6. GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

6.1 Introduction

This Chapter of the EA presents a review of baseline conditions and potential impacts on the water environment and flood risk as a result of the Proposed Development and Associated Development as described in **Chapter 2: Project Description.** The ground and water environment as described in this Chapter includes geology, hydrology and hydrogeology receptors. The method applied to the hydrology assessment is provided in **Annex K**. A Private Water Supply Risk Assessment (PWSRA) has been undertaken and is provided in **Annex L**. A water construction management plan is provided in **Annex M**.

6.2 Baseline Survey Methodology

6.2.1 Study Area

The assessment of impacts in relation to geology, hydrology and hydrogeology receptors is undertaken for the Hydrology Study Area, as shown in **Figure 6.1,** an area which extends 250 m from infrastructure of the Proposed Development and Associated Development. An area extending 2 km from both the Project has been defined to assess the potential effects on private water supply (PWS) (the PWS Study Area), and a Wider Study Area extending 10 km from the Project has been identified to assess potential effects on the downstream water environment (the Wider Study Area). These are also shown on **Figure 6.1**.

6.3 Baseline Environment

6.3.1 Surface Hydrology

Based on SEPA mapping[1], the Hydrology Study Area is located within the sub-catchments of Allt Tom a' Challtuinne to the north west and Allt Garbh to the south, part of the wider catchment of the Douglas Water. The Douglas Water is classified under the Water Framework Directive (WFD) as Poor (SEPA ID 10226). The Douglas Water flows from the north and passes the eastern aspect of the Proposed Development before flowing south-east and discharging into Loch Fyne. Several unnamed watercourses drain across the Hydrology Study Area and flow north-east and east into Douglas Water. In the south, several unnamed watercourses flow south from the Hydrology Study Area across the existing access track and A83 road into the Allt Garbh. Allt Garbh then flows north east before intersecting with Douglas Water. The hydrological catchments associated with these watercourses are shown in **Figure 6.5.**

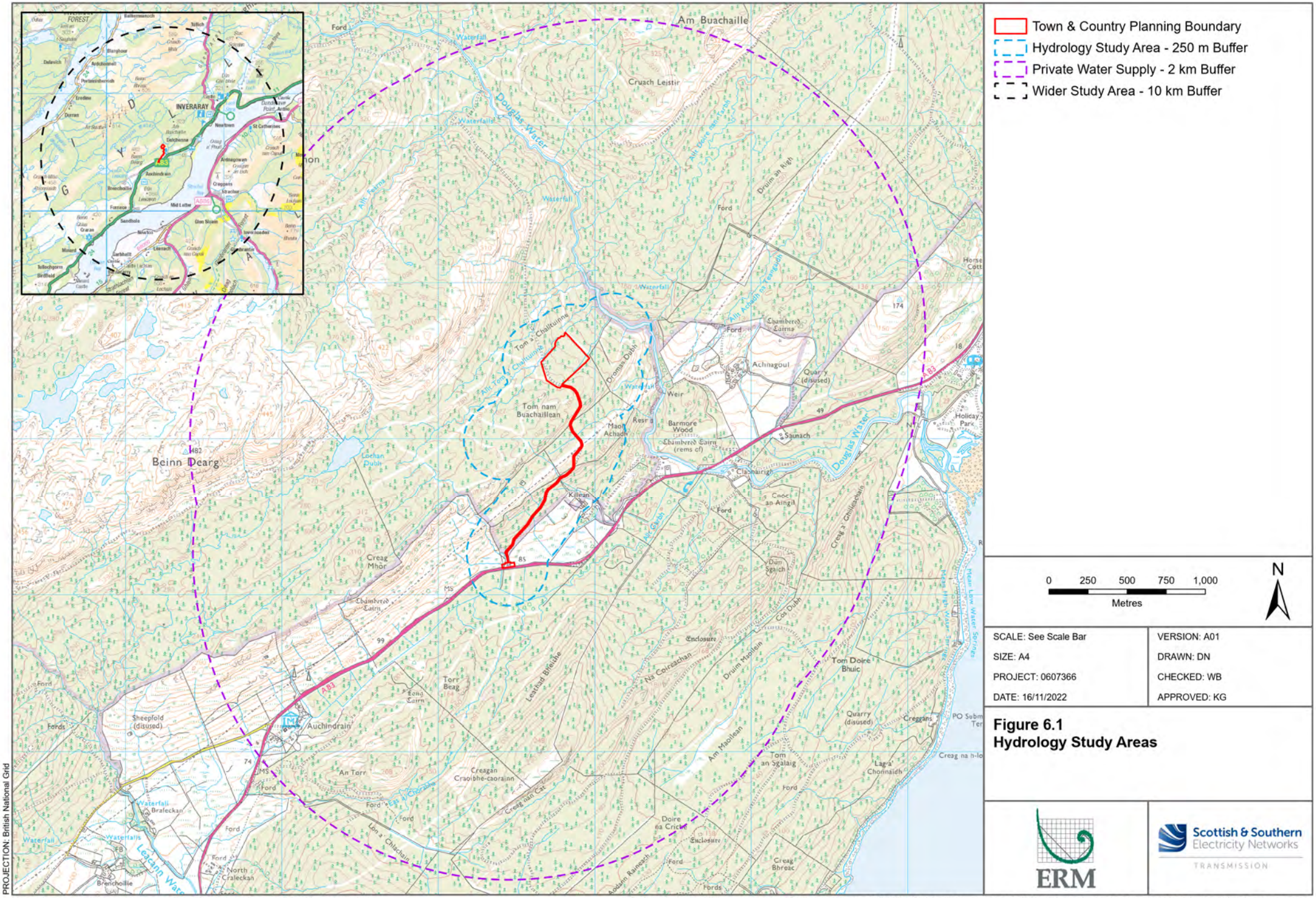
6.3.2 Coastal Waters

The surface waters from the Hydrology Study Area drains into Loch Fyne coastal waters. It has an overall condition of 'Good'[2]. Loch Fyne is part of the Upper Loch Fyne and Loch Goil Marine Protected Area (MPA), with the area identified as a shellfish waters protected area[3] which is currently "*not at target objective"* due to diffuse source pressures as a result of rural activities.

6.3.3 Hydrogeology

The underlying Oban and Kintyre groundwater body has an overall SEPA classification of 'Good'[4], with a low productivity in which groundwater *"flow is virtually all through fractures and other discontinuities".*

[1] SEPA (2014) Water Environment Hub [online] Available at https://www.sepa.org.uk/data-visualisation/water-environment-hub/ (Accessed 16/11/2021)
[2] SEPA (2014) Water Environment Hub [online] Available at: https://www.sepa.org.uk/data-visualisation/water-environment-hub/ (Accessed 16/11/2021)
[3] Scottish Government (2013) Shellfish Protected Areas [online] Available at https://www.gov.scot/publications/shellfish-water-protected-areas-maps/ (Accessed 10/01/2021)
[4] Scottish Government (2021) Scotland Environment Map [online]. Available at: https://map.environment.gov.scot/sewebmap/ (Accessed 17/11/2021)



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6.3.4 Flood Risk

The SEPA flood map[5] shows that there is no risk from river flooding within the Hydrology Study Area. There are small, isolated areas across the Hydrology Study Area including along the existing access track to be upgraded which are shown to be at medium to high risk of annual flooding from surface water. The Hydrology Study Area is not at risk from coastal flooding.

6.3.5 Geology

The British Geological Survey (BGS)[6] 1:50,000 superficial deposit mapping (shown on **Figure 6.2**) shows no superficial deposits mapped within the centre and south of the Hydrology Study Area, including the Associated Development, with Devensian Till to the north of the Hydrology Study Area, underlying the Proposed Development, and adjacent to the A83. The BGS 1:50,000 bedrock mapping (shown on **Figure 6.3**) comprises semipelite of the Argyll Group with metagabbro and microgabbro of the Dalradian Supergroup. These are intruded by large bands of igneous intrusions (late Silurian to early Devonian) and minor igneous intrusions of the Mull Dyke Swarm (Palaeogene).

6.3.6 Soils

The National Soils Map of Scotland mapping indicates that peaty gleys are present across the Project. The existing forestry access track is largely underlain by peaty gleys, however, brown soils are present to the south. The Carbon and Peatland Map (SNH, 2016)[7] indicates the Project is underlain by Class 5 peaty soil.

A peat depth survey undertaken in November 2021, as shown in **Annex N** probed the Project, focussing on proposed infrastructure. Peat depth was found vary from 0 m to 3.9 m across the Project. Probes that recorded peat in excess of 2 m were confined to lower lying localised pockets to the south west.

6.3.7 Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

In accordance with SEPA guidance[8] the NVC communities that have the potential to be moderately or highly groundwater dependent GWDTEs based on the SEPA guidance are outlined in **Table 6.8.1** and shown in **Figure 6.4.**

Table 6.8.1 Potential GWDTE Communities and Project-specific Groundwater Dependency

NVC class	SEPA Groundwater Dependency	Project Description	Project-specific Groundwater Dependency
M25	Moderate	Located upslope to the north and downslope to the south and west of the Project. Located along the banks of minor watercourses. Also located in headwaters and along watercourses on steep topography upslope of the Project.	Low – located in area fed by surface water
W4	High	Located upslope to the north and downslope to the east of the Project situated along riparian zone of minor tributaries of the Douglas Water.	Low – located in area fed by surface water

[5] SEPA (2021) SEPA Flood Maps. Available at: https://map.sepa.org.uk/floodmaps (Accessed 17/11/2021)
[6] British Geological Survey (BGS) Geoindex Onshore [online]. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html (Accessed on 17/11/2021)
[7] Scotland's Environment, Carbon & Peatland 2016 [online] Available at: https://map.environment.gov.scot/Soil_maps/?layer=10 (Accessed 16/12/2021)
[8] SEPA (2017) Land Use Planning System Guidance Note 31.
Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3 [Online] Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf (Accessed: 01/12/2021)

NVC class	SEPA Groundwater Dependency	Project Description	Project-specific Groundwater Dependency
		W4 located to south of Tom Nam Buachaillean located on steep slopes where overland flow will dominate. Located downslope to south along existing access track, likely associated with roadside ditches. W4 polygons to the east are hydrologically disconnected from the Project by the Douglas Water.	
MG10	Moderate	Located in open area surrounding existing substation. Hydrologically disconnected from the Project.	Low – located in area fed by surface water

As a result of the Project-specific groundwater dependency, it is considered that the above GWDTE habitats identified in the NVC survey are ombrotrophic in nature, meaning they are rain-fed as opposed to being supported by groundwater and are therefore scoped out of further assessment.

6.3.8 Public Water Supplies

Consultation with Scottish Water confirmed that the Project is located within a Drinking Water Catchment Area - the watercourses within the Hydrology Study Area drain into Douglas Water which supplies Inveraray Water Treatment Works (WTW). Scottish Water also comment that "the activity is a sufficient distance from the intake that it is likely to be low risk, however care should be taken and water quality protection measures must be implemented".

In relation to utilities, they also confirmed while there are Scottish Water assets present at the site entrance, these will not be affected by the Project.

6.3.9 Private Water Supplies

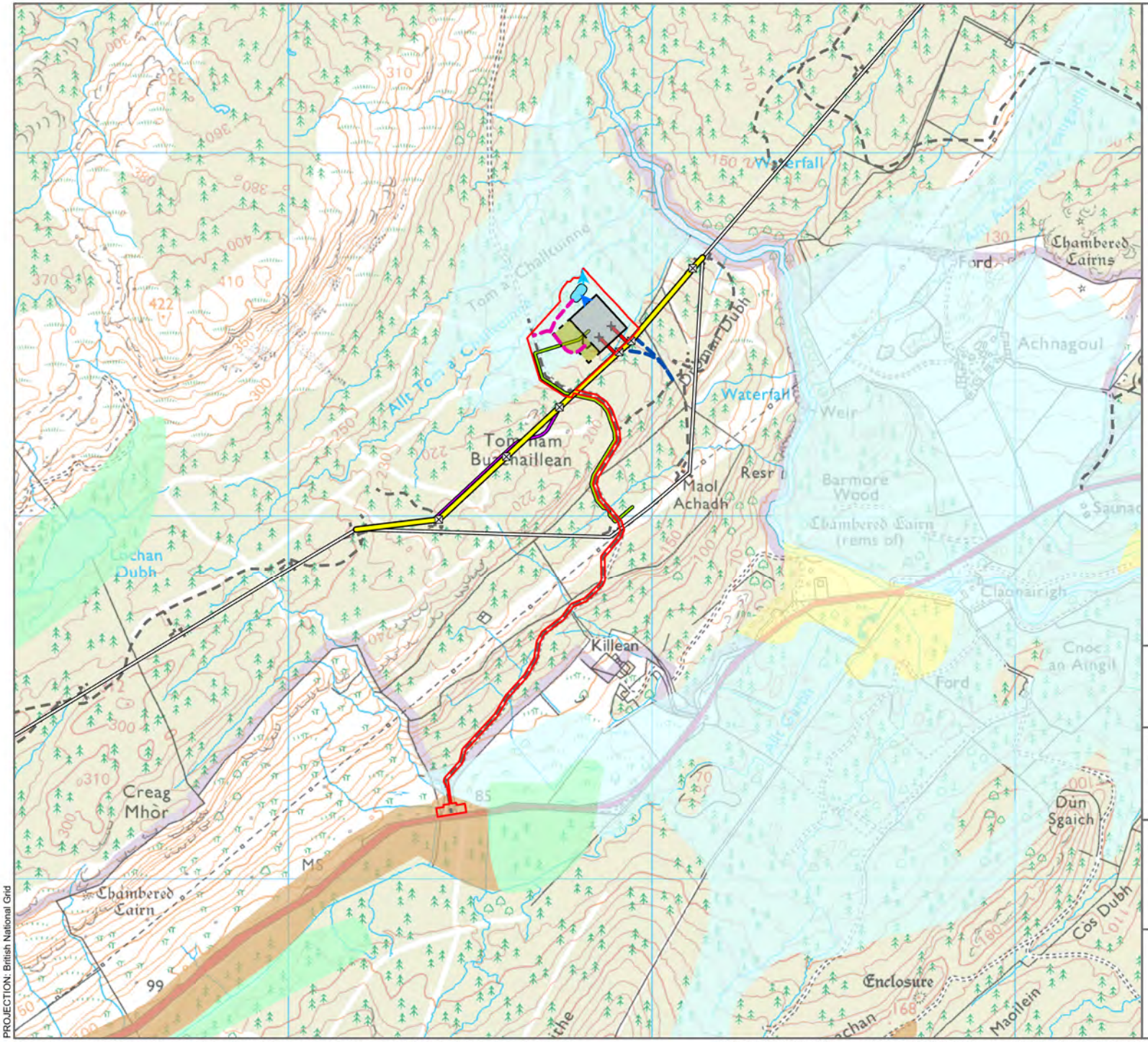
Consultation with Argyll and Bute Council was undertaken on the 12 November 2021, to determine if any private water supplies (PWS) were recorded within 2 km of the Hydrology Study Area. Two PWS were recorded within 2 km of the Hydrology Study Area as shown in **Table 6.10.1** and **Figure 6.5**:

Table 6.10.2: Private Water Supplies registered within 2 km of the Proposed Development

Private Water Supply	Easting Northing	Approximate distance from Proposed Development	Hydrological Connection to the Proposed Development
Kilbride Chalet	207070 705215	1.99 km east of the Project and on raised topography (130 m AOD)	**Property scoped out of assessment.** Resident confirmed on mains supply.
Saunach Kennels	206184 705024	1.2 km south east and Downslope of the Project (40 m AOD)	**Private water supply scoped into assessment** Confirmation required supply not abstracting from Douglas Water.

A previous private water supply risk assessment (PWSRA) was carried out for the EIA for Inveraray to Crossaig overhead line (OHL) project published in July 2018, which was also reviewed in order to inform this baseline assessment[9]. No additional PWS were identified as part of the PWSRA surrounding the Proposed Development.

[9] Inveraray to Crossaig 275 kV Overhead Line Reinforcement (2018) [online] Available at: https://www.energyconsents.scot/ (Accessed 16/11/2021)



Existing Infrastructure:
- Existing Access Track
- Existing Inveraray to Crossaig Overhead Line

Proposed Development:
- Proposed Permanent Access Track
- SUDs Inlet Pipeline
- SUDs Outfall Pipeline
- Proposed Substation Layout
- Town & Country Planning Boundary
- SUDs Pond
- Proposed Substation Temporary Works Area

Associated Development:
- Proposed Tower Location
- Proposed OHL Alignment
- OHL Downleads
- Proposed Permanent Access Track
- Temporary Access Track

Permitted Development:
- 33kV Interconnector Cable Route

Superficial Geology (1:50k scale):
- Alluvium - Clay, Silt, Sand and Gravel
- Till, Devensian - Diamicton
- Hummocky (Moundy) Glacial Deposits - Diamicton, Sand and Gravel
- Peat

0 100 200 300 400 500
Metres

N

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Figure 6.2
Superficial Geology

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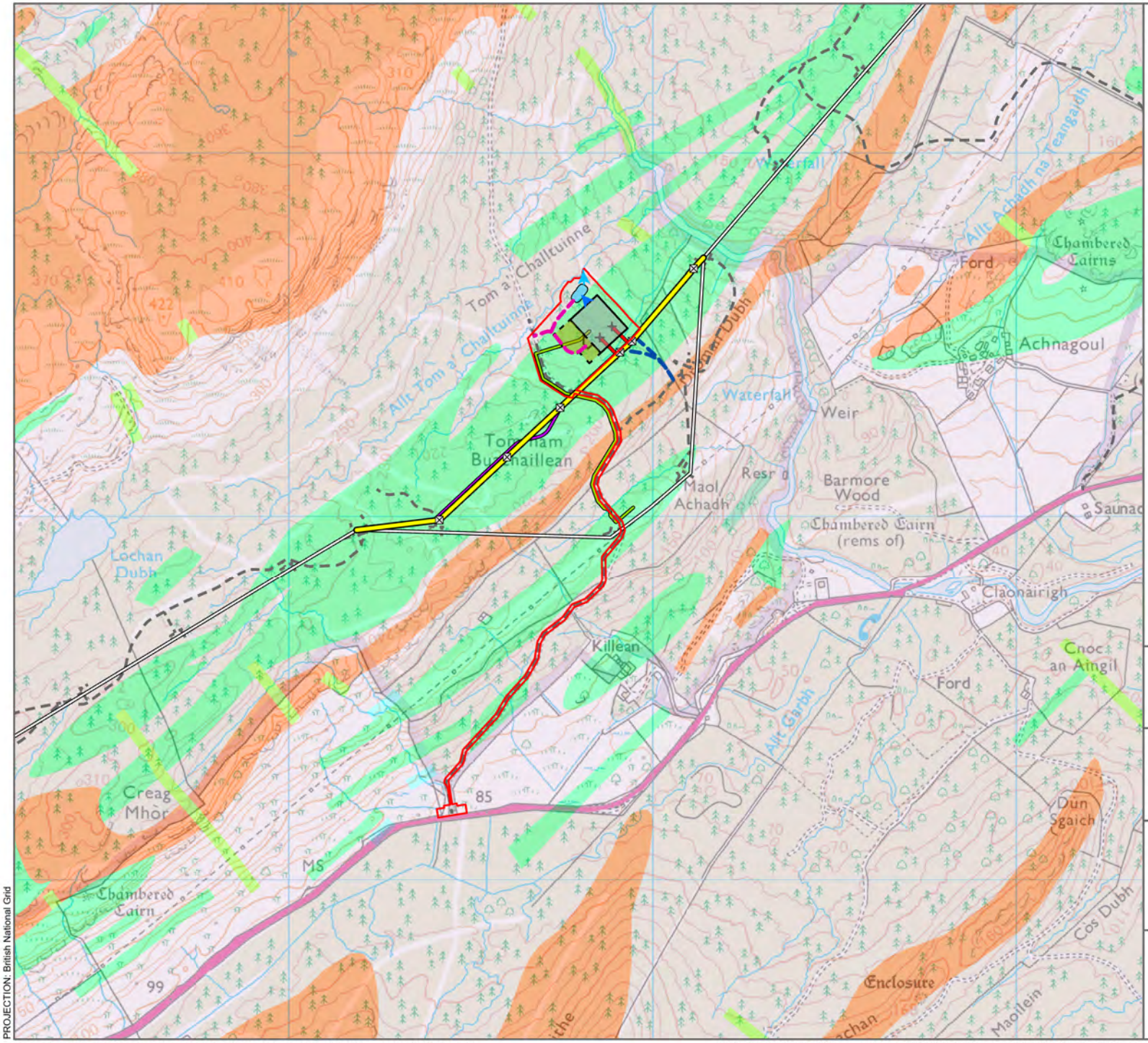

Existing Infrastructure:
- Existing Inveraray to Crossaig Overhead Line
- Existing Access Track

Proposed Development:
- Proposed Permanent Access Track
- SUDs Inlet Pipeline
- SUDs Outfall Pipeline
- Proposed Substation Layout
- Town & Country Planning Boundary
- SUDs Pond
- Proposed Substation Temporary Works Area

Associated Development:
- Proposed Tower Location
- Proposed OHL Alignment
- OHL Downleads
- Proposed Permanent Access Track
- Temporary Access Track

Permitted Development:
- 33kV Interconnector Cable Route

Underlying Bedrock Geology (1:50k scale):
- Mull Dyke-Swarm - Basalt and Microgabbro
- Scottish Highland Siluro-Devonian Calc-Alkaline Minor Intrusion Suite (Other Than Dykes) - Felsite
- Argyll Group - Metalimestone and Pelite
- Dalradian Supergroup - Metagabbro and Metamicrogabbro
- Ardrishaig Phyllite Formation - Semipelite, Calcareous
- Ardrishaig Phyllite Formation - Metalimestone

0 100 200 300 400 500
Metres

N

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Figure 6.3
Underlying Bedrock Geology

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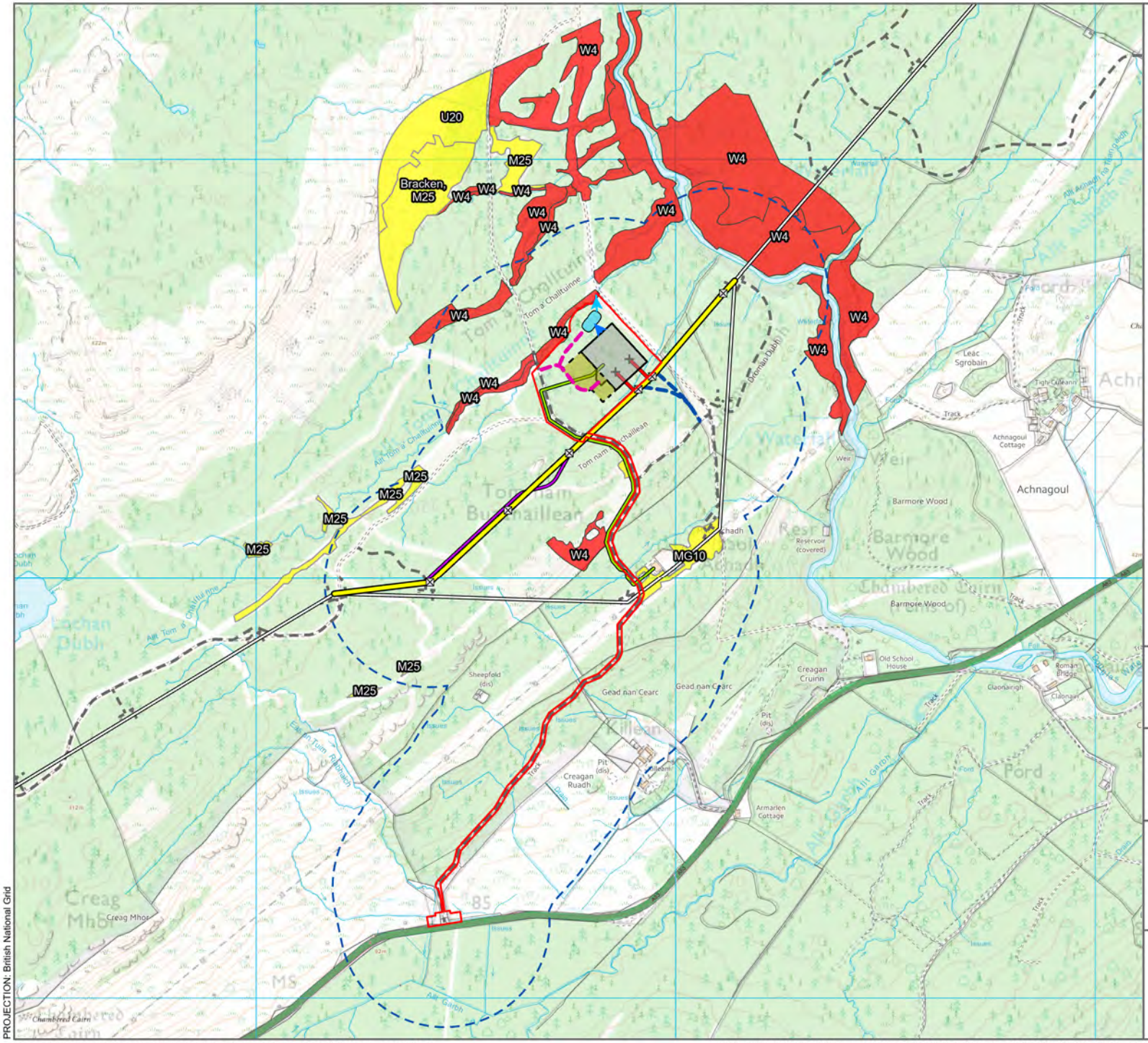

Existing Infrastructure:

- Existing Access Track
- Existing Inveraray to Crossaig Overhead Line

Proposed Development:

- Proposed Permanent Access Track
- SUDs Inlet Pipeline
- SUDs Outfall Pipeline
- Proposed Substation Layout
- Town & Country Planning Boundary
- SUDs Pond
- Proposed Substation Temporary Works Area

Associated Development:

- Proposed Tower Location
- Proposed OHL Alignment
- OHL Downleads
- Proposed Permanent Access Track
- Temporary Access Track

Permitted Development:

- 33kV Interconnector Cable Route

GWDTE Potential Groundwater dependency (based on SEPA guidance):

- High Dependency
- Moderate Dependency
- Hydrology Study Area - 250 m Buffer

0 100 200 300 400 500
Metres

N

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Figure 6.4
Potential Groundwater Terrestrial Ecosystems

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The accompanying PWSRA for this Environmental Appraisal is supplied in **Annex L**. Following consultation with residents it was confirmed that Kilbride Chalet (2 Kilbride Cottage) is supplied by mains water rather than PWS. A hydrological site walkover was undertaken at Saunach Kennels on the 15th March 2022. The visit confirmed that the property is supplied by a spring source which is hydrologically disconnected from the Project by the Douglas Water. PWS are therefore scoped out of further assessment.

6.3.10 Designated Sites

Review of NatureScot GIS datasets[10] available through the Scotland's Environment mapping service was used to identify statutory designated sites related to the water and geological environment within the Wider Study Area.

Statutory designations within 10 km of the Project and their potential hydrological connectivity to the Project are outlined in **Table 6.11.1**.

Table 6.11.3: Statutory Designations within 10 km of the Project

Designation	Approximate distance from the Project	Qualifying Interest	Hydrologically Connected to the Project
Upper Loch Fyne and Loch Goil MPA[11]	2.4 km south east	Shellfish waters protected area	Douglas Water discharges directly into Loch Fyne
Ardchyline Wood SSSI[12]	5.0 km east	Upland oak woodland	Hydrologically disconnected by Loch Fyne.
Craignure Mine SSSI[13]	5.7 km south west	Mineralogy of Scotland	Hydrologically disconnected by topography and the Leacann Water.

6.4 Sensitivity of Receptors

The sensitivities of the identified receptors and their likelihood of being affected by the Project are detailed in **Table 6.12.1**.

Table 6.12.1: Potential Impacts to Receptors from Construction and Operation

Receptor	Sensitivity	Sensitivity Description
Surface Hydrology (watercourses)	Medium	A large, medium or small waterbody with a SEPA water quality classification of 'Poor'.
Coastal Waters	High	Coastal waterbody with a SEPA water quality classification of 'Good'.
Hydrogeology (groundwater)	High	Oban and Kintyre groundwater body classified as 'Good' and as a 'low productivity aquifer'
Near-surface Water	High	Supports area of carbon-rich and peaty soils.
Soils	Medium	No areas of Class 1 or 2 peat
Designated Receptors	High	Loch Fyne MPA is hydrologically connected to the Development.

[10] NatureScot (2021) SiteLink Map [online] Available at: https://sitelink.nature.scot/map (Accessed 17/11/2021)
[11] NatureScot (2021) Upper Loch Fyne and Loch Goil MPA (NC) [online] Available at https://sitelink.nature.scot/site/10424 (Accessed 17/11/2021)
[12] NatureScot (2021) Ardchyline Wood SSSI [Online] Available at: https://sitelink.nature.scot/site/70 (Accessed 17/11/2021)
[13] NatureScot (2021) Craignure Mine SSSI [online] Available at: https://sitelink.nature.scot/site/443 (Accessed 17/11/2021)

Receptor	Sensitivity	Sensitivity Description
Public Water Supplies	High	Development is located within the wider Drinking Water Catchment (Douglas Water).

6.5 Embedded Mitigation

The Proposed Development has been designed to reduce potential impacts as far as reasonably practicable. This includes mitigation that is embedded into the design of the project in accordance with industry standard methods and procedures, which will reduce impacts from construction and operation. The following mitigation measures relating to the hydrological environment are embedded into the design and construction of the Proposed Development:

- 50 m watercourse buffers (on a 1:50,000 scale on OS mapping) for construction works with the exception of watercourse crossings along access tracks;
- The Proposed Development will utilise much of the existing forestry track already in place at this location, this will help to minimise ground disturbance and requirement for watercourse crossings.

A Water Construction Environmental Management Plan (WCEMP) accompanies this EA Report (**Annex M**) and will form part of the embedded development design. Relevant sections of the SSEN General Environmental Management Plans (GEMPs) will inform a CEMP to be implemented by the Development's selected contractor post-submission. GEMPs are included as **Annex A** to this report and relevant GEMPs include the following.

- Working in or near Water;
- Soil Management;
- Contaminated Land;
- Oil Storage and Refuelling;
- Bad Weather; and
- Working with concrete.

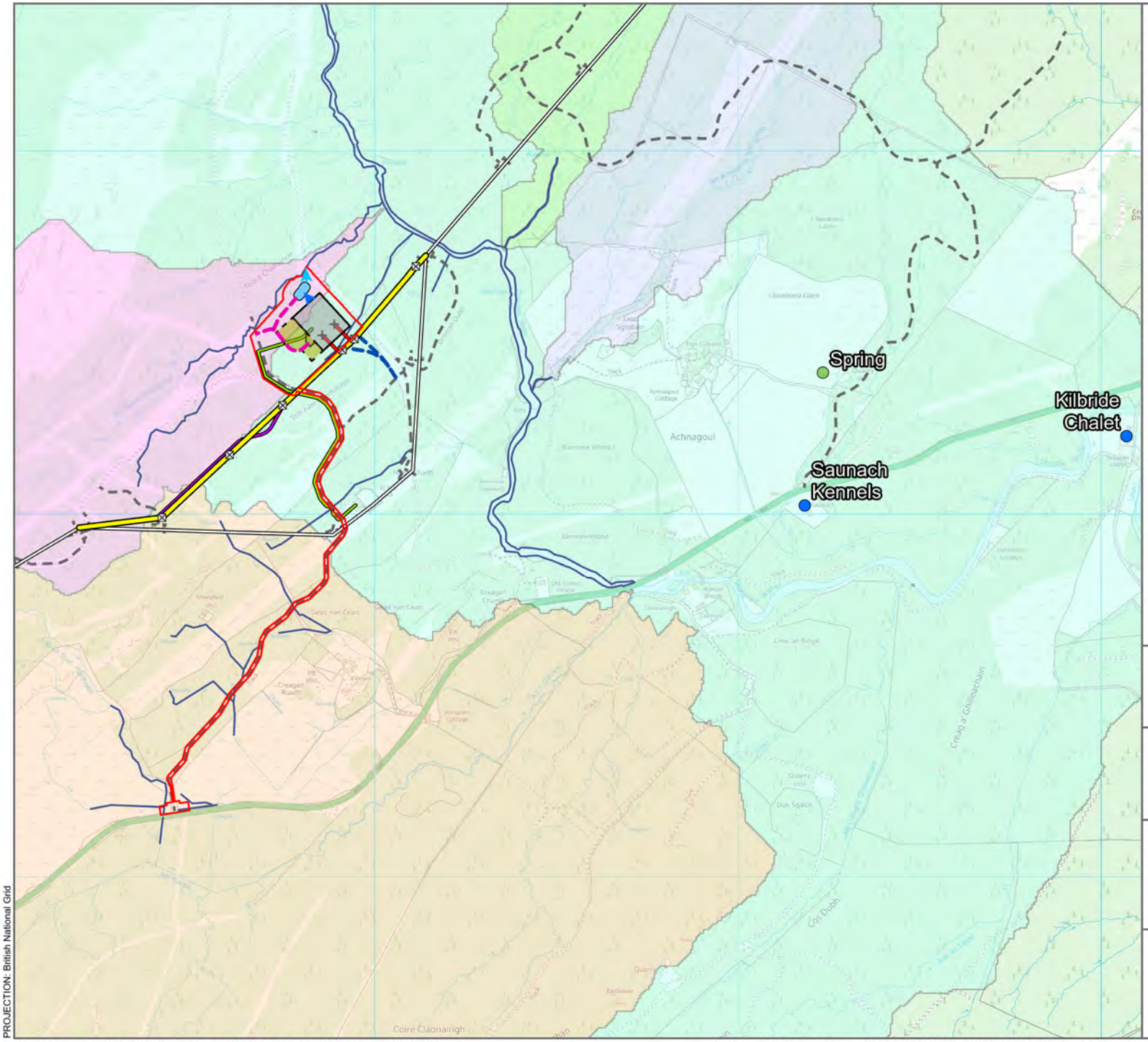
As consultation with Scottish Water confirms to the Project is located within a drinking water catchment where a Scottish Water Abstraction is located, mitigation measures will include a surface water quality monitoring programme. The details of the mitigation measures used to protect public water sources and the water quality monitoring program are outlined in the WCEMP (**Annex M**).

The construction phase of the works will be undertaken in accordance with good practice guidance within the following documents:

- Control of Water Pollution from Construction Sites - Guide to Good Practice, CIRIA 2002;
- Environmental Good Practice on Site C650, CIRIA 2005;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) – A Practical Guide (Version 8.4), SEPA, October 2019; and
- Regulatory Method (WAT-RM-04) Indirect Sewage Discharges to Groundwater (Version 8.0), SEPA, April 2022.

The Pollution Prevention Guidelines (PPGs) and Guidance for Pollution Prevention (GPPs) identified below will be applied during construction and operation.

- GPP 1 Understanding your environmental responsibilities – good environmental practices General Guide to the Prevention of Pollution (GPP 1, October 2020);
- PPG3 Use and Design of Oil Separators in Surface Water Drainage Systems (PPG3, April 2006);
- GPP5 Works and maintenance in or near water (GPP5, February 2018);
- PPG6 Working at Construction and Demolition Sites (PPG6, May 2012);



Existing Infrastructure:
- Existing Inveraray to Crossaig Overhead Line
- Existing Access Track

Proposed Development:
- Proposed Permanent Access Track
- SUDs Inlet Pipeline
- SUDs Outfall Pipeline
- Proposed Substation Temporary Works Area
- Proposed Substation Layout
- SUDs Pond
- Town & Country Planning Boundary

Associated Development:
- Proposed Tower Location
- Proposed OHL Alignment
- OHL Downleads
- Proposed Permanent Access Track
- Temporary Access Track

Permitted Development:
- 33kV Interconnector Cable Route

Hydrological Catchments:
- Allt Achadh na Teangaidh
- Allt Doire nan Tarbh
- Allt Garbh
- Allt Tom a Challtuinne
- Douglas Water
- Onsite Watercourses
- Private Water Supplies

Private Water Supply Source:
- Spring

0 100 200 300 400 500
Metres

N

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Figure 6.5
Private Water Supplies

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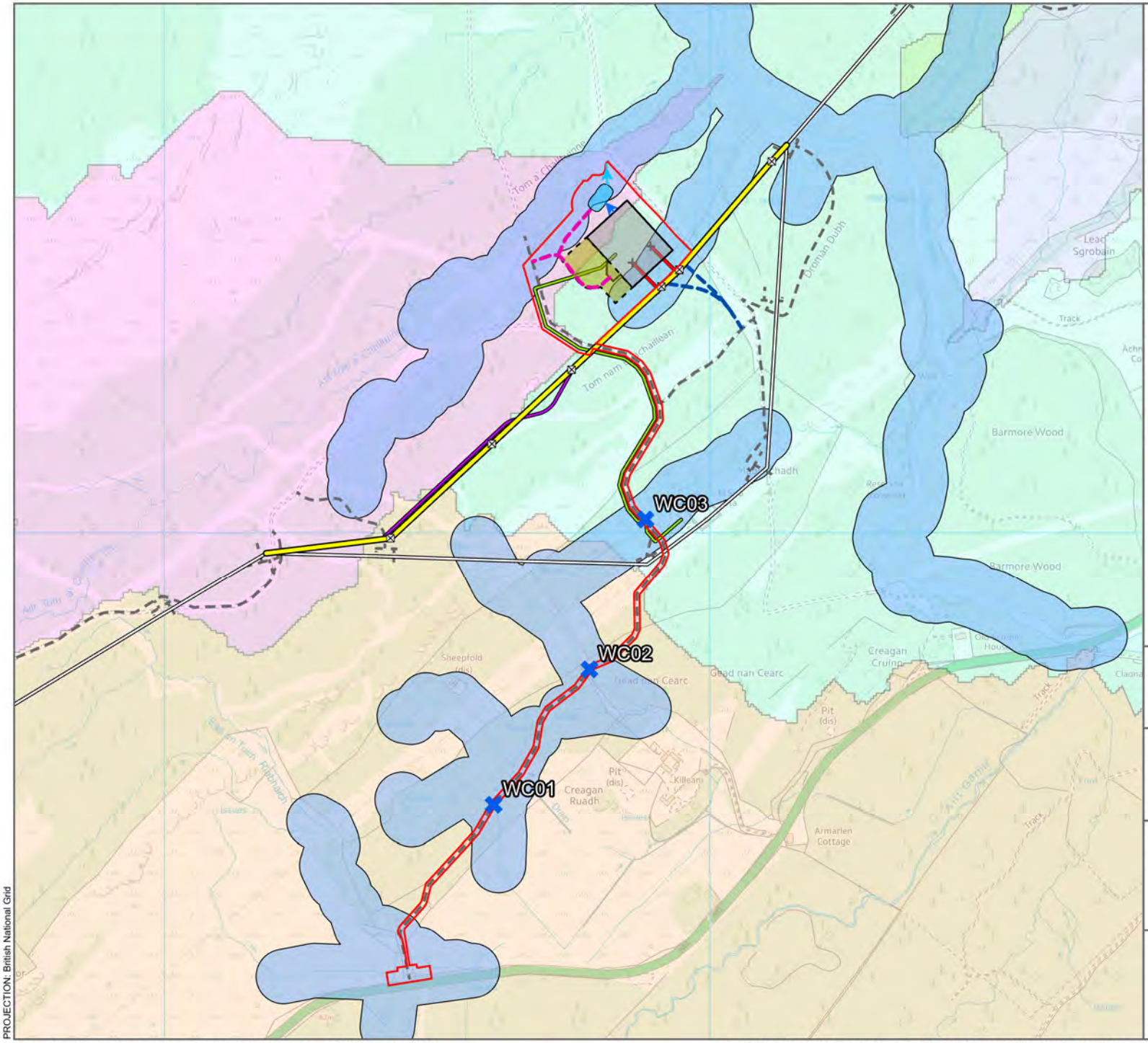

Existing Infrastructure:
- Existing Inveraray to Crossaig Overhead Line
- Existing Access Track

Proposed Development:
- Proposed Permanent Access Track
- SUDs Inlet Pipeline
- SUDs Outfall Pipeline
- Proposed Substation Layout
- Town & Country Planning Boundary
- SUDs Pond
- Proposed Substation Temporary Works Area

Associated Development:
- Proposed Tower Location
- Proposed OHL Alignment
- OHL Downleads
- Proposed Permanent Access Track
- Temporary Access Track

Permitted Development:
- 33kV Interconnector Cable Route
- 50 m Watercourse Buffer

Hydrological Catchments:
- Allt Achadh na Teangaidh
- Allt Doire nan Tarbh
- Allt Garbh
- Allt Tom a Challtuinne
- Douglas Water

Watercourse Crossing:
- Upgraded Watercourse Crossing

0 100 200 300 400 500
Metres

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Figure 6.6
Watercourse Crossings

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- PPG 7 Safe Storage – the safe operation of refuelling facilities (PPG 7, July 2011);
- GPP8 Safe Storage and Disposal of used oils (GPP8, July 2017);
- GPP13 Vehicle Washing and Cleansing (GPP13, April 2017);
- PPG18 Managing fire water and major spillages (PPG18, June 2000);
- GPP21 Pollution Incident Response Planning (GPP21, July 2017); and
- GPP22 Dealing with Spills (GPP2, October 2018).

As detailed in the WCEMP, substation transformers and diesel generators will be located in secondary containment concrete bunds which will be designed to accommodate a minimum of 110% of the volume of oil in the transformers, in accordance with relevant GPPs and PPGs, including GPP8[14].

6.6 Appraisal - Potential Construction Effects - Substation

6.6.1 Activities Assessed

The nature and magnitude of effects that could result from construction activities, are assessed in the following paragraphs and include the following activities:

- The potential upgrade of existing forestry access tracks for the construction of the Proposed Development from the A83
- The potential upgrade of three existing watercourse crossings on existing forestry access tracks, in accordance with Routeing Report **(Annex P)**;
- Construction of a new substation and associated infrastructure, areas of hardstanding and temporary works area for the Proposed Development;
- Drilling of new boreholes for water supply for the Proposed Development;
- Construction of new access track; and
- Tree felling required to facilitate the new access into the Proposed Development.

6.6.2 Felling

Felling of trees will be required for the Project, which in accordance with **Chapter 5: Forestry** will result in the total loss of woodland area of 4.7 ha for the Proposed Development and 15.95 ha for the Associated Development. The effects from felling are considered within impacts to surface water receptors relating to water quality and increased runoff.

6.6.3 Runoff from Increased Areas of Hardstanding

The areas of new hardstanding, including temporary works area and temporary tracks (assuming track width of 5m), in terms of the percentage of the relevant catchments that may be affected, are as follows:

- 0.016 % Allt Garbh;
- 0.658 % Allt Tom a Challtuinne; and
- 0.069 % Douglas Water.

Details of mitigation measures to prevent acidification of watercourses and increased flow within the immediate catchment of the felling area is detailed within the WCEMP. Based on the increase in flow rates and mitigation measures included, the magnitude of change as a result of increased run-off as a result of felling is considered to be Negligible.

[14] GPP 8 Safe storage and disposal of used oils (2017) [online] Available at: https://www.netregs.org.uk/media/1435/gpp-8-v3-swni.pdf/ (Accessed 10/01/2022)

6.6.4 New Licensed Activities

As part of the Proposed Development, new licensed activities will include abstraction of groundwater from a borehole and a septic tank with assumed soakaway discharge to groundwater. The detailed design of the septic tank will ensure any water discharge is in line with SEPA requirements. The exact specification of the septic tank will be confirmed once the contractor has been appointed.

6.6.5 Effects

Mitigation measures for the Proposed Development are outlined within the WCEMP. The requirement for upgrades to watercourse crossings, including new watercourse crossings for new access tracks (on 1: 50,000 scale mapping), are shown in **Figure 6.6**.

Table 6.13.1 Summary of Effects (Construction Phase Substation)

Receptor	Development Interaction	Mitigation Measures	Receptor sensitivity	Magnitude of effect following mitigation	Significance of effect
Surface Watercourses and coastal waters	Potential for temporary impact on surface water quality during construction. Potential for changes to water flow and quality due to felling.	Best practice and GEMPs as implemented by WCEMP. The site will require a Construction Site Licence process, to be considered at pre-construction phase which will provide detail on CAR licence and SuDs requirements.	Medium	Negligible	Negligible
Groundwater and Near surface water	Potential for temporary impact on groundwater quality and changes in groundwater interflow patterns during construction, including septic tank discharge.	GEMP as implemented by WCEMP SEPA requirements for septic tanks outlined in WCEMP.	High	Negligible	Minor
Designated Sites	Potential for temporary impact on flow and water quality during construction	GEMP as implemented by WCEMP	High	Negligible	Minor
Soils	Direct temporary impacts during construction	GEMP as implemented by WCEMP	Medium	Low	Minor

Receptor	Development Interaction	Mitigation Measures	Receptor sensitivity	Magnitude of effect following mitigation	Significance of effect
Public Water Supplies	Potential for impact on flow and water quality during construction.	GEMP as outlined by WCEMP. To include preparation and implementation of monitoring schedule within the Drinking Water Catchment, in accordance with consultation with Scottish Water.	High	Negligible	Minor

6.7 Appraisal - Potential Construction Effects - OHL

6.7.1 Activities Assessed

The nature and magnitude of effects that could result from construction activities, are assessed in the following paragraphs and include the following activities:

- The potential upgrade of existing forestry access tracks for the construction of the Proposed Development from the A816;
- The potential upgrade of three existing watercourse crossing on existing forestry access tracks, in accordance with Routeing Report **(Annex P)**;
- Construction of a new OHL for the Proposed Development;
- Construction of temporary access tracks for tower construction;
- Construction of new OHL access track;
- Diversion of the unnamed tributary of the Douglas Water; and
- Tree felling required to facilitate the new access into the Proposed Development.

Mitigation measures for the Proposed Development are outlined within the WCEMP.

Table 6.14.1: Summary of Effects (Construction Phase OHL)

Receptor	Development Interaction	Mitigation Measures	Receptor sensitivity	Magnitude of effect following mitigation	Significance of effect
Surface Watercourses and coastal waters	Potential for temporary impact on surface water quality during construction. Potential for changes to water flow and quality due to felling. Potential for impacts to unnamed tributary of	Best practice and GEMPs as implemented by WCEMP. The site will require a Construction Site Licence process, to be considered at pre-construction phase which will provide detail on CAR	High	Negligible	Minor

Receptor	Development Interaction	Mitigation Measures	Receptor sensitivity	Magnitude of effect following mitigation	Significance of effect
	Douglas Water as a result of watercourse diversion	licence, watercourse diversion and SuDs requirements.			
Groundwater and Near surface water	Potential for temporary impact on groundwater quality and changes in groundwater interflow patterns during construction.	GEMP as implemented by WCEMP	High	Negligible	Minor
Designated Sites	Potential for temporary impact on flow and water quality during construction	GEMP as implemented by WCEMP	High	Negligible	Minor
Soils	Direct temporary impacts during construction	GEMP as implemented by WCEMP	Medium	Low	Minor
Public Water Supplies	Potential for impact on flow and water quality during construction.	GEMP as outlined by WCEMP. To include preparation and implementation of monitoring schedule within the Drinking Water Catchment, to be agreed with Scottish Water	High	Negligible	Minor

6.8 Appraisal - Potential Operational Effects - Substation

Potential effects associated with the operation of the Proposed Development are:

- Increased run-off rates and volume from increased hardstanding, resulting in increased flood risk;
- Alterations to natural flow pathways from runoff from areas of hardstanding; and
- Risk of a chemical pollution event from minor spills from maintenance vehicles.

As a result of felling during the construction phase, there may be increased run-off rates. On-site and off-site compensatory planting for woodland removed for infrastructure and replanting onsite for areas removed for management felling will take place which will limit increase in run-off rates. In accordance with **Chapter 5: Forestry** there will be no net loss of woodland area.

Table 6.15.1 Summary of Effects (Operational Phase Substation)

Receptor	Development Interaction	Mitigation Measures	Receptor sensitivity	Magnitude of effect following mitigation	Significance of effect
Surface Watercourses and Coastal Waters	Potential for impacts on surface water quality during operation.	Implement best practice measures during site operation	High	Negligible	Minor
Groundwater and Near surface water	Potential for temporary impact on groundwater quality from septic tank discharge.	SEPA requirements for septic tanks outlined in WCEMP.	High	Negligible	Minor
Designated Sites	Potential for impacts on flow and water quality during operation	Implement best practice measures during site operation	High	Negligible	Minor
Public Water Supplies	Potential for impact on flow and water quality during operation	Implement best practice measures during operational phase. This will include implementation of the agreed monitoring schedule within Drinking Water Catchment for post-construction phase.	High	Negligible	Minor

6.9 Appraisal - Potential Operational Effects - OHL

Potential effects associated with the operation of the Proposed Development are:

- Increased run-off rates and volume from increased hardstanding, resulting in increased flood risk;
- Alterations to natural flow pathways from runoff from areas of hardstanding; and
- Risk of a chemical pollution event from minor spills from maintenance vehicles.

As outlined in **Chapter 5: Forestry** while there may be increased run-off rates as a result of felling there are plans for replanting which will result in no net loss of woodland area.

Table 6.16.1: Summary of Effects (Operational Phase OHL)

Receptor	Development Interaction	Mitigation Measures	Receptor sensitivity	Magnitude of effect following mitigation	Significance of effect
Surface Watercourses and Coastal Waters	Potential for impact on surface water quality during operation.	Implement best practice mitigation measures and operational SuDS design	High	Negligible	Minor
Designated Sites	Potential for impact on flow and water quality during operation	Implement best practice mitigation measures	High	Negligible	Minor
Public Water Supplies	Potential for impact on flow and water quality during operation	Implement best practice measures during operational phase. This will include implementation of the agreed monitoring schedule within Drinking Water Catchment for post-construction phase.	High	Negligible	Minor

6.10 Appraisal - Cumulative Effects

A cumulative effect is considered to be an additional effect on hydrological resources (within the same hydrological catchment) arising from the Proposed Development in combination with the Associated Development, as well as the effects of the Project in combination with other developments likely to affect the hydrological environment.

6.10.1 Proposed Development and Associated Development Cumulative Effect Assessment

Cumulative effects may result to downstream receptors where constructive works are active simultaneously at the Proposed Development and Associated Development. Since construction works at substation and tower bases are unlikely to occur concurrently and will be active as short a time as practicable, these are not considered to result in extensive cumulative effects. In addition to this, mitigation measures as detailed in the WCEMP will be implemented and it is therefore considered that there is no potential for cumulative effects on receptors downstream.

6.10.2 Project and Other Developments Cumulative Effect Assessment

The following developments associated with substation within 10 km of the Proposed Development are identified below (scoped in):

- Temporary change of land use for works compound at ‘Land North of Killean House Inveraray’ (consented);
- Formation of borrow pit at ‘Land North of Auchindrain Furnace’ (consented);
- Extension to existing An Suidhe Electricity Substation (consented); and

- Retention of existing SSEN Transmission LT40 track and additional track (consented).

The developments above may result in cumulative effects to downstream receptors; however, these are likely to be minimal as the only construction activities will be upgrades to existing access tracks and extension to the existing substation. In addition to this, mitigation measures as detailed in the WCEMP will be implemented and it is therefore considered that there is no potential for cumulative effects on receptors downstream.

6.10.3 Residual Cumulative Effects

Mitigation measures detailed in the WCEMP will be implemented and no significant residual cumulative effects are predicted.

Table 6.17.1 Summary of Cumulative Effects

Receptor	Potential Effect	Magnitude	Significance of Effect	Additional Mitigation Proposed	Residual Significance
Surface hydrology	Chemical Pollution	Negligible	Negligible	None	Negligible
	Erosion and Sedimentation	Negligible	Negligible	None	Negligible
	Impediments to Flow	Negligible	Negligible	None	Negligible
	Increase in Run-off from increase in hardstanding	Negligible	Negligible	None	Negligible
	Acidification of watercourses	Negligible	Negligible	None	Negligible
Coastal Water	Chemical Pollution	Negligible	Minor	None	Minor
	Erosion and Sedimentation	Negligible	Minor	None	Minor
	Acidification of watercourses	Negligible	Minor	None	Minor
Hydrogeology (groundwater)	Chemical pollution	Negligible	Minor	None	Minor
	Erosion and Sedimentation	Negligible	Minor	None	Minor
	Changes in Groundwater Interflow Patterns	Negligible	Minor	None	Minor
	Acidification of groundwater	Negligible	Minor	None	Minor
Near-surface water	Chemical pollution	Negligible	Minor	None	Minor
	Erosion and Sedimentation	Negligible	Minor	None	Minor

Receptor	Potential Effect	Magnitude	Significance of Effect	Additional Mitigation Proposed	Residual Significance
	Acidification of watercourses	Negligible	Minor	None	Minor
Soils	Compaction or loss of soil	Negligible	Minor	None	Minor
Designated Sites	Chemical pollution	Negligible	Minor	None	Minor
	Erosion and Sedimentation	Negligible	Minor	None	Minor
Public Water Supplies	Chemical pollution	Negligible	Minor	Surface water monitoring programme and mitigation measures outlined within WCEMP	Minor
	Erosion and Sedimentation	Negligible	Minor		Minor

6.11 Summary of Impacts

This Environmental Appraisal has assessed the likely impacts of the Project on geology, hydrology and hydrogeology. Following the implementation of the embedded mitigation and measures set out in accordance with industry best practice in the WCEMP, as well as the GEMP, the residual effects arising from the Project will be minor or negligible for most of the receptors. The exceptions to this are public and private water supplies which requires further consultation with relevant consultees and residents. Following consultations any receptors considered at risk of impacts will be mitigated through measures outlined in the WCEMP, which includes a water monitoring schedule to be agreed with consultees.

The conclusion of this Environmental Appraisal is that the residual effects arising from the construction and operation of the Project would not result in a significant effect on geology, hydrological or hydrogeological resources.