SP Energy Networks

Kendoon to Tongland 132kV Reinforcement Project

Private Water Supply Assessment Update

FINAL

July 2021

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1 Introduction

Following submission of the Environmental Impact Assessment (EIA) Report in support of the five applications for the development of a series of overhead line (OHL) connections and associated developments which form the Kendoon to Tongland 132 kilovolt (kV) Reinforcement Project (KTR Project) in September 2020 (ECU00002124, ECU00002125, ECU00002126, ECU00002127, and ECU00002128), the Scottish Environment Protection Agency (SEPA) requested additional information on several private water supplies (PWS).

Kaya Consulting Limited was commissioned by SP Energy Networks (SPEN) to provide this information to SEPA, and this report provides a summary of the SEPA comments, requested information and subsequent updated risk assessments for several PWS.

In an email from SEPA, dated 20 November 2020, SEPA noted the following information is needed prior to determination:

- The source locations for High Carminnows, Phail Barcris and Waterside PWS should be identified as per SEPA Guidance. Supplied properties should be consulted where necessary to determine source locations. This includes construction details and borehole depth where applicable; and
- The source of the Dalshangan PWS should be identified and Risk Assessed. The details should be provided to SEPA for review.

A letter report was prepared by Kaya Consulting (dated 19 January 2021) and submitted to SEPA providing the updated information and updated risk assessments.

A further email from SEPA on 5 July 2021 noted that no further information was required for the High Carminnows PWS and Dalshangan PWS risk assessments. However, SEPA requested that risk assessments for Phail Barcris and Waterside PWS should also incorporate available data on the superficial/bedrock geology and aquifer type and the zone of contribution. The geology and aquifer data was previously described in the EIA Report and was incorporated into updated risk assessments and provided in a second letter to SEPA from Kaya Consulting (dated 7 July 2021).

This report presents the additional data and updated risk assesments that were provided to SEPA in support of the application.

This report has been prepared by Dr Sally Stewart BSc (Hons) MSc PhD MCIWEM CWEM. Sally is a Principal Environmental Scientist and Geomorphologist, with over 19 years of consulting and research experience in the UK, Canada and India. Sally has experience of EIA, water resource management, and flood risk assessments. She is also an experienced river and coastal geomorphologist who has advised on numerous riverine and coastal development projects. Sally has been responsible for carrying out the assessment and writing of hydrology chapters for many wind farm and linear project EIAs in the UK. She has also undertaken numerous flood assessments and geomorphology studies.[1]

[1] Information on expertise provided in line with Regulation 5 of the EIA Regulations.

2 Regulatory Requirements

SPEN has submitted this new package of additional information to the ECU, requested by Scottish Ministers under Regulation 19 of the EIA Regulations, to address the concerns raised by SEPA in relation to PWS as described above. There have been no changes to the layout or design of the KTR Project following the submission of the application.

The responsibility lies with the Scottish Ministers to determine whether to grant or refuse consent based on the information which has been made available in the 2020 EIA Report and this Additional Information, the merits of the KTR Project and other material considerations, including local and national planning and renewable energy policy.

This report complements the 2020 EIA Report, ensuring that all relevant information is available for consideration by the Scottish Ministers and consultees when determining the application. Unless otherwise stated in the report, the content of the 2020 EIA Report remains valid.

The information contained in this report is considered to be substantive information for the purposes of the EIA Regulations. It will therefore be published as 'additional information' in accordance with Regulation 20 of the EIA Regulations (as amended)[2], and publicly advertised. This will engage a further round of consultation on the application whereby comments will be sought from consultees and members of the public.

Submission of this report will trigger a consultation period of at least 30 days from the date of formal publication during which members of the public and consultees will have the opportunity to make representations to the ECU. The submission will be formally published under Regulation 20 of the EIA Regulations (as amended), and will be made available for public viewing along with the 2020 EIA Report on the project website www.spenergynetworks.co.uk/pages/dumfries_galloway_project_documents.aspx and the Scottish Government ECU Portal at www.energyconsents.scot/ApplicationSearch.aspx.

Any representations to the application may be submitted via the Energy Consents Unit website at www.energyconsents.scot/Register.aspx; by email to the Scottish Government, Energy Consents Unit mailbox at representations@gov.scot; or by post to the Scottish Government, Energy Consents Unit, 4th Floor, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU, identifying the proposal and specifying the grounds for representation. Please note that there may be a delay in the Energy Consents Unit receiving representations by post.

[2] In light of the current Covid-19 pandemic, Regulation 20 has been amended by Regulation 4(10) and (11) of The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020.

3 Additional Data on PWS Source Locations

PWS property owners were contacted in early December 2020 either via phone-call or site visits, and the source locations were provided. Details of the source locations have been added to **Tables 1 and 2** below. The tables correspond to **Tables 1 and 2** in **Appendix 9.3** of the KTR Project EIA Report and provide the updated information and results of the updated risk assessments on the PWS sources (see **Section 3** of this report).

Table 1: Details of PWS

Nat. Grid Ref (source)	KTR Connection[1]	Source Name	Source Ref	Source Type	Type[2] (A or B)	No of Properties and Use	Comments
NX59174 89984	PG	High Carminnows	103122	Borehole	B	1 Domestic	Borehole located beside property. The supply is pumped into home/ tank. Borehole of unknown depth within block enclosure with manhole lid access.
NX 59465 89618	PG	Dalshangan Wood	103096	Borehole	B	1 Domestic	Borehole, covered well, 80m deep.
NX59908 87642[3]	PG	Phail Barcris	99068	Borehole	B	1 Domestic	Borehole is located within close proximity to the house but the exact coordinates uncertain[3].
NX60934 81169	PG & EG	Waterside	100069	Spring	B	1 Domestic	Spring and collection tanks upslope of farm. The farm and cottage are now connected to the mains. However, the landowner wants to maintain the existing PWS for future reconnection.

[1] KTR Connection**:** PG = Polquhanity to Glenlee, CK = Carsfad to Kendoon, EG = Earlstoun to Glenlee, GT = Glenlee to Tongland, BG = BG route deviation

[2]Type: Type A supplies are larger PWS, or those with a commercial activity, and are defined as Regulated supplies, which supply either a commercial activity or 50 or more people in domestic premises. These supplies are subject to regular testing by D&GC. Type B supplies are smaller supplies that serve only domestic properties (<50 persons).

[3]The property owner of Phail Barcris was unable to provide the exact location of the borehole, due to personal circumstances. The borehole is known to be in close proximity to the property, therefore for the purposes of this assessment the source is assumed to have the same NGR as the property.

Table 2: PWS sources and properties within 250m of KTR infrastructure

Nat. Grid Ref	KTR Connection	Source or Property Name	Property	Source /Source Type	Type	Nearby KTR Infrastructure	Distance from closest Infra-structure (m)	Flow Path Analysis Result[1]	Likely Effect
NX59174 89984	PG	High Carminnows		Borehole	B	Construction Compound 1	50	Potential impact	Minor
NX59167 89959	PG	High Carminnows	Property		B	Construction Compound 1	60	Potential impact	Minor

Nat. Grid Ref	KTR Connection	Source or Property Name	Property	Source /Source Type	Type	Nearby KTR Infrastructure	Distance from closest Infra-structure (m)	Flow Path Analysis Result[1]	Likely Effect
NX59465 89618	PG	Dalshangan Wood		Borehole	B	Access Track to Polquhanity terminal tower, Underground Cable	260, 260	No impact	None
NX59473 89440	PG	Dalshangan Wood	Property		B	Access Track to Polquhanity terminal tower, Underground Cable	288, 241	No impact	None
NX59908 87642	PG & N	Phail Barcris		Borehole[2]	B	Access Track between towers 8 and 9, Tower 9, Underground Cable	170, 180, 3	Potential impact	Minor
NX59908 87642	PG & N	Phail Barcris	Property		B	Access Track between towers 8 and 9, Tower 9, Underground Cable	170, 180, 3	Potential impact	Minor
NX60934 81169	PG, EG & R	Waterside		Spring[3]	B	Access Track to Tower 33, Tower 33, Underground Cable	68, 53, 320	Potential impact	Minor
NX61240 80996	PG, EG & R	Waterside	Property		B	Access Tracks, Tower EG6, Underground Cable	198, 151, 48	No impact – property is now supplied by Scottish Water mains	None

[1]Flow Path Analysis Result: Likelihood of impact on PWS from infrastructure construction, based on flow paths.

[2]The property owner of Phail Barcris was unable to provide the exact location of the borehole, due to personal circumstances. The borehole is known to be in close proximity to the property, therefore for the purposes of this assessment the source is assumed to have the same NGR as the property.

[3] Spring and collection tanks upslope of farm. The farm and cottage are now connected to the mains. However, the landowner wants to maintain the existing PWS for future reconnection.

4 Updated Risk Assessments

Updated risk assessments for the High Carminnows, Phail Barcris and Waterside PWS were carried out based on the updated source information, together with a risk assessment of Dalshangan Wood PWS. **Figures 1-5** show revised PWS risk assessment figures and the results are summarised in **Table 2**.

Flow routing analysis was carried out in Global Mapper GIS software using 1m Light Detection and Ranging (LiDAR) terrain data (where available) and Ordnance Survey 5m digital terrain data. In the absence of data on ground water levels and flow paths, analysis of topography, surface water flows paths and the type of PWS was used to infer hydrological and hydrogeological connectivity and identify if the KTR Project could potentially have an impact on a PWS. In addition, a review of available geology (bedrock and superficial) and aquifer types was also carried out to aid understanding of hydrogeological connectivity.

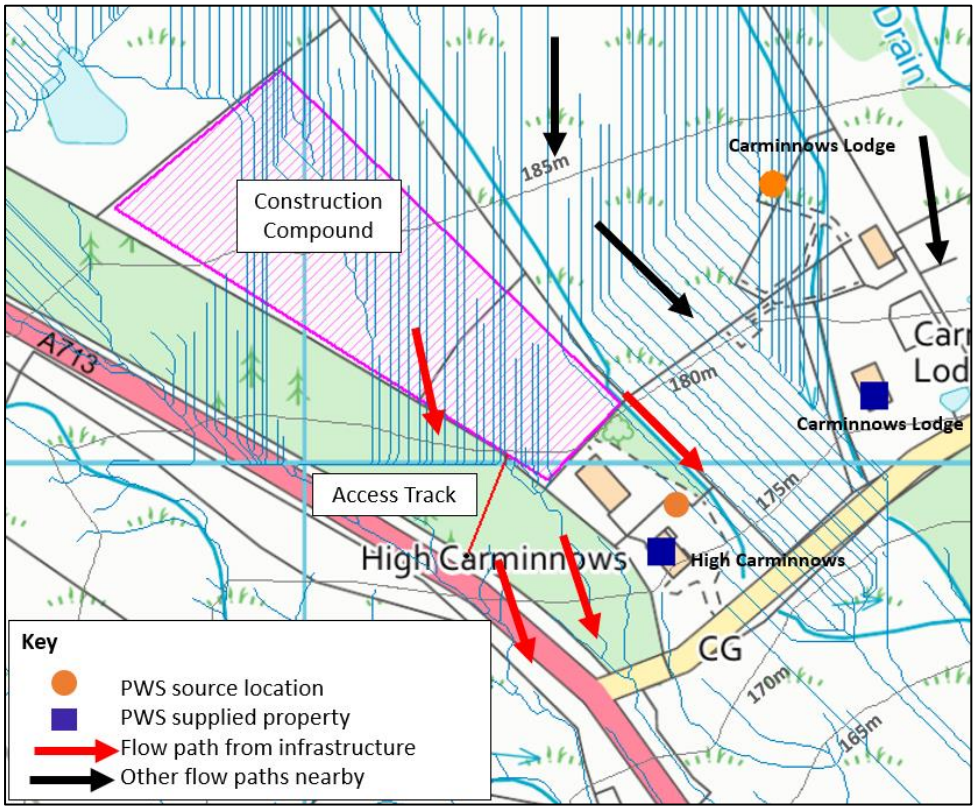
Figures 1–5 show the surface water indicative flow paths, topography, and project infrastructure close to each PWS.

For PWS that are sourced from groundwater and/or groundwater springs, this assumes that groundwater flows paths are similar to surface water flows paths (a reasonable inference based on topography and in the absence of groundwater levels and groundwater flow data). The results of the flow routing analysis were used to determine which PWS may be impacted and which PWS require additional mitigation (e.g., water quality monitoring during construction to ensure no contamination of supply during the work). However, given the above assumption, PWS which are close to excavations for tower bases, even if they are not within a direct surface water flow path, are also recommended to be monitored during construction as a precaution, as groundwater flow paths may be slightly different. The reasons for monitoring or not monitoring a PWS are described in the text for each individual PWS.

High Carminnows (PG connection)

The source of the High Carminnows PWS is a borehole of unknown depth; located to the north of the property (**Figure 1**). The source and property are located ~50m and ~60m south-east of construction compound 1, respectively. The construction compound will not involve excavations of greater than 1m depth. Watershed analysis (**Figure 1**) shows that surface runoff created from the compound and access track will be routed to the south of the source and property. However, there is still a risk of contaminated run-off or suspended sediment/dust from the construction compound entering shallow groundwater. The borehole is covered with a manhole lid, so it is protected from pollution/sediment entering from the surface. In addition, embedded mitigation measures during construction will minimise the risk, however given the proximity of the borehole to the construction compound, the magnitude of effect on the PWS is considered to be **minor** resulting in an effect of **minor** significance. Monitoring of the water quality of this PWS will be undertaken before and during construction.

Figure 1: Indicative surface flow paths and nearby infrastructure for High Carminnows PWS



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Phail Barcris (PG connection and N route)

The source of the Phail Barcris PWS is a borehole and is known to be located within close proximity of the property. The PWS owner was unable to provide the exact location or depth of the borehole, due to personal circumstances. For the purposes of this assessment the borehole is assumed to be at the property. The PWS is located ~170m north-east of an access track and ~180m north of the working area of tower 9. The borehole and property are downgradient of the infrastructure and given the topography tower 9 and its associated access track are potentially within the zone of groundwater contribution to the PWS (although the tower and access track are much higher than the borehole, as discussed below).

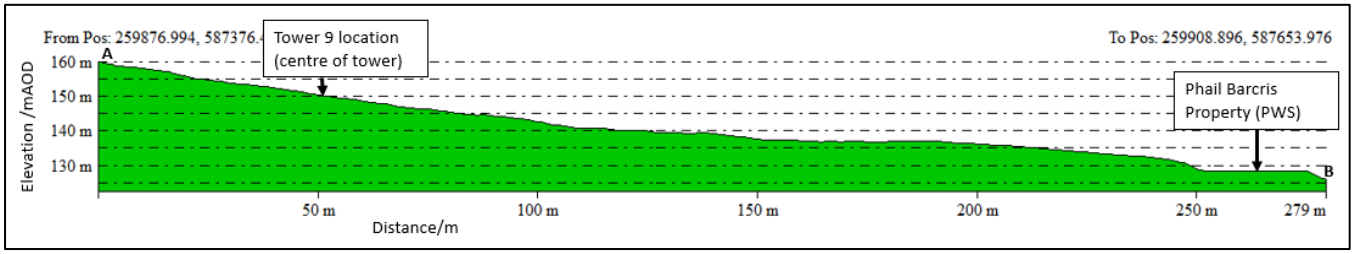
Based on British Geological Survey (BGS) mapping, the drift geology in the area comprises hummocky glacial deposits/moraines comprising blocky till in a matrix of grit and sand. The bedrock geology comprises greywackes or metamorphosed turbidite deposits of the Shinnel Formation (Ordovician age), with thick to thinly bedded sandstone and siltstone (**Figures 9.5.1 and 9.6.1** in the EIA report, respectively). The Ordovician bedrock in the area is classified as non-aquifers or low productivity aquifers that are generally without groundwater except at shallow depths within the weathered zone or fractures.

Figure 2 shows the topography profile from south of the proposed tower 9 to the Phail Barcris PWS, based on 1m LiDAR data. The PWS borehole is located at an elevation of 128 m AOD (above Ordnance Datum) while the proposed OHL tower 9 is located at 150m AOD. Assuming the PWS borehole is at least 10m deep, this puts the borehole source at 118m AOD (or likely lower if borehole is deeper). The proposed L7 steel lattice OHL towers will require excavation of up to 4m deep for each of the tower legs (see **Chapters 4 and 5** of the EIA Report), which will require excavation to ~146m AOD. Given the considerable elevation difference between the proposed tower excavations (~146m AOD) compared to the assumed minimum borehole depth (~118m AOD), localised excavation at the tower is considered highly unlikely to significantly impact the groundwater quantity or quality at the PWS borehole source. The available geology and aquifer information indicates that groundwater is only likely to be present at shallow depths within the weathered zone or fractures.

Surface flow paths from the infrastructure are towards the source and property (**Figure 3**) and the PWS could be potentially affected by the infrastructure construction and excavation, although as described above this is considered unlikely. With the embedded mitigation measures, the magnitude of effect on the PWS is considered to be **minor** resulting in an effect of **minor** significance. The existing OHL (N route) tower to be removed and its associated access is downgradient of the PWS source and tower removal will not impact the PWS.

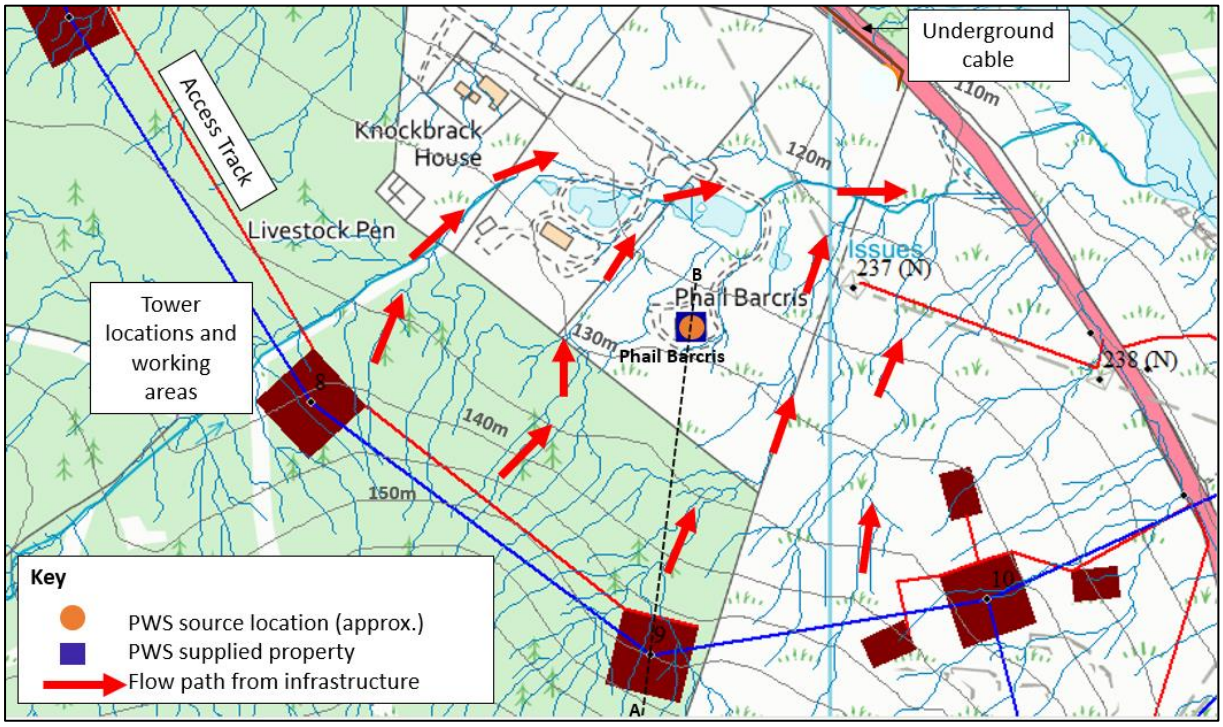
Given the uncertainties regarding borehole depth and its exact location and as it is within 250m of excavation >1m, monitoring of the PWS will be undertaken before and during construction to confirm the impact (if any). If the water quality or quantity deteriorates during construction (e.g., discoloured, high sediment content, hydrocarbons, low flow) an alternative water supply will be installed at the PWS property, such as portable bowsers, to ensure minimal disruption of supply. The contractors will have a supply of bowsers ready to deploy to affected PWS, if required.

Figure 2: Topography section, showing elevation difference between proposed OHL tower 9 and the Phail Barcris PWS (extracted from 1m LiDAR data)



Note: The profile location is shown in Figure 3 below as the dashed black line A-B.

Figure 3: Indicative surface flow paths and nearby infrastructure for Phail Barcris PWS. The location of the topographic transect (Figure 2) is shown by black dashed line A-B



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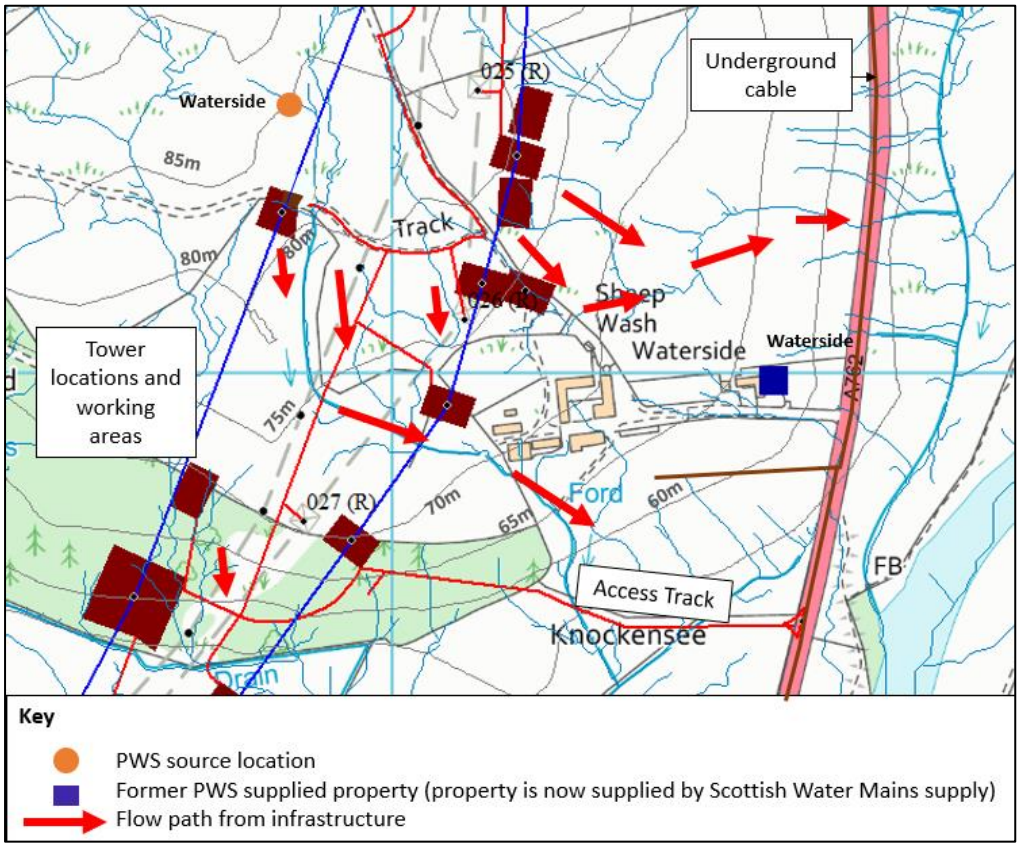
Waterside (PG and EG connections and R route)

The source of the Waterside PWS is a spring, with collection tanks, located upgradient of the property and upgradient of all KTR Project infrastructure (**Figure 4**). The zone of contribution to the PWS source is upgradient of the KTR infrastructure.

Site visits in December 2020 confirmed that the farm and cottage are now connected to a water mains supply and the PWS is no longer in use. However, the landowner wants to maintain the existing PWS for future possible reconnection, so it is assessed herein. However, as the property is now connected to Scottish Water mains, the water supply (via mains) to the property will not be impacted by the KTR Project.

Figure 4: Indicative surface flow paths, topography (5m contours) and nearby infrastructure for Waterside PWS



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The PWS source location is ~53m north of tower 33 and ~68m west of the access track. The underground cable route is over ~320m from the source and will not impact the PWS. The tower foundations will require excavation of up to 4m deep for each tower leg and given its proximity to the PWS source may have an impact, so is risk assessed herein.

The BGS drift geology mapping (**Figure 9.5.2** in the EIA report) shows that no superficial deposits are present at this location. The bedrock geology comprises greywackes or metamorphosed turbidite deposits of the Glenlee Formation (Ordovician age), which are thin, medium to thick bedded turbidites with a thick development of grey siltstone inset. Sandstones are mainly quartzose. (**Figure 9.6.2** in the

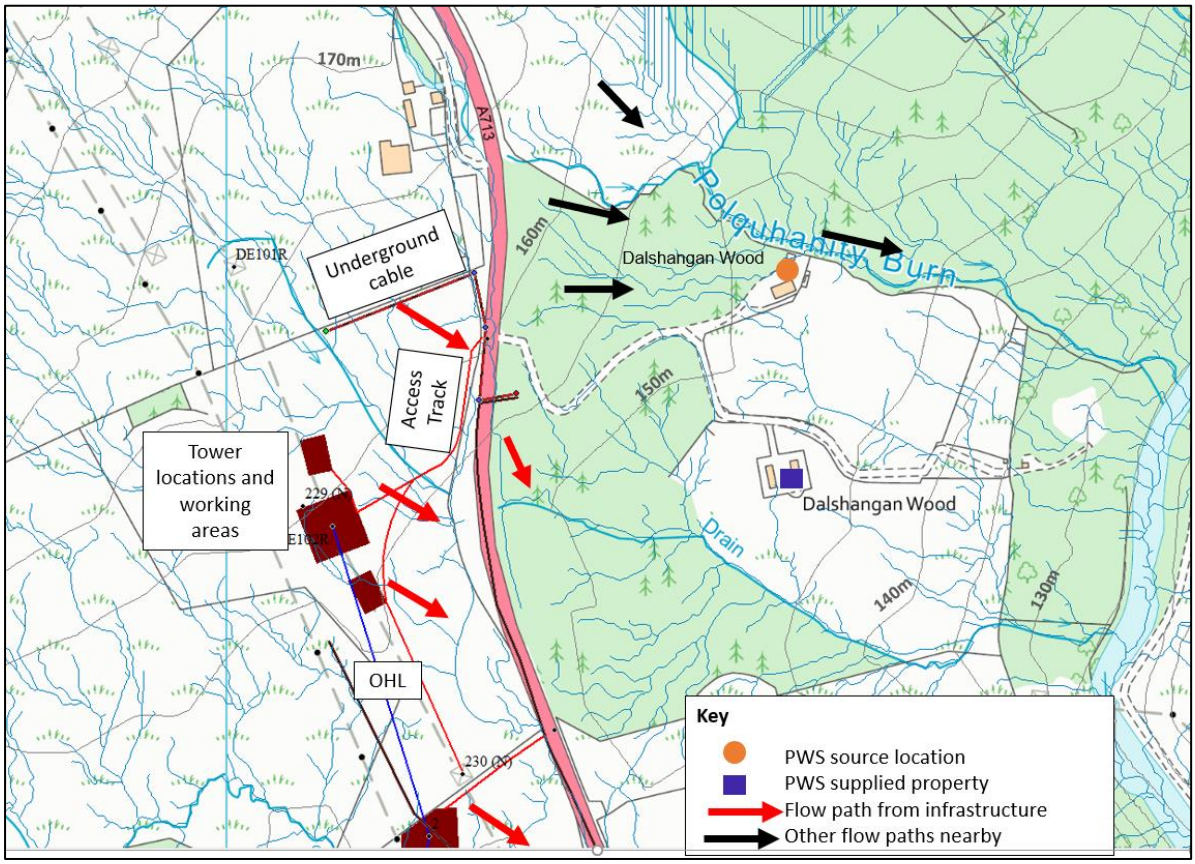
EIA report). The Ordovician bedrock in the area is classified as non-aquifers or low productivity aquifers that are generally without groundwater except at shallow depths within the weathered zone or fractures.

The results of surface flow routing analysis and topographic analysis (**Figure 4**) shows that any surface flow paths from infrastructure will flow south and south-east, routed to the north and south of the Waterside property and will not impact the PWS source location. Based on 1m LiDAR topographic data, the spring source is located at an elevation of 85 m AOD (above Ordnance Datum). The proposed OHL tower 33 is located downgradient from the spring at 80m AOD. It is considered highly unlikely that localised excavation at the tower location will significantly impact the groundwater at the spring source (which is 5m higher than the tower and 50m upslope). However, given the uncertainties in hydrogeological connectivity and the shallow nature of localised groundwater, there is a very slight risk that there may be a localised minor impact in quantity of spring water due to potential dewatering/drawdown during excavation. This is not considered significant as the PWS is no longer in use. However, it is recommended that monitoring of the PWS spring source be undertaken before and during construction to confirm the impact of the temporary excavation (if any). It is also recommended that discussions with the property owner commence prior to construction to determine whether the PWS will be used during the construction period. As the property is now connected to a mains supply, any temporary impact on the PWS source during construction is considered to have an effect significance of **none**.

Dalshangan Wood

The source of the Dalshangan Wood PWS is a borehole of 80m depth, located around 180m north of the supplied property between an outbuilding and the Polquhanity Burn (**Figure 5**) and is a covered well. The PWS source location is ~260m east of the underground cable route and ~260m east of a new access track to the Polquhanity terminal tower. The source is over 415m east of any new towers and over 500m southeast of construction compound 1. The supplied property is located ~288 and ~241m east of the access track and the underground cable route, respectively. Flow routing analysis (Figure 4) shows that any surface flow paths from infrastructure will flow south-east and will not impact the PWS source or property. The magnitude of effect on the PWS is considered to be negligible resulting in an effect significance of **none**.

Figure 5: Indicative surface flow paths, topography (5m contours) and nearby infrastructure for Dalshangan Wood PWS



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5 Summary

This report provides a summary of two letter reports that were submitted in response to SEPA comments on the EIA Report for the KTR Project.

Additional data on source locations on the High Carminnows, Phail Barcris and Waterside and Dalshangan Wood PWS are provided, based on data collected via phone-calls and/or site visits to the PWS in December 2020.

Updated risk assessments for the four PWS were carried out considering the updated source locations and the results are presented in the report. The data and updated risk assessments were reviewed and subsequently accepted by SEPA and used to inform their decision on the planning application. SEPA has confirmed that they do not object to the KTR Project.