5**.

1.5.13 Due to its infrastructure and surrounding geology, it is likely to be predominantly supplied by near-surface groundwater that will largely follow topography, with minimal deeper groundwater influence.

1.5.14 As outlined in **Section 1.4**, embedded mitigation has been utilised to prevent impacts as far as practicable through design of the Proposed Development. As shown in **TA8.2 Figure 5,** the source is located approximately 200 m upslope of the Proposed Development. PWS08 source is located within SEPAs 250 m abstraction infrastructure buffers for turbine (T)2. Due to the source being upslope of the Proposed Development, separated by a fault and considered to be supplied by near-surface groundwater which largely follows topography, potential impacts to PWS08 is considered to be low.

1.5.15 It is considered that the pipework of PWS08 is at increased potential risk during construction of the access tracks and temporary hardstanding of T2. The location of the pipe between the source tank and the property supplied was not visible during the site walkover, except where visible underlying the upgraded forestry access track. From the residents description and pipework visible onsite, it will likely cross under the Proposed Development, however, this has not currently been confirmed.

1.5.16 Taking account of embedded and committed best practice mitigation measures, the magnitude of impact is assessed as low, on a high sensitivity receptor. There is therefore potential for an indirect, temporary, short-term effect of **moderate** significance, which is considered to be **significant** in terms of the EIA Regulations.

### *PWS13*

1.5.17 Consultation with the landowner of Laigh Hall prior to the site visit confirmed PWS13 to be a spring which supplies the property. The supply is treated with a UV filter, and is no longer shared with Upper Hall as the property is abandoned and derelict.

1.5.18 Consultation with a nearby landowner confirmed the spring to be located at a source tank at NGR 268147, 628995, approx. 600 m north-west of Laigh Hall. As shown in **Annex 3 Table 3,** the tank is brick lined with a steel top, with pipes into the surrounding hillside. The supply is piped from the tank to a tap south of the source at NGR 268191, 628888 and to the property at NGR 267863, 628503. The location of the pipework was not visible during the site walkover, an approximate location of the pipework based on consultation with the landowner is shown in **TA8.2 Figure 5**.

1.5.19 The spring is underlain by the moderately productive bedrock aquifer of the Inverclyde Group, which is a multi-layered aquifer where flow is mostly through fractures. The spring is located in close proximity to an igneous intrusion of the Mull Dyke Swarm. Mapped superficial deposits of till are also shown underlying the source. The source is located in close proximity to a nearby watercourse.

1.5.20 Due to its infrastructure and surrounding geology, it is likely to be predominantly supplied by near-surface groundwater that will largely follow topography, with minimal deeper groundwater influence.

1.5.21 As shown in **TA8.2 Figure 5**, the spring is located approximately 50 m downslope of the nearest Proposed Development infrastructure, and is located outwith SEPA groundwater abstraction 10 m, 100 m and 250 m infrastructure buffers.

1.5.22 Due to the source being considered to be near-surface groundwater which largely follows topography and to be partly fed by surface water overland flow, potential impacts to surface water quality and quantity was considered. Proposed Development infrastructure was therefore sited outwith 50 m from the source tank, to ensure implementation of committed best practice mitigation measures. Based on slope, GIS modelling and professional judgement this is considered sufficient to prevent any impacts to the source.

1.5.23 The supply pipework however may be located within groundwater abstraction buffers and underlying Proposed Development infrastructure in areas. Embedded mitigation has been implemented as far as practicable through the iterative design of the Proposed Development, and infrastructure has been sited as far as practicable from the PWS source and supply pipework, while considering other constraints.

1.5.24 It is considered that the pipework of PWS13 is at increased potential risk during construction of the solar PV modules. The location of the pipe between the tank and the property supplied was not visible during the site walkover. It may cross under the Proposed Development, however, this has not been confirmed and is based on approximate locations provided by the nearby landowner.

1.5.25 Taking account of embedded and committed best practice mitigation measures, the magnitude of impact is assessed as low, on a high sensitivity receptor. There is therefore potential for an indirect, temporary, short-term effect of **moderate** significance, which is considered to be **significant** in terms of the EIA Regulations.

**Sensitivity of Receptors**

**Table 1: Sensitivity of Receptors**

| Source | Sensitivity | Justification |
|---|---|---|
| PWS03 | High | Spring source supplied by near-surface groundwater and surface water runoff. |
| PWS08 | High | Spring source supplied by near-surface groundwater and surface water runoff. |
| PWS13 | High | Spring source supplied by near-surface groundwater and surface water runoff. |

**Magnitude of Impact**

**Table 2: Magnitude of Impact**

| Source | Magnitude | Justification |
|---|---|---|
| PWS03 | Low | Source located upslope and outwith SEPA groundwater abstraction infrastructure buffers. PWS supply pipework may underlie Proposed Development access tracks and solar PV modules. |
| PWS08 | Low | Source located within 250 m SEPA groundwater abstraction infrastructure buffer, however, is assessed to be predominantly fed by near-surface groundwater with no Proposed Development infrastructure within source catchment. PWS supply pipework may underlie Proposed Development access tracks. |
| PWS13 | Low | Source located outwith SEPA groundwater abstraction infrastructure buffers. PWS supply pipework may underlie Proposed Development solar PV modules. |

**Significance of Effect**

**Table 3: PWS Significance of Effect**

| Source | Effect | Mitigation Proposed |
|---|---|---|
| PWS03 | Moderate - significant | Additional mitigation required. |
| PWS08 | Moderate - significant | Additional mitigation required. |
| PWS13 | Moderate - significant | Additional mitigation required. |

## 1.6 Additional Mitigation

1.6.1 The potential effect on PWS03, PWS08 and PWS13 is assessed to be of moderate significance. This is due to the potential low magnitude impact to the connecting PWS supply pipework between the source tanks and properties supplied. There is considered to be negligible magnitude of impact to the water quality or quantity of the source abstractions.

1.6.2 To ensure the continued water quantity at the supply, during construction of the Proposed Development infrastructure, a watching brief will be employed, with excavation to be closely monitored by the onsite EnvCoW. If pipework associated with the PWS is identified this will be marked and a detailed design strategy prepared. This strategy may involve laying the supply pipework beneath access tracks or to redirect the pipework to maintain supply.

1.6.3 As the potential effect on all other PWS is assessed to be of low significance, additional mitigation measures are considered to not be required. Best practice guidance and standard mitigation measures will be employed to protect hydrological and hydrogeological receptors.

## 1.7 Monitoring

1.1.2 To ensure the continued water quality at the supply during installation of Proposed Development infrastructure, water quality monitoring will be undertaken at PWS03, PWS08 and PWS13. A WQMP will be prepared and agreed with EAC and SLC in consultation with SEPA, prior to commencement of construction. The following sampling frequency is proposed in line with updated SEPA guidance and will be fully outlined within the WQMP:

- Monthly for 12 months prior to construction phase works in proximity to the PWS supply pipework,
- Fortnightly during construction phase works in proximity to the PWS supply pipework; and
- Monthly for 12 months following construction in proximity to PWS supply pipework.

1.1.3 Following the pre-construction monitoring, a baseline monitoring report will be produced and maximum and minimum thresholds for parameters agreed with EAC, SLC and SEPA. Monthly reports will be produced following monitoring throughout the construction phase, including where any exceedances above or below thresholds are noted.

1.1.4 The following water quality parameters are proposed to be monitored at a minimum:

- pH;
- Colour;
- Turbidity;
- Total Suspended Solids (TSS);
- Total Dissolved Solids (TDS);
- Lead, Iron, Manganese, and Aluminium;
- Total Petroleum Hydrocarbons (TPH); and

- E.coli, Enterococci and Total Coliforms.

## 1.8 Residual Effects

1.1.5 As noted above, no significant potential environmental effects to surface water or groundwater quality or quantity were identified for PWS, excepting PWS03, PWS08 and PWS13, taking account of embedded and good practice mitigation.

1.1.6 Following the additional mitigation measures and the implementation of monitoring as outlined above, and within the WQMP, the residual effects for PWS03, PWS08 and PWS13 water quality and quantity are considered to be **minor** and is considered to be **not significant** in terms of the EIA Regulations.

## 1.9 References


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# Annex 1 Figures

# Annex 2 Example Consultation Questionnaire

# PRIVATE WATER SUPPLY ASSESSMENT

Ref: -4188

Name & Address:

Contact Details:

Are you happy for ITPEnergised to contact you with any queries with regards to this form? ..... YES/NO

*Please provide as much information as you can for the relevant questions below.*

1. **Is your property connected to a water mains supply?** ..... YES/NO
   *If **YES**, please return this sheet to ITPEnergised in the envelope enclosed.*
   *If **NO**, please answer the following question.*
   *(If your property is both connected to the mains and has a private supply, please answer the following questions with respect to the private supply)*

2. **Please indicate what type(s) of private water supply you have:**

   Spring-fed □ Watercourse Supply □

   Borehole □ Other / Unknown □

3. **Spring Fed Source(s)**

   Location of Spring:

   Is your spring water gravity fed or pumped to your holding tank? GRAVITY / PUMPED / UNKNOWN

4. **Borehole Supply**

   Location of Borehole:

   Does your borehole have a pump? YES / NO / UNKNOWN

   What is the depth of the borehole?

5. **Watercourse Supply**

   Location of Supply:

   Name of Watercourse:

6. **Other / Unknown Source(s)**

   Please provide what details you have including likely source location, water treatment, quantities used, etc.

7. **Please indicate what you use your water supply for:**

   Drinking □ Domestic □

   Livestock □ Other □

8. **Please provide details of water treatment, if known:**

| | | | |
|---|---|---|---|
| None | ☐ | Filter | ☐ |
| UV | ☐ | Other | ☐ |

9. **Do you share your supply with other properties? If yes, please list below.**

| |
|---|
| |

10. **Further Information** (e.g. notes on water quality, historical problems, pumping rates / volumes / yields etc.)**:**

| |
|---|
| |

# Annex 3 PWS Screening

**Table 1 -PWS Consultation and Site Visit Summary**

| Supply Ref | Supply Name | Property Ref | Property Name | Source Type | Initial Consultation | Site Visit | Consultation Summary |
|---|---|---|---|---|---|---|---|
| PWS01 | Waterhead | 1 | Waterhead House | Spring | No response received to letter consultation. | Property was visited during site visit on 5 September 2024, no answer, consultation letter left in post-box. | Assessment based on EAC EHO records. |
| PWS02 | Middlefield | 2 | Middlefield Farmhouse and Cottage | Spring | Email consultation with landowner confirmed approximate source tank and pipework location. Confirmed supply is shared with The Forkings and The Forking Lodge. The source is gravity fed, used for domestic purposes, there is no treatment. | Site visit was undertaken 4 April 2024, this confirmed source and holding tank location. A secondary site visit was undertaken 5 September 2024, this confirmed the pipework location from holding tank to property. | Assessment is based on resident consultation during site visit. |
| | | 12 | The Forkings Lodge | | | | |
| | | 13 | The Forkings | | | | |
| PWS03 | Linburn | 3 | Blackside House | Spring | Email consultation with landowner of Linburn Farm confirmed approximate source tank and pipework location. Confirmed that supply is shared with Blackside House. The source is gravity fed, used for domestic and livestock purposes, treatment type unknown. | Site visit was undertaken 4 April 2024, which confirmed location of source tank. A second site visit was undertaken 5 September 2024, where the approximate location of the supply pipework between the source tank and supplies at Linburn Farm and Blackside House was confirmed with the landowner of Linburn Farm. | Assessment is based on resident consultation when site visit was undertaken. |
| | | 4 | Linburn Farm | | | | |
| PWS04 | Burnfoot | 5 | Burnside | Spring | Email consultation with nearby landowner confirmed | Site visit was undertaken 4 April 2024, where residents | |

| Supply Ref | Supply Name | Property Ref | Property Name | Source Type | Initial Consultation | Site Visit | Consultation Summary |
|---|---|---|---|---|---|---|---|
| | | 6 | Burnfoot Farm | | approximate source tank location. | confirmed location of source tank and supply pipework connecting to property. Confirmed supply is not shared with other properties and used for domestic use. | Assessment is based on resident consultation during site visit. |
| PWS05 | Netherwood | 7 | Netherwood Farm Butchery | Spring | Email consultation with landowner confirmed approximate source tank and supply pipework location. Confirmed supply is shared between all other Netherwood farm buildings. The source is gravity fed, used for domestic purposes, with a UV filter treatment installed. | Site visit was undertaken 4 April 2024, this confirmed location of source tank. | Assessment is based on resident consultation during site visit. |
| | | 8 | Netherwood Farm Bungalow | | | | |
| | | 9 | Netherwood Farm Cottage | | | | |
| | | 10 | Netherwood Farm | | | | |
| PWS06 | Greenockdyke | 11 | Greenockdyke Farm | Spring | Email consultation with landowner confirmed approximate location of source tank and supply pipework. Landowner confirmed that supply is shared with Bibblon. The source is gravity fed, used for domestic purposes, there is no treatment. | Site visit not undertaken as scoped out following desk-based assessment. | Assessment is based on resident consultation during site visit. |
| | | 27 | Bibblon | | | | |

| Supply Ref | Supply Name | Property Ref | Property Name | Source Type | Initial Consultation | Site Visit | Consultation Summary |
|---|---|---|---|---|---|---|---|
| PWS07 | Plewlands | 14 | High Plewlands Farmhouse and Glengavel View | Spring | Response from resident confirmed source type and location of supply pipework. The source is located on Spoutloch Burn, south of Glengavel Reservoir and south-west of the northern development area. The PWS is gravity fed, and used for drinking and domestic purposes. | Site visit not undertaken to source as considered to be hydrologically disconnected by Glengavel Water and Glengavel Reservoir. | Assessment is based on resident response to initial letter consultation. |
| PWS08 | Glengavel | 15 | Glengavel House | Spring | Email consultation with resident confirmed approximate locations of source tank and supply pipework. The PWS is gravity fed, and used for drinking and domestic purposes. Additional consultation was undertaken with Scottish Woodlands who provided co-ordinates of source tank and pipework. | Site visit was undertaken 5 September 2024, where source tank and approximate pipework location was confirmed. Confirmed supply is not shared with any other properties. | Assessment based on resident consultation from letter response and site visit. |

| Supply Ref | Supply Name | Property Ref | Property Name | Source Type | Initial Consultation | Site Visit | Consultation Summary |
|---|---|---|---|---|---|---|---|
| PWS09 | Templelands | 16 | Templelands Cottage | Spring | No response received to letter consultation. Council records stated supply shared with Glengavel House. Glengavel House confirmed supply is not shared. | Property was visited during site visit on 5 September 2024, consultation letter left at property. Location of a borehole at property was identified on BGS GeoIndex borehole records (BGS ID 20948228). Logs present confirmed borehole drilled to 60 m with well screen from 31.5 m. Records provided of water quality sample test results , and a pump installation record, both September 2020. | Assessment based on BGS GeoIndex borehole records, as council data confirmed to be inaccurate through consultation with Glengavel House. |
| PWS10 | Geil Mill | 17 | Geil Mill Cottage | Spring | No response received to letter consultation. | Resident at Barnock House confirmed property is no longer occupied, during site visit 5 September 2024. | Assessment based on SLC EHO consultation. |
| PWS11 | Bankend | 18 | Bankend Farm | Borehole | No response received to letter consultation. | Site visit was undertaken 5 September 2024, where resident confirmed the property was supplied by a borehole. Confirmed supply is used for drinking, domestic, and livestock purposes. Supply treated by a carbon filter tank with micro filter. Resident confirmed previous spring supply was lost to quarry works. | Assessment is based on resident consultation during site visit. |

| Supply Ref | Supply Name | Property Ref | Property Name | Source Type | Initial Consultation | Site Visit | Consultation Summary |
|---|---|---|---|---|---|---|---|
| PWS12 | Stoneyhill | 19 | Stoneyhill Farm | Spring | No response received to letter consultation. | Site visit was undertaken 5 September 2024 to both Stoneyhill Farm and Stoneyhill Cottage. The residents at both properties confirmed supplied by a shared spring source, used for domestic and agricultural purposes, with no treatment. | Assessment is based on resident consultation during site visit. |
| | | 20 | Stoneyhill Cottage | | | | |
| PWS13 | Laigh Hall | 25 | Laigh Hall | Spring | Response from Laigh Hall landowner confirmed the source is located at Middlefield Farm, in field next to pond. The source is gravity fed from a tank approximately 2 km from the property, which is filled via two springs. A UV and filter is used for treatment, and the supply is used for drinking, domestic and livestock purposes.<br>Further email consultation with nearby landowner confirmed approximate location of source tank and supply pipework. Upper Hall is abandoned and no longer occupied. | Site visit was undertaken 4 April 2024, which confirmed source tank location. A second site visit was undertaken 5 September 2024 to confirm route of supply pipework from source tank to property with nearby landowner, however, could not be found during walkover of identified area. | Assessment is based on resident consultation from letter response and nearby landowner during site visit. |
| | | 26 | Upper Hall | | | | |

| Supply Ref | Supply Name | Property Ref | Property Name | Source Type | Initial Consultation | Site Visit | Consultation Summary |
|---|---|---|---|---|---|---|---|
| PWS14 | Lightshaw | 28 | Lightshaw Farm | Spring | Email consultation with property owner confirmed approximate source location. | Site visit was undertaken 16 January 2023, which confirmed the source and holding tank location. | Assessment based on resident consultation from letter response and site visit. |
| U1 | Unconfirmed | 21 | Laigh Plewland Farm | Unconfirmed | No response received to letter consultation. Not present on council EHO PWS register. | Site visit was undertaken 5 September 2024, with no one present at time of visit. During visit appears to be owned by quarry and not currently occupied. Council EHO records for PWS10 is located at Laigh Plewland Farm, so may be a shared supply. | Property is not registered with council and whether PWS or mains has not been confirmed by residents. Assessment undertaken on worst-case scenario that property is supplied by PWS. |
| U2 | Unconfirmed | 22 | Peelhill Farm | Unconfirmed | No response received to letter consultation. Not present on council EHO PWS register. | Property was visited during site visit 5 September 2024, consultation letter was left with resident to complete and return, however, form was never returned. Neighbouring properties confirmed to be supplied by mains. | Property is not registered with council and whether PWS or mains has not been confirmed by residents. Assessment undertaken on worst-case scenario that property is supplied by PWS. |
| M1 | Mains | 23 | Peelhill Farm Cottage | Mains | No response received to letter consultation. | Site visit was undertaken 5 September 2024, resident confirmed property to be supplied by mains. | Assessment is based on resident consultation during site visit. |
| M2 | Mains | 24 | Barnock House | Mains | No response received to letter consultation. | Site visit was undertaken 5 September 2024, resident confirmed property to be supplied by mains. | Assessment is based on resident consultation during site visit. |

**Table 2- PWS Assessment**

| Source Ref | Source Type | Approx Source Location (BNG) | Approx distance from Proposed Development | PWS Assessment | PWS Scoped In/Out of Further Assessment |
|---|---|---|---|---|---|
| PWS01 | Spring | 270230, 631073 | 1.0 km | According to EAC EHO records, the source is located 1 km upslope from the Proposed Development. It is hydrologically disconnected by the Greenock Water, and is located outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| PWS02 | Spring | 268130, 629769 | 270 m | The source tank is considered to be supplied by near-surface groundwater and surface water runoff from the surrounding hillside. It is located within the same sub-catchment of the Greenock Water as the Proposed Development. It is also located within the same moderately productive bedrock aquifer as the Proposed Development. The source tank is located to the north and upslope of the southern development area. The source tank and supply pipework has been confirmed to be located ouwtih SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| PWS03 | Spring | 268343, 629821 | 200 m | The source tank is considered to be supplied by near-surface groundwater and surface water runoff from the surrounding hillside. It is located within the same sub-catchment of the Greenock Water as the Proposed Development. It is also located within the same low productivity bedrock aquifer as the Proposed Development. The source tank is located to the north and upslope of the southern development area, outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers.<br>Consultation with the landowner during the site visit provided an approximate route of the supply pipework. This route traverses through areas in the east of the southern development area, which will be located under Proposed Development access tracks and solar PV modules. | Scoped into further assessment, due to location of supply pipework. |

| Source Ref | Source Type | Approx Source Location (BNG) | Approx distance from Proposed Development | PWS Assessment | PWS Scoped In/Out of Further Assessment |
|---|---|---|---|---|---|
| PWS04 | Spring | 267264, 628591 | 70 m | The source tank is considered to be supplied by groundwater.. Located within the same moderately productive bedrock aquifer as the Proposed Development. The source tank is hydrologically disconnected from the nearest solar PV modules by the surface watercourse of Back Burn. It is located outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| PWS05 | Spring | 265972, 628732 | 330 m | The source tank is considered to be supplied by near-surface groundwater and surface water runoff from the surrounding hillside. It is located within the same moderately productive bedrock aquifer as the Proposed Development. It is hydrologically disconnected from the Proposed Development by the Netherwood Burn. The source tank and supply pipework has been confirmed to be located outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| PWS06 | Spring | 265639, 628685 | 650 m | The source tank is considered to be supplied by near-surface groundwater and surface water runoff from the surrounding hillside. It is located within the same moderately productive bedrock aquifer as the Proposed Development. It is hydrologically disconnected from the Proposed Development by the Netherwood Burn. Source confirmed to be outwith 250 m from the southern development area, and is therefore located outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following desk-based assessment. |
| PWS07 | Spring | 265673, 633257 | 2 km | The source is located within the sub-catchment of Spoutloch Burn, hydrologically disconnected from the Proposed Development by Glengavel Water and Glengavel Reservoir. The source is confirmed to be outwith 250 m from the northern development area, and is therefore located outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following desk-based assessment. |
| PWS08 | Spring | 267036, 635444 | Source 210 m from T2 | The source tank and supply pipework is located within the northern development area. The holding tank is located within the 250 m infrastructure buffer of T2. The source is assumed to be upslope of the tank | Scoped into further assessment, due to location |

| Source Ref | Source Type | Approx Source Location (BNG) | Approx distance from Proposed Development | PWS Assessment | PWS Scoped In/Out of Further Assessment |
|---|---|---|---|---|---|
| | | | | along an unnamed surface watercourse on Dungavel Hill. The supply pipework currently crosses an existing track before is assumed to traverse downhill along the forestry ride to the property. It is proposed to be crossed by the temporary hardstanding at T2 and access tracks. | of source tank and supply pipework. |
| PWS09 | Borehole | 265540, 635975 | 570 m | According to borehole records on BGS GeoIndex Onshore, groundwater supplied from same low productivity bedrock aquifer as underlying the Proposed Development. The source is located outwith 250 m from the northern development area, and is therefore outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| PWS10 | Spring | 265434, 635250 | 780 m | According to SLC EHO records, the source is a spring. It is hydrologically disconnected from the Proposed Development by the Glengavel Water and Glengavel Reservoir. The source is located outwith 250 m from the northern development area, and is therefore outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| PWS11 | Borehole | 264763, 636071 | 1.3 km | The source is underlain by a low productive bedrock aquifer, that while underlying part of the site, does not underlie the Proposed Development. The source is located outwith 250 m from the northern development area, and is therefore outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| PWS12 | Spring | 263417, 634929 | 2.7 km | The source is underlain by a low productive bedrock aquifer, that while underlying part of the site, does not underlie the Proposed Development. The source is located outwith 250 m from the northern development area, and is therefore outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. The source is also hydrologically disconnected by the Glengavel Water and Glengavel Reservoir. | Scoped out following site visit. |

| Source Ref | Source Type | Approx Source Location (BNG) | Approx distance from Proposed Development | PWS Assessment | PWS Scoped In/Out of Further Assessment |
|---|---|---|---|---|---|
| PWS13 | Spring | 268147, 628995 | 50 m | The source tank and supply pipework is located within the southern development area. The source tank is considered to be supplied by near-surface groundwater and surface water runoff from the surrounding hillside. It is located within the same sub-catchment of the Greenock Water as the Proposed Development. It is also located within the same moderately productive bedrock aquifer as the Proposed Development. The source tank is located outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers.<br>Consultation with nearby landowner during the site visit provided an approximate route of the supply pipework. This route traverses through areas in the south of the southern development area, which may be located under Proposed Development solar PV modules, however it is assumed that the pipework follows the existing access track. | Scoped into further assessment, due to location of supply pipework. |
| PWS14 | Spring | 271498, 629393 | 1.8 km | The source is located within River Ayr catchment, which is separate to the site. It is also located within a separate bedrock aquifer which does not underlie the Proposed Development. The source is located outwith 250 m from the southern development area, and is therefore outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| U1 | Unconfirmed | 265434, 635250 (Property) | 780 m | Property is not registered with council and whether PWS or mains has not been confirmed by residents. Council registered PWS10 is located at property, so it is considered likely that the supply may be shared. If supplied by PWS it would be hydrologically disconnected by Glengavel Water and Glengavel Reservoir. The source would also be located outwith 250 m from the northern development area, and is therefore outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | Scoped out following site visit. |
| U2 | Unconfirmed | 264377, 636713 (Property) | 1.9 km | Property is not registered with council and whether PWS or mains has not been confirmed by residents. Surrounding properties were confirmed to be supplied by mains through consultation. If supplied by PWS it would be | Scoped out following site visit. |

| Source Ref | Source Type | Approx Source Location (BNG) | Approx distance from Proposed Development | PWS Assessment | PWS Scoped In/Out of Further Assessment |
|---|---|---|---|---|---|
| | | | | hydrologically disconnected by Glengavel Water and Glengavel Reservoir. The source would also be located outwith 250 m from the northern development area, and is therefore outwith SEPA's groundwater abstraction 10 m, 100 m and 250 m buffers. | |
| M1 | Mains | N/A | N/A | Property supplied by mains, therefore scoped out of further assessment. | Scoped out following desk-based assessment. |
| M2 | Mains | N/A | N/A | Property supplied by mains, therefore scoped out of further assessment. | Scoped out following desk-based assessment. |

**Table 4 PWS Photographs**

| Source Ref | Source Name | Photograph |
|---|---|---|
| PWS03 | Linburn |  |
| PWS08 | Glengavel |   |

| Source Ref | Source Name | Photograph |
|---|---|---|
| PWS13 | Laigh Hall |  |