SSEN Transmission

Bingally 400 / 132 kV Substation

Environmental Appraisal

Volume 1

February 2025

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12. HYDROLOGY, HYDROGEOLOGY, GEOLOGY, SOILS AND PEAT

12.1 Introduction

12.1.1 With reference to **Volume 1, Chapter 1 Introduction and Background, Section1.1.10**, this Voluntary EA has been prepared based on the structure and assessment methodology of an EIA. This overall report, however, is a Voluntary EA Report and is not carried out under the EIA Regulations.

12.1.2 This chapter of the Voluntary EA identifies and assesses the potential impacts and effects of the Proposed Development on the Hydrology, Hydrogeology, Geology, Soils and Peat during construction and operation. The assessment has been undertaken in accordance with best practice guidance (described in **Section 13.2** below), and consideration has been given to the water environment, geology (superficial soils and bedrock), geological and hydrogeological designations and land contamination. Agricultural soils have not been considered in this chapter as effects on agriculture have been scoped out of the EA.

12.1.3 For this assessment the water environment includes the water quality of surface water features, fluvial hydromorphology of watercourses and the geomorphology of lochs/lochans, and quality, flows, and levels of groundwater features. Where there are water dependent ecosystems, these are also considered in this assessment when determining the importance of water features. The sensitive hydrological and hydrogeological receptors are also considered and any key environmental designations in the areas surrounding the Proposed Development.

12.1.4 There is interaction between environmental topics and therefore this chapter should be read in conjunction with **Volume 1, Chapter 8 Ecology**.

12.1.5 This chapter is also supported by the following figures (which are provided in **Volume 2**) and technical appendices (which are provided in **Volume 3**):

- **Figure 12-1 Study Area**;
- **Figure 12-2 Peat**;
- **Figure 12-3 Superficial Deposits**;
- **Figure 12-4 Bedrock**;
- **Figure 12-5 Groundwater Receptors**;
- **Figure 12-6 Surface Water Receptors**;
- **Appendix H Geotechnical and Geo-environmental Desk Study**;
- **Appendix I Peat Management Plan (PMP)**; and
- **Appendix J Peat Landslide Hazard and Risk Assessment (PLHRA)**.

12.2 Legislation and Policy

12.2.1 Legislation, planning policy and guidance relevant to this assessment and pertinent to the Proposed Development is outlined in this section (please note that regulations transferring powers from the European Union to the United Kingdom authorities are not listed).

Legislation

12.2.2 The following national legislation is relevant to the Proposed Development and will be considered as part of this assessment:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) ('the CAR Regulations')[1];
- Water Environment Water Services ('the WEWS Act') (Scotland) Act 2003[2];
- Environmental Liability (Scotland) Regulations 2009[3];
- Pollution Prevention and Control (Scotland) Regulations 2012 (PPC)[4];
- The Climate Change (Scotland) Act 2009[5];
- Contaminated Land (Scotland) Regulations (2005)[6];
- The Environmental Protection (Duty of Care) (Scotland) Regulations (2014)[7];
- The Construction (Design and Management) Regulations (2015)[8];
- Nature Conservation (Scotland) Act (2004)[9];
- Town & Country Planning (Scotland) Act (1997) as amended[10];
- Environmental Protection Act (1990) (as amended) and Part 2A The Contaminated Land Regime (2006)[11];
- Scotland's Zero Waste Plan (2010)[12];
- Scottish Energy Strategy (2017)[13]; and
- Electricity Act (1989)[14].

Planning Policy

12.2.3 The Applicant is seeking planning permission under the 1997 Act to construct and operate the Proposed Development. There are legal, policy and advice documents which are material considerations to the decision-making process of this process, covering relevant legislation, national and local planning policy, and advise notes / supplementary guidance, and these are described in the following sections.

National Planning Framework 4 (NPF 4)

12.2.4 The National Planning Framework 4 (NPF 4), published in February 2023[15], replaces the previous National Planning Framework 3 (NPF 3)[16]. NPF 4 sets out the Scottish Government

[1] Scottish Parliament, 2011. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) ('the CAR Regulations'). [Online] Available: https://www.legislation.gov.uk/ssi/2011/209/contents/made

[2] Scottish Parliament, 2003. Water Environment Water Services ('the WEWS Act') (Scotland) Act 2003. [Online]. Available: https://www.legislation.gov.uk/asp/2003/3/contents

[3] Scottish parliament, 2009. Environmental Liability (Scotland) Regulations 2009. [Online]. Available: https://www.legislation.gov.uk/ssi/2009/266/contents/made

[4] Scottish Parliament, 2012a. Pollution Prevention and Control (Scotland) Regulations 2012 (PPC). [Online]. Available: https://www.legislation.gov.uk/ssi/2012/360/contents/made

[5] Scottish Parliament, 2009. Climate Change (Scotland) Act 2009. [Online]. Available: https://www.legislation.gov.uk/asp/2009/12/contents

[6] Scottish Parliament, 2005. The Contaminated Land (Scotland) Regulations 2005. [Online]. Available: https://www.legislation.gov.uk/sdsi/2005/0110697936

[7] Scottish Parliament, 2014. The Environmental Protection (Duty of Care) (Scotland) Regulations. [Online]. Available: https://www.legislation.gov.uk/ssi/2014/4/contents/made

[8] Scottish Parliament, 2015. The Construction (Design and Management) Regulation 2015. [Online]. Available: https://www.legislation.gov.uk/uksi/2015/51/contents/made

[9] Scottish Parliament, 2004. Nature Conservation (Scotland) Act 2004. [Online]. Available: https://www.legislation.gov.uk/asp/2004/6/contents

[10] Scottish Parliament, 1997. Town and County Planning (Scotland) Act 1997. [Online]. Available: https://www.legislation.gov.uk/ukpga/1997/8/contents

[11] Scottish Parliament, 1990. Environmental Protection Act (1990) (as amended) and Part 2A The Contaminated Land Regime [Online]. Available: https://www.gov.scot/publications/environmental-protection-act-1990-part-iia-contaminated-land-statutory-guidance/pages/17/

[12] Scotland's Zero Waste Plan 2010 [Online]. Available: https://www.gov.scot/publications/scotlands-zero-waste-plan/

[13] Scottish Energy Strategy 2017. [Online]. Available: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2017/12/scottish-energy-strategy-future-energy-scotland-9781788515276/documents/00529523-pdf/00529523-pdf/govscot%3Adocument/00529523.pdf

[14] Electricity Act 1989 (legislation.gov.uk). [Online]. Available: https://www.legislation.gov.uk/ukpga/1989/29/contents

[15] The Scottish Government. 2023. National Planning Framework 4. [Online]. Available: https://www.gov.scot/publications/national-planning-framework-4/

[16] The Scottish Government. 2014. National Planning Framework 3. [Online]. Available: https://www.gov.scot/publications/national-planning-framework-3/

spatial development principles, regional priorities, national developments and national planning policy, covering six spatial principles which aim to deliver sustainable places, liveable places and productive places.

12.2.5 Policy 5 within NPF4 highlights the development proposals that need to be satisfied in relation to the effects on soils for the Proposed Development to be supported.

12.2.6 Policy 11 within NPF 4 states that project design and mitigation should address any effects on hydrology, the water environment and flood risk.

12.2.7 Policy 9 within NPF4 is intended to encourage, promote and facilitate the reuse of brownfield, vacant and derelict land and empty buildings, and to help reduce the need for greenfield development. It states that, "*where land is known or suspected to be unstable or contaminated, development proposals will demonstrate that the land is, or can be made, safe and suitable for the proposed new use*".

Scottish Planning Policy (SPP)

12.2.8 SPP was published in June 2014, its purpose is to set out national planning policies that reflect priorities of the Scottish Ministers for operation of the planning system and the development and use of land through sustainable economic growth[17]. SPP aims to promote a planning process that is consistent across Scotland but flexible enough to accommodate local circumstances. SPP demonstrates a commitment to sustainable growth through a balance of development in appropriate places.

12.2.9 SPP outlines that planning should look to 'promote protection and improvement of the water environment, including rivers, lochs, estuaries, wetlands, coastal waters and groundwater, in a sustainable and co-ordinated way'.

Planning Advice Notes and Specific Advice Sheets

12.2.10 Planning Advice Notes (PANs) and Specific Advice Sheets set out detailed advice from the Scottish Government in relation to a number of planning issues. PANs and Specific Advice Sheets relevant to the Proposed Development could include (refer to **Table 12-1** below):

Table 12-1 Planning Advice Notes and Specific Advice Sheets

Planning Advice Notes and Specific Advice Sheets	Key Requirements relating to the Water Environment	The Proposed Development
Planning and waste management[18]	States that there should be environmental protection considerations to mitigate any potential effects on the water environment.	Mitigation measures are outlined in **Section 12.7** of the chapter, and within the CEMP.
Planning Advice Note 79: water and drainage[19]	States that for all new developments sustainable drainage schemes (SuDS) are now required for surface water systems which provides attenuation and treatment prior to return, by natural dissipation where possible, to the water environment.	Mitigation measures are outlined in **Section 12.7** of the chapter, and within the CEMP.

[17] The Scottish Government. 2014. Scottish Planning Policy (SPP). [Online]. Available: https://www.gov.scot/publications/scottish-planning-policy/pages/2/

[18] The Scottish Government 2015. Planning and Waste Management Advice. [Online]. Available: https://www.gov.scot/publications/planning-and-waste-management-advice/

[19] The Scottish Government 2006. PAN 79 Water and Drainage. [Online]. Available: https://www.gov.scot/publications/planning-advice-note-pan-79-water-drainage/

Planning Advice Notes and Specific Advice Sheets	Key Requirements relating to the Water Environment	The Proposed Development
Planning Advice Note 33: Development of Contaminated Land[20]	Provides advice on the development of contaminated land with respect to planning and the determination of planning applications where contamination is or may be present	Mitigation measures are outlined in **Section 12.7** of the chapter, and within the CEMP.

River Basin Management Plan

12.2.11 The River Basin Management Plan[21] (RBMP) sets out a range of actions to address impacts to the water environment. RBMP outline actions for public bodies and land managers and are produced by SEPA on behalf of the Scottish Government. The Site is within the RBMP. In summary, the RBMP provides the following:

- The conditions of the water environment;
- Pressures which could or are impacting the water environment; and
- Actions to address any impacts.

Local Planning Policy – Highland Council

12.2.12 THC divides its local development plans (LDP) into separate local plans in addition to a Highland-wide LDP[22]. The region which covers the Site and surrounding area is the Inner Moray Firth LDP[23]. The Inner Moray Firth LDP was formally adopted in June 2024 and provides the local planning policies and is representative of how the council views where developments should and should not be over the next 10 - 20 years. The following policy within **Table 12-2** is applicable to the Proposed Development.

Table 12-2 List of water environment related policies outlined in Inner Moray Firth LDP

Policy Number	Description
Policy 2 Nature Protection, Restoration and Enhancement	*"Any potential adverse impacts of development proposals on biodiversity, nature networks and the natural environment must be minimised through careful planning and design and following the mitigation hierarchy. Local developments will only be supported if they include appropriate measures to integrate nature-based solutions and enhance biodiversity, in proportion to the nature and scale of the proposed development."*

12.2.13 The Highland-wide LDP[22] was adopted in April 2012. The following policies listed in **Table 12-3** are applicable to the Proposed Development.

Table 12-3 List of water environment, minerals and soils related policies outlined in Highland LDP

Policy Number	Description
Policy 53 Minerals	*"The Council will safeguard all existing economically significant, workable minerals reserves/operations from incompatible development which is likely to sterilise it unless:* • *there is no alternative site for the development; and*

[20] The Scottish Government 2000: Planning Advice. [Online]. Available: https://www.gov.scot/publications/pan-33-development-of-contaminated-land/
[21] SEPA 2021. The River Basin Management Plan for Scotland 2021-2027. [Online]. Available: 211222-final-rbmp3-scotland.pdf
[22] The Highland Council, 2012. Highland-wide Local Development Plan. [Online]. Available: https://www.highland.gov.uk/info/178/development_plans/199/highland-wide_local_development_plan
[23] The Highland Council 2024. Inner Moray Firth LPD. [Online]. Available: https://www.highland.gov.uk/downloads/file/28837/inner_moray_firth_local_development_plan_2_strategy_and_general_policies

Policy Number	Description
	• *the extraction of mineral resources will be completed before the development commences."*
Policy 55 Peat and Soils	*"Development proposals should demonstrate how they have avoided unnecessary disturbance, degradation or erosion of peat and soils.* *Unacceptable disturbance of peat will not be permitted unless it is shown that the adverse effects of such disturbance are clearly outweighed by social, environmental or economic benefits arising from the development proposal.* *Where development on peat is clearly demonstrated to be unavoidable then the Council may ask for a peatland management plan to be submitted which clearly demonstrates how impacts have been minimised and mitigated."*
Policy 63 Water Environment	*"The Council will support proposals for development that do not compromise the objectives of the Water Framework Directive (2000/60/EC). In assessing proposals, the Council will take into account the River Basin Management Plan for the Scotland River Basin District and associated Area Management Plans and supporting information on opportunities for improvements and constraints"*
Policy 64 Flood Risk	*"Development proposals should avoid areas susceptible to flooding and promote sustainable flood management. Development proposals within or bordering medium to high flood risk areas, will need to demonstrate compliance with Scottish Planning Policy (SPP) through the submission of suitable information which may take the form of a Flood Risk Assessment."*
Policy 65 Waste Water Treatment	*"a connection to the public sewer will be required, unless the applicant can demonstrate that the development is unable to connect to a public sewer for technical or economic reasons and that the proposal is not likely to result in or add to significant environmental or health problems. The Council's preference is that any private system should discharge to land rather than water"*
Policy 66 Surface Water Drainage	*"All proposed development must be drained by Sustainable Drainage Systems (SuDS) designed in accordance with The SuDS Manual (CIRIA C697) and, where appropriate, the Sewers for Scotland Manual 2nd Edition. Planning applications should be submitted with information in accordance with Planning Advice Note 69: Planning and Building Standards Advice on Flooding paragraphs 23 and 24. Each drainage scheme design must be accompanied by particulars of proposals for ensuring long-term maintenance of the scheme."*
Policy 69 Electricity Transmission Infrastructure	*"Proposals for overground, underground or sub-sea electricity transmission infrastructure (including lines and cables, pylons/ poles and vaults, transformers, switches and other plant) will be considered having regard to their level of strategic significance in transmitting electricity from areas of generation to areas of consumption. Subject to balancing with this consideration, and taking into account any proposed mitigation measures, the Council will support proposals which are assessed as not having an unacceptable significant impact on the environment, including natural, built and cultural heritage features. In locations that are sensitive, mitigation may help to address concerns and should be considered as part of the preparation of proposals."*

Guidance

12.2.14 The following guidance are used and referenced throughout the report:

- The Guidance of Pollution Prevention (GPP)[24];
- Design Manual for Roads and Bridges (DMRB) LA 113 Road drainage and the Water Environment[25];

[24] NetRegs. Guidance for Pollution Prevention (GPP) documents. [Online]. Available: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/

[25] Highways England (2020) Design Manual for Roads and Bridges LA 113 Road Drainage and the Water Environment. [Online]. Available: https://www.standardsforhighways.co.uk/search/d6388f5f-2694-4986-ac46-b17b62c21727

- DMRB LA 109 Geology and soils[26];
- Environment Agency's Land Contamination Risk Management (LCRM) guidance[27];
- DEFRA guidance (Guidelines for Environmental Risk Assessment and Management)[28];and
- CIRIA C552[29].

12.3 Assessment Methodology and Significance Criteria

Assessment Scope

12.3.1 The assessment of potential effects on the water environment is described in the introduction to this chapter (refer to **Section 12.1**).

12.3.2 The baseline and potential effects from the Site on the geology and soils environment have been assessed by completing a desk study (included in **Volume 3**, **Appendix H Phase 1 Geo-Environmental and Geotechnical Desk Study**) which includes a Conceptual Site Model (CSM) along with a Preliminary Risk Assessment and presents the findings of a preliminary ground investigation.

12.3.3 **Table 12-4** below outlines the scope of this assessment.

Table 12-4 Scope of Assessment

Impact	Receptor	Development Phase
Groundwater Quality and Flow	Northern Highlands Groundwater Body	Construction Operation
	Strathglass Sand and Gravel Groundwater Body	
Groundwater Pollution	Northern Highlands Groundwater Body	Construction Operation
	Strathglass Sand and Gravel Groundwater Body	
Surface Water Quality - Spillage Risk	All surface water features that may be directly or indirectly impacted as identified later.	Construction Operation
Surface Water Quality - Suspended Fine Sediment	All surface water features that may be directly or indirectly impacted as identified later.	Construction Operation
Hydromorphology - Culverts and crossings	All surface water features that may be directly or indirectly impacted as identified later.	Construction Operation
Hydromorphology - Outfalls and SuDS	All surface water features that may be directly or indirectly impacted as identified later.	Construction Operation
Loss of Geological Features	All superficial and bedrock geology that may be directly or indirectly impacted as identified later.	Construction Operation
Loss of Soils (including compaction and erosion)	Soil resources / peat that may be directly or indirectly impacted as identified later.	Construction Operation

[26] Highways England (2019) Design Manual for Roads and Bridges LA109 Geology and soils. [Online]. Available: https://www.standardsforhighways.co.uk/search/adca4c7d-4037-4907-b633-76eaed30b9c0

[27] Environment Agency's Land Contamination Risk Management (LCRM) Guidance. [Online] Available: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

[28] Cranfield University and DEFRA, Guidelines for Environmental Risk Assessment and Management - Green Leaves III, Nov 2011. [Online] Available: https://assets.publishing.service.gov.uk/media/5a79d20540f0b66d161ae5f9/pb13670-green-leaves-iii-1111071.pdf

[29] Construction Industry Research and Information Association (CIRIA), C552 Contaminated land risk assessment, guide to good practice, 2001.

Impact	Receptor	Development Phase
Land Contamination Disturbance and Migration	Human health, surface waters and groundwater that may be directly or indirectly impacted as identified later.	Construction Operation
GWDTEs	**Volume 1, Chapter 8 Ecology** includes a list of GWDTEs that may be directly or indirectly impacted, a summary is included later.	Construction Operation

Extent of the Study Area

12.3.4 The Site is located approximately 1.2 km east of Tomich and 1 km east of the existing Fasnakyle Substation. The nearest residential properties are approximately 1 km west of the Proposed Development, and approximately 1 km south of Tomich.

12.3.5 For the purposes of this Voluntary EA, a designated red line boundary around the Site and the proposed extent of the Study Area, has been selected within which receptors have been identified.

12.3.6 The Study Areas used within this report are as follows:

- 1 km from the Site for geology (including soils and peat)
- 250 m from the Site for land contamination.
- For the hydrology and hydrogeology, a 250 m study area around areas of new development or temporary works has been used. For these water features, the baseline also considers downstream attributes beyond the 250 m study area as water quality impacts can sometimes propagate along watercourses. The baseline also considers downstream attributes beyond the Site up to 2 km downstream.

12.3.7 The Study Area is determined by the location of new development and construction works and access routes. The Study Area with 250 m and 1 km boundary limits is shown on **Volume 2**, **Appendix A Figures**, **Figure 12-1**.

12.4 Consultation Undertaken To Date

12.4.1 **Table 12-5** lists the consultation that has taken place in preparing this assessment.

Table 12-5 Summary of Consultation

Consultee	Key Issue	Action Taken
Scottish Water	Scottish Water confirms that the Proposed Development falls within a drinking water catchment (Abhainn Deabhag) where a Scottish Water abstraction is located. Therefore, more detail about the proposal is required to fully assess the risk to the ground water source. Scottish Water state that as the area is within a drinking water catchment, this should be noted in future documentation, and anyone working on the site should be made aware of this fact. Scottish Water request further involvement at the more detailed design stages, to determine the most appropriate proposals and mitigation within the catchment to protect water quality and quantity.	It has been noted that receptors within the Study Area are within a drinking water catchment and receptors have been assessed as such.

Consultee	Key Issue	Action Taken
SEPA	Where it is identified that peat is likely to be present on site, SEPA welcome that a full peat assessment will be undertaken to assess the extent of its presence. SEPA recommend that the presence of Ground Water Dependent Terrestrial Ecosystems (GWDTE) is also considered, and surveys undertaken if appropriate. Although no private water supplies are identified within 250 m of the proposed Bingally Substation location, it is not clear if a new access route would encroach on this buffer. If this is the case, SEPA request that it would be helpful if further information is provided once the route options are available. If a new access track is proposed, provided any watercourse crossings are designed to accommodate the 1 in 200-year event, plus climate change, and other infrastructure is located well away from watercourses, SEPA do not foresee a need for detailed information on flood risk. Freedom of Information Request: Provided historical land use within and surrounding the Proposed Development which included CAR licence permits, sewage treatment systems and waste details.	A peat probe survey has been carried out across the Site with an assessment of the peat extent and depth presented in the Peat Management Plan (**Volume 3, Appendix I Peat Management Plan**) GWDTEs have been identified and considered, further information is in **Volume 1, Chapter 8 Ecology**. A letter and questionnaire relating to Private Water Supplies was sent out to properties surrounding the Site. No private water supplies have been identified with 250 m of the substation location or associated access track from this survey. Culverts have been designed to accommodate the 1 in 200- year event and climate change. Information recorded in **Volume 3, Appendix H Geotechnical and Geo-environmental Desk Study Report**[30].
THC	Freedom of Information Request: Records held of potential sources of contaminated land within the Proposed Development.	Information recorded in **Volume 3**, **Appendix H Geotechnical and Geo-environmental Desk Study Report**[30].

Method of Baseline Data Collation

12.4.2 A desk study review was conducted as part of the assessment of baseline conditions. This involved using a range of sources to identify and characterise the Site area.

12.4.3 The following sources have been used to inform the baseline upon which effects have been assessed:

- Online Ordnance Survey (OS) digital maps[31];
- Met Office website[32];
- SEPA Water Environment Hub[33];
- Standing Waters Database[34];
- Scotland's Aquaculture website[35];
- Scotland's Environment website[36];
- Scotland's Soils website[37];
- National River Flow Archives website[38];

30 AECOM Report. Bingally 400kV Substation and Access Track, Geotechnical and Geo-environmental Desk Study (Ref. 60701792, September 2024).
31 Ordnance Survey. [Online]. Available: https://www.ordnancesurvey.co.uk/
32 Meteorological Office website. [Online]. Available: https://www.metoffice.gov.uk/public/weather/climate/gfhyzzs9j
33 SEPA Water Environment Hub. [Online]. Available: Water Classification Hub
34 Standing Waters Database. [Online]. Available: http://gateway.snh.gov.uk/pls/apex_cagdb2/f?p=111:1000
35 Scotland's Aquaculture website. [Online]. Available: http://aquaculture.scotland.gov.uk/
36 Scotland's Environment website. [Online]. Available: https://www.environment.gov.scot/maps/scotlands-environment-map/
37 Scotland's Soils website. [Online]. Available: http://map.environment.gov.scot/Soil_maps/?layer=1
38 National River Flow Archive website. [Online]. Available: https://nrfa.ceh.ac.uk/data/station/info/6001

- British Geological Survey (BGS) published maps[39];
- BGS GeoIndex Onshore mapping[40];
- NatureScot (NS) SiteLink[41];
- Scotland's aquifers and groundwater bodies[42];
- UK centre for Ecology and Hydrology[43];
- Scotland's Soils[44];
- The Coal Authority Map Viewer[45];
- Zetica Unexploded Ordnance (UXO) risk map[46];
- UK Health Security Agency Radon Affected Area Map[47];
- Groundsure Enviro+Geo Insight[48];
- SEPA Flood Risk[49]
- SEPA data requests (received on the 26th April & 6th April 2024);
- Pollution Events[50];
- Surface Water Monitoring Stations[51];
- Ecology Surveys, including UKHab and NVC;
- Private Water Supply (PWS) data from THCs Online Database[52];
- National Library of Scotland (Ordnance Survey (OS) Map)[53];
- The Highland Council data request (received on the 12th April 2024);
- Igne, Proposed LT521 Fasnakyle 400 kV Substation, Report on Ground Investigation (May 2024);
- Jacobs, ASTI Substation Site-LT521 Fasnakyle Ground Investigation Report (April 2024); and
- Peat Probing information provided by SSEN along the alignment of the proposed access track (July 2024).

12.4.4 A walkover of the Study Area for geology was conducted on 10 May 2024. The survey was carried out by a team of surveyors consisting of a hydrogeologist and a geo-environmental consultant. The purpose of the survey was to identify and characterise surface and groundwater receptors, consider flow pathways from source to receptors, and make general observations about the character of the landscape and other relevant features that may influence the sensitivity and importance of water features.

39 British Geological Survey (BGS) Maps. [Online]. Available: https://webapps.bgs.ac.uk/data/MapsPortal/series.html?collection=PMAP&series=S50k
40 British Geological Survey (BGS) GeoIndex Onshore map viewer. [Online]. Available: https://www.bgs.ac.uk/map-viewers/geoindex-onshore
41 NatureScot [Online]. Available: https://sitelink.nature.scot/map
42 British Geological Survey. [online] Available: https://www2.bgs.ac.uk/groundwater/waterResources/ScotlandsAquifers.html
43 UK Centre for Ecology and Hydrology. [online] Available: https://www.ceh.ac.uk/data

45 The Coal Authority Map Viewer. [Online]. Available: https://datamine-cauk.hub.arcgis.com/
46 Zetica UXO Risks Map (2024). [Online]. Available: https://zeticauxo.com/guidance/risk-maps/
47 UK Health Security Agency Radon Affected Area Map (2024). [Online]. Available: https://www.ukradon.org/information/ukmaps
48 Groundsure Enviro+Geo Insight (ref. GSIP-2024-14714-18280_A to G), dated 01 May 2024.
49 SEPA Flood Risk. [Online]. Available: Flood Maps | SEPA - Flood Maps | SEPA
50 Information from Freedom of Information request to SEPA
51 Information from Freedom of Information request to SEPA
52 Highland Council Open Map Data. [Online]. Available: https://map-highland.opendata.arcgis.com/datasets/ded172bbade24650bb2c1baec5e0d318_0/explore
53 National Library of Scotland. [Online]. Available: https://www.nls.uk/

12.4.5 The AECOM Geotechnical and Geo-environmental Desk Study (included in **Volume 3**, **Appendix H Phase 1 Geotechnical and Geo-environmental Desk Study**) presents the data review findings for the geology, soils and land contamination aspects of this EA.

12.4.6 The ground investigation was commissioned by SSEN Transmission and reported by Igne in the Proposed LT521 Fasnakyle 400 kV Substation, Report on Ground Investigation (May 2024). The objective of the works was to provide information on the ground conditions for design and construction of the proposed Bingally Substation and in relation to any geochemical contamination of the area. The ground investigation (GI) covered both the proposed Bingally Substation platform, and areas to the northeast of the proposed substation platform area (i.e. south of the proposed access track). The GI work was carried out between 6 November 2023 and 23 January 2024. The ground investigation works included 25 boreholes sunk by a mixture of dynamic sampling, rotary open-hole and rotary core drilling methods to a maximum depth of 13.1 m below ground level (bgl). A total of 38 trial pits were excavated by mechanical means. Additionally, 6,270 peat probes were undertaken. Geotechnical and chemical laboratory testing was carried out on soil samples. Post-fieldwork gas monitoring was also undertaken. The ground investigation Factual Report is included in the Geotechnical and Geo-environmental Desk Study (**Volume 3**, **Appendix H Phase 1 Geotechnical and Geo-environmental Desk Study**). There is an additional GI currently being undertaken in the area of the proposed access track. Peat probing results have been provided by SSEN (July 2024) and these are further discussed in **Section 12.5.10**. No other data in relation to the additional GI undertaken in the footprint of the access track has been provided to AECOM for review.

12.4.7 The general methodology used to assess the effect of the Site on the hydrology, hydrogeology, geology, soils and peat receptors and the surrounding area is as follows:

- Desktop study to obtain baseline and historical data;
- Consultation with THC and landowners to identify water abstractions and PWS;
- Identification of the potential effects of the Proposed Development on sensitive receptors, taking account of the Applicant's General Environmental Management Plans (GEMPs); and
- Identification of options for the mitigation of potential effects, taking account of additional mitigation measures.

Source-Pathway-Receptor Approach

12.4.8 The qualitative assessment of potential likely significant effects during the construction and operational phases of the Site has been based on a source-pathway-receptor approach. For an impact on the water environment to exist, the following is required:

- An impact source or cause of effect such as:
  - a structure over a watercourse;
  - the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms;
  - or the loss or damage to all or part of a water feature; and
  - cuttings/excavations and associated dewatering activities capable of causing temporary or permanent changes to groundwater level or flow pattern and quality (as in the case of groundwater).
- A receptor that is sensitive to that impact (i.e. water features and the services they support) that could potentially be affected; and

- A pathway by which the two are linked (i.e. all three elements must be present before a potential impact linkage can be realised).

12.4.9 The first stage in applying the source-pathway-receptor approach is to identify the causes or sources of potential impact from a development. The sources have been identified through a review of the details of the Site, including the size and nature of the Site, potential construction methodologies and timescales etc.

12.4.10 The next step in the approach is to undertake a review of the potential receptors; these include water environment receptors that have the potential to be affected. Water features, including their attributes, have been identified through desk study and site surveys as described later. Potential receptors also include geological features and soils including peat. Consideration is also given to the effects of potential contamination on human health and the water environment.

12.4.11 The last stage of the approach is to determine if there is a viable exposure pathway or a 'mechanism' linking the source to the receptor. This is determined in the context of local conditions relative to receptors within the Study Area and surrounding environments, such as topography, geology, climatic conditions, land use and the nature of the impact (e.g. the mobility of a liquid pollutant or the proximity to works that may physically impact a water feature or be a source of water pollution).

12.4.12 A detailed assessment of potential source-pathway-receptor linkages and a Contaminated Land Risk Assessment has been completed and used to develop the CSM, which is provided in **Volume 3**, **Appendix H Phase 1 Geo-Environmental and Geotechnical Desk Study**.

Determining Magnitude of Change and Sensitivity of Receptors

12.4.13 The assessment of effect significance outlined within the below sections is consistent with the terminology and criteria outlined within **Volume 1, Chapter 5 EA Approach and Methodology**. However, the terminology used in **Volume 1, Chapter 5 EA Approach and Methodology** has been slightly modified for use in this chapter, to align with what is used in DMRB LA 113 Road drainage and the Water Environment[54] and DMRB LA 109 Geology and soils[55] as detailed below. Although these guidelines are used for highways it still outlines a scale of sensitivities for water environment, geology and soils receptors based upon baseline information, therefore, is suitable for this Site.

12.4.14 The sensitivity of receptors, or importance, of the potentially affected water environment features has been established on the basis of a four-point scale, using the criteria presented in **Table 12-6** which has been modified from DMRB LA 113 Road drainage[54] and the water environment to include hydromorphology. Geology, soils and contamination criteria for determining the value of a resource is taken from DMRB LA 109 Geology and soils[55] has been modified to include peatland. The geology and soils criteria used is included in **Table 12-6**.

12.4.15 The magnitude of adverse or beneficial impacts for the water environment has been determined by the seven-point scale presented in **Table 12-7** taking DMRB LA 113 Road drainage and the water environment into account. The magnitude of impact with typical descriptions are included in **Table 12-8**, modified from the LA 109 Geology and soils descriptions.

[54] Highways England (2020) Design Manual for Roads and Bridges LA 113 Road Drainage and the Water Environment. [Online]. Available: https://www.standardsforhighways.co.uk/search/d6388f5f-2694-4986-ac46-b17b62c21727

[55] Highways England (2019) Design Manual for Roads and Bridges LA109 Geology and soils. [Online]. Available: https://www.standardsforhighways.co.uk/search/adca4c7d-4037-4907-b633-76eaed30b9c0

12.4.16 The significance of effects has been determined using the matrix presented in **Table 12-9**. The assessment has considered the magnitude of impacts and the importance of the resources / receptors that could be affected in order to classify the effect. Where the matrix allows a range of effect, professional judgement will be used to determine the residual significance.

Table 12-6. Receptor Importance Descriptions

Sensitivity	Groundwater	Surface Water	Hydromorphology	Geology	Soils	Contamination
Very High	Principal aquifer providing a regionally important resource and/ or supporting a site protected under International and UK legislation Ecology and Nature Conservation. Groundwater locally supports GWDTE.	Watercourse having a WFD classification shown in a River Basin Management Plan (RBMP) and Q95 ≥1.0 m^3/s. The Site protected/ designated under International or UK habitat legislation (SAC, SPA, SSSI, Water Protection Zone (WPZ), Ramsar site. International Designated Salmonid / Cyprinid fishery. Species protected by International legislation.	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.	Geology: very rare and of international importance with no potential for replacement (e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSI's and Geological Conservation Review (GCR) sites where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such.	Receptor contains Class 1 or 2 priority peatland and soils directly supporting a designated site (e.g. SAC, SPA, RAMSAR, SSSI etc.).	Human health: very high sensitivity land use such as residential or allotments; Surface water: relevant sensitivity criteria as given in this Table (from LA 113); Groundwater: relevant sensitivity criteria as given in this Table (from LA 113).
High	Principal aquifer providing locally important resource or supporting river ecosystem and/ or supporting sensitive habitats of national importance. Groundwater supports a GWDTE.	Watercourse having a WFD classification shown in a RBMP and Q95 <1.0 m3/s. Major Cyprinid Fishery. Species protected under International or UK legislation Ecology and Nature Conservation	Conforms closely to natural, unaltered state and will often exhibit well-developed and diverse geomorphic forms and processes characteristic of river and lake type. Deviates from natural conditions due to direct and / or indirect channel, floodplain, bank modifications and/ or catchment development pressures.	Geology: rare and of national importance with little potential for replacement (e.g. geological SSSI, Areas of Special Scientific Interest (ASSI), NNR). Geology meeting national designation citation criteria which is not designated as such.	Receptor contains Class 1 or 2 priority peatland.	Human health: high sensitivity land use such as public open space; Surface water: relevant sensitivity criteria as given in this Table (from LA 113); Groundwater: relevant sensitivity criteria as given in this Table (from LA 113).
Medium	Aquifer providing water for agricultural or industrial use with	WFD not having a WFD classification shown in a	Shows signs of previous alteration and/ or minor flow/ water	Geology: of regional importance with limited potential for replacement	Receptor contains Class 3 or 5 peatland areas, or other areas	Human health: medium sensitivity land use such as

Sensitivity	Groundwater	Surface Water	Hydromorphology	Geology	Soils	Contamination
	limited connection to surface water. Secondary Aquifer. Groundwater of limited value because its quality does not allow potable or other quality sensitive uses.	RBMP and Q95 >0.001 m^3/s.	level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.	(e.g. RIGS / Local Geological / Geomorphological Sites (LGS)). Geology meeting regional designation citation criteria which is not designated as such.	identified as being carbon rich or peaty soils from sources out with the 2016 Carbon and Peatland Map; Soils supporting non-statutory designated sites (e.g. Local Nature Reserves (LNR)), LGS's, Sites of Nature Conservation Importance (SNCIs)).	commercial or industrial; Surface water: relevant sensitivity criteria as given in this Table (from LA 113); Groundwater: relevant sensitivity criteria as given in this Table (from LA 113).
Low	Unproductive Strata	Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001 m3/s.	Substantially modified by past land use, previous engineering works or flow/ water level regulation. Watercourses likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation. Watercourses may also be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and	Geology of local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarry's / mining sites).	Receptor contains Class 4 soils with areas unlikely to be associated with peat or carbon rich soils. Unlikely to include carbon-rich soils.	Human health: low sensitivity land use such as highways and rail; Surface water: relevant sensitivity criteria as given in this Table (from LA 113); Groundwater: relevant sensitivity criteria as given in this Table (from LA 113).

Sensitivity	Groundwater	Surface Water	Hydromorphology	Geology	Soils	Contamination
			probable strategic need for maintenance dredging. Artificial and minor drains and ditches will fall into this category.			
Negligible	N/A	N/A	N/A	No geological exposures, little / no local interest.	N/A	Human health: undeveloped surplus land / no sensitive land use proposed.

Table 12-7. Magnitude of Impact – Water Environment (after LA 113)

Impact	Criteria
Major Adverse	Results in a loss of attribute and/ or quality and integrity of the attribute.
Moderate Adverse	Results in impact on integrity of attribute, or loss of part of attribute.
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability.
Negligible	Results in impact on attribute, but of insufficient magnitude to affect the use or integrity.
Minor Beneficial	Results in some beneficial impact on attribute or a reduced risk of negative impact occurring.
Moderate Beneficial	Results in moderate improvement of attribute quality.
Major Beneficial	Results in major improvement of attribute quality.
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Table 12-8. Magnitude of Impact – Geology and Soils (after LA109)

Impact	Typical Description
Major	Geology: • Loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features, or elements. Soils: • Long term or permanent loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements; likely to cause exceedance of statutory objectives and/or breaches of legislation. Contamination: 1) Human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. category 4 screening levels) SP1010[56] with potential for significant harm to human health. Contamination heavily restricts future use of land; 2) Surface water: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • Reduction in water body WFD classification; • Loss of regionally important public water supply; • Loss or extensive change to a designated nature conservation site. 3) Groundwater: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • Loss of, or extensive change to, an aquifer; • Loss of regionally important water supply; • Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies; • Reduction in water body WFD classification.
Moderate	Geology: • Partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features, or elements.

[56] CL:AIRE 2014. Contaminated Land: Applications in real environments (CL:AIRE).SP1010, 'Development of category 4 screening levels for assessment of land affected by contamination

Impact	Typical Description
	Soils: • Partial loss of resource, potentially adversely affecting integrity; partial loss of or damage to key characteristics, features or elements with/without exceedance of statutory objectives or with/without breaches of legislation. Contamination: 1) Human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. category 4 screening levels) SP1010. Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use; 2) Surface water: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies; • Contribution to reduction in water body WFD classification. 3) Groundwater: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • Partial loss or change to an aquifer; • Degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies; • Partial loss of the integrity of GWDTE; • Contribution to reduction in water body WFD classification.
Minor	Geology: • Minor measurable change in geological feature / designation attributes, quality, or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. Soils: • Reversible or minor loss of, or alteration to, one (or potentially more) key characteristics, features or elements; some measurable change in attributes, quality or vulnerability. Contamination: 1) Human health: contaminant concentrations are below relevant screening criteria (e.g. category 4 screening levels) SP1010. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health; 2) Surface water: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • Minor effects on water supplies. 3) Groundwater: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • Minor effects on an aquifer, GWDTEs, abstractions and structures.
Negligible	Geology: • Very minor loss or detrimental alteration to one or more characteristics, features, or elements of geological feature / designation. Overall integrity of resource not affected. Soils: • No discernible loss / reduction of soil function(s) that restrict current or approved future use. Contamination: 1) Human health: contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g. category 4 screening levels) SP1010. No

Impact	Typical Description
	requirement for control measures to reduce risks to human health / make land suitable for intended use; 2) Surface water: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113; 3) Groundwater: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • No measurable impact upon an aquifer and/or groundwater receptors.
No change	Geology: • No temporary or permanent loss / disturbance of characteristics features or elements. Soils: • No loss / reduction of soil function(s) that restrict current or approved future use. Contamination: 1) Human health: reported contaminant concentrations below background levels; 2) Surface water; sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • No loss or alteration of characteristics, features or elements; no observable impact in either direction. 3) Groundwater: sensitivity criteria from Table 3.70 Road drainage and water environment LA 113: • No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effect

12.4.17 The significance of effects has been determined using the matrix presented in **Table 12-9**. Effects classed as moderate or greater are considered 'Significant' in planning terms.

Table 12-9. Matrix for assessment of significance

Magnitude	Sensitivity				
	Very High	High	Medium	Low	Negligible
Major	Major	Major	Moderate	Moderate	Minor
Moderate	Major	Moderate	Moderate	Minor	Negligible
Minor	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible
No change[57]	Neutral	Neutral	Neutral	Neutral	Neutral

Limitations and Assumptions

12.4.18 The EA process enables informed decision-making based on the best possible information about the environmental implications of a development being made available. However, it is common for there to be some uncertainty as to the exact scale and nature of the environmental impacts predicted. Where there is uncertainty of design, reasonable worst-case assumptions have been made.

[57] This is based on LA 104 Environmental Assessment Methodology. [Online]. Available: https://www.standardsforhighways.co.uk/tses/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true

12.4.19 This assessment is based on data available from online sources and a literature search. For many water bodies in the Study Area there was no long-term water quality or hydrological data. Data which was freely available was also limited (i.e. several years old, thus not fully representative of current conditions). No digital bathymetry or water depth-storage data was provided and therefore the potential effects from the Proposed Development on water quality, hydrology and hydrogeology has been assessed qualitatively and based on background information and certain assumptions defined in the impact assessment section.

12.4.20 The PWS data was gathered from a freedom of information request to SEPA, and by using THC online database[58]. The data collected from THC does not clarify whether the coordinates correlate to the property served by the PWS or the actual PWS location. For the purposes of this assessment, it has been assumed that the coordinates received from the councils correspond to the location of the PWS. A survey was also sent out to the residents of Tomich to gain details of any other PWS that may be in the area which gained five responses. It is possible that there are unknown PWS.

12.4.21 Information has been sourced from the previous phase of desk study, together with the data obtained during intrusive site investigation works, which includes the results of field tests performed in exploratory holes, and laboratory tests on a selection of representative samples of the soils and rock strata encountered. Ground investigation methods involve inherent limitations as the volume of soils and rock sampled from the exploratory holes is very low in comparison with the area of site. Unforeseen and unforeseeable ground conditions and potentially contaminated materials or groundwater could always be encountered within localised areas across the site.

12.4.22 At the time of writing, intrusive ground investigation works were being undertaken for the proposed access track into the proposed substation site areas and therefore full results were not available. Only peat probing results were available for the proposed access track and have been used to inform this assessment.

12.4.23 Any borehole data from BGS sources are included on the basis that: “The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation”.

12.4.24 Baseline conditions for soils in relation to the Site has been established from a variety of sources including maps available online at the time of writing this chapter, including from Scotland’s Soils and NatureScot, and from peat probing and the limited intrusive ground investigation results.

12.4.25 It is assumed that a CEMP will result in effective measures being put in place prior to construction to control/mitigate potential pollution incidents, from sources such as accidental leaks or fuel spills from construction plant and machinery. It is also necessary to ensure that any materials being imported onto the site do not contain contaminated materials.

12.4.26 This chapter should be read in light of the legislation, statutory requirements and/ or industry good practice applicable at the time of the assessment being undertaken. Any

[58] Highland Council Open Map Data, 2024. Available Online: https://map-highland.opendata.arcgis.com/datasets/ded172bbade24650bb2c1baec5e0d318_0/explore

subsequent changes in this legislation, guidance or design may necessitate the findings to be reassessed in the light of these circumstances.

12.4.27 As there is currently limited design and construction methodology the assessment has assumed best practice measures will be used throughout.

12.5 Baseline Conditions

Study Area Topography, Land Use and Climate

12.5.1 The Site is situated at approximate elevations varying between 78 m and 383 m AOD. The proposed substation site is at approximately between 320 and 339 m AOD, with the proposed access track sloping north to south from 95 m AOD to 317 m AOD, to meet the proposed substation. The south of the Site has slightly higher elevations, with the north flattening out. The land use is predominantly forests with smaller portions of waterbodies, wetlands and shrubs and / or herbaceous vegetation and associations[59].

12.5.2 The Site is situated approximately 1.2 km southeast of the town of Tomich and 1 km east of the existing Fasnakyle substation. The proposed access track runs northeast to southwest and passes through a rural landscape consisting of mainly forestry. The proposed access track route does not cross any urban areas.

12.5.3 The National River Flow Archive (NRFA) website[60] shows that the Site falls within two catchment areas which record rainfall. These include the Glass at Fasnakyle catchment (NH315287) at the west of the Site, and the Glass at Kerrow Wood catchment (NH354320) which is at the east of the Site. Standard Annual Average Rainfall (SAAR) for the period 1961-1990 is 2209 mm per year at the Glass at Fasnakyle, and 2249 mm per year at the Glass at Kerrow Wood.

12.5.4 The days of rainfall above 1 mm are also recorded by the Met Office[61]. Nairn Druim Station is located approximately 50 km northeast from the Site and is the closest station. Data was taken from 2023. October, November, December, January and February have the highest amount of rainfall, while generally rainfall is lowest during May, June and July. This is shown below in **Chart 1**.

[59] OSM Landuse Cover. [Online]. Available: https://osmlanduse.org/#13.47507317725987/-4.81384/57.29824/0/
[60] National River Flow Archive. [Online]. Available: https://nrfa.ceh.ac.uk/
[61] Met Office. [Online]. Available: https://www.metoffice.gov.uk/research/climate/maps-and-data/historic-station-data

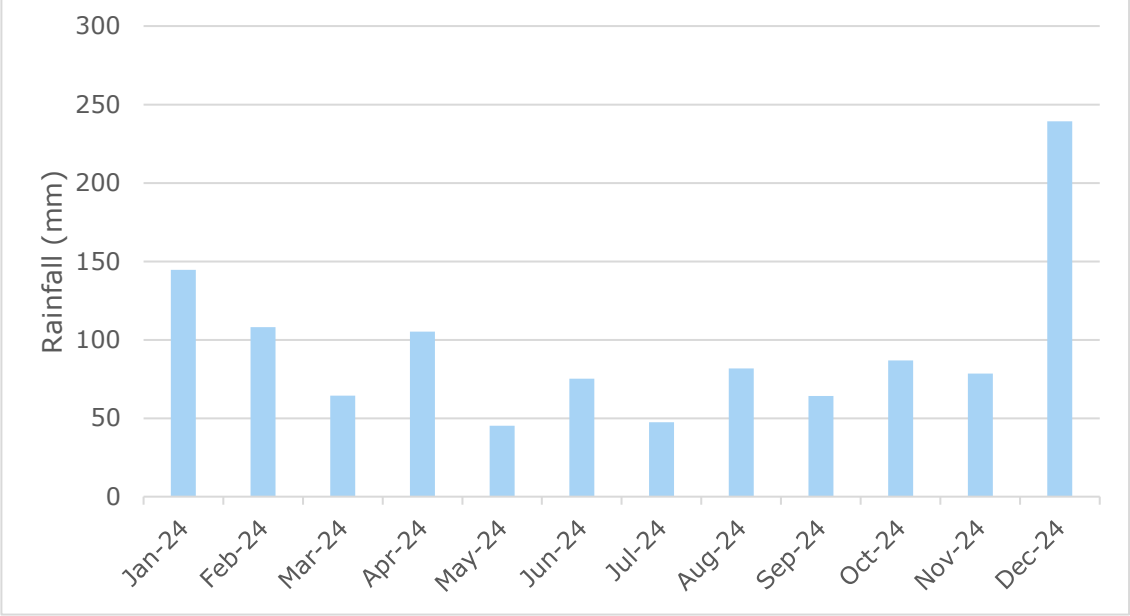

Chart 1 Average monthly rainfall recorded at Nairn Druim Station

Peat

12.5.5 The National Soil Map of Scotland[62] identifies the main soil type across the Site as humus-iron podzols with peaty gleyed podzols. Peaty gleys with dystrophic semi-confined peat are present within the south of the Site as well as out with the Site to the east. Locally, a small area of the Site is shown to be underlain by peaty gleyed podzols towards its centre along the proposed access track. Mineral alluvial soils with peaty alluvial soils are also shown within the northern extent of the Site and out with the Site within approximately 1 km west. Brown earths with humus-iron podzols are shown approximately 600 m northwest of the Site.

12.5.6 The 2016 Carbon and Peatlands Map 2016[63] provides an indication of the locations and extents of carbon-rich soils, deep peat and peatland habitats. The map is used to provide an indication of the peatland classification across the Study Area. A description of the different carbon and peatland classifications is provided in **Table 12-10**.

Table 12-10 Classification of Carbon and Peatland Habitats (reproduction of Map Legend available on Scotland Environment Website)

Class of Carbon Peatland	Class Description	Indicative Soil	Indicative Vegetation
1	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value.	Peat Soil	Peatland
2	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential.	Peat soil with occasional peaty soil	Peatland or areas with high potential to be restored to peatland

[62] Scotland's Environment, National Soil Map of Scotland. https://map.environment.gov.scot/Soil_maps/?layer=1
[63] Scotland's Environment, 2016 Carbon and Peatland Map [Online]. Available: https://map.environment.gov.scot/Soil_maps/?layer=1

Class of Carbon Peatland	Class Description	Indicative Soil	Indicative Vegetation
3	Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat.	Predominantly peaty soil with some peat soil	Peatland with some heath
4	Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils.	Predominantly mineral soil with some peat soil	Heath with some peatland
5	Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.	Peat soil	No peatland vegetation
0	Peatland habitats are not typically found on such soils.	Mineral soils	No peatland vegetation
-1	Information to be updated when new data are released.	Not classified (unknown soil type)	Not applicable
-2	Non-soil (e.g. loch, built up area, rock and scree).	No soil	Not applicable

12.5.7 The 2016 Carbon and Peatland Map indicates that the predominant soil type within the Site and Study Area is Class 0 (mineral soils). Localised areas of Class 1 nationally important deposits are recorded within the south of the Site within the vicinity of the proposed substation footprint and southern extent of the proposed access track. Localised areas of Class 2 nationally important deposits are also recorded within the Site, underlying the proposed access track towards its centre. Areas of Class 1 and 2 deposits are also recorded out with the Site boundary within 250 m, predominately to the east. Within the south of the Site and underlying the proposed footprint of the substation Class 5 peatland soils are recorded. Class 5 soils are also recorded to be predominant to the east of the Site within the Study Area.

12.5.8 The peat localities, as identified by the 2016 Carbon and Peatland Map, in relation to the Site and surrounding areas are presented in **Volume 2**, **Appendix A Figures**, **Figure 12-2**.

12.5.9 Peat was encountered and recorded as part of the 2024 Igne ground investigation Factual Report. A summary of the peat findings relating to this ground investigation is recorded in **Section 12.5.15** of this report.

12.5.10 Additional peat probing within the Site was undertaken by BAM Ritchies in May to July 2024. The additional probing was undertaken to cover areas of the proposed access track, OHL and any infrastructure which were not included within the initial probing by Igne as part of Ground Investigation. A summary of the peat findings relating to this ground investigation is recorded in **Section 12.5.15** of this report

12.5.15Geology and Ground Conditions

12.5.11 The following summary of the geology beneath the Site is based on a review of geological mapping available from the BGS GeoIndex map viewer, published BGS 1:50,000 scale map Sheets 73W Invermoriston (dated 2012 and 1976), and the Groundsure Report. A summary of the geology is included in the AECOM Geotechnical and Geo-environmental

Desk Study (**Volume 3**, **Appendix H Phase 1 Geotechnical and Geo-environmental Desk Study**).

Artificial Ground

12.5.12 There are no BGS designated areas of made ground or artificial ground recorded within the Site or the surrounding area (up to a distance of 1 km). However, localised made ground is anticipated in areas such as the pylon towers (on-site), paths and access tracks (on-site and off-site), possibly at an infilled quarry (on site), etc. Made ground was not recorded during the 2024 ground investigation undertaken by Igne.

Superficial Geology

12.5.13 According to the BGS sources, the superficial geology comprises peat and Glacial Till (Till Devensian-Diamicton) across the majority of the Site. A significant area is shown to be absent of superficial deposits which suggests the presence of shallow or outcropping rockhead. The superficial deposits for the Site are presented in **Volume 2**, **Appendix A Figures**, **Figure 12-3**.

12.5.14 Alluvial Fan Deposits (of gravel, sand, silt and clay), alluvium (of sand, gravel and boulders), River Terrace Deposits (of sand and gravel), Glacial Deposits, Glaciofluvial Sheet Deposits (of sand, gravel and boulders) and Hummocky Glacial Deposits are present off-site to the west of the northern and central portions of the Site. The immediate southwest to the Site and approximately 1 km southeast of the Site shows Moranic Deposits (of sand, gravel and boulder).

12.5.15 The 2024 Igne Ground Investigation (GI) Factual Report recorded superficial deposits similar to the geological mapping. A summary of the geological strata encountered during the ground investigation is presented below:

- Topsoil was encountered in TP16 and TP27 only, recorded to a maximum depth of 0.30 m bgl (TP16);
- Peat was encountered from surface to a maximum depth of 3.50 m (BH28) within 13 boreholes and in all trial pits, with the exception of TP16 and TP27. Suspected peat was also encountered within 5,991 (of a total of 6,270) peat probes undertaken across the Proposed Development. Peat depths estimated from the probing (undertaken during the 2024 Igne GI) were typically less than 2 m in thickness, although local areas of deeper peat were recorded within the area of the ground investigation up to a maximum of 7.82 m. Where observed in exploratory holes, the peat was generally described as dark brown slightly sandy plastic amorphous locally spongey fibrous peat. The Von Post scale for the humification and estimation of moisture content for the peat, was typically recorded in the range of H4 (slightly decomposed with the plant structure not easily identifiable) to H5 (moderately decomposed with recognisable but vague plant structure) / B1 (dry) to B2 (<500%), although humification of up to H8 (very strong decomposition with very indistinct plant structure) was locally recorded as well as moisture contents of up to B3 (500 – 1000%);
- Peat depths estimated as part of the BAM Ritchies survey were typically less than 1.0 m in thickness although localised deeper peat deposits were recorded with the maximum thickness estimated as 4.5 m;
- Superficial deposits of sand and gravel were encountered from surface (BH03) to 5.00 m bgl (BH18). Granular Glacial Deposits were generally encountered beneath the peat or topsoil within 19 boreholes and 32 trial pits. Gravel was described as brown very sandy silty fine to coarse angular and subangular of psammite with cobbles (BH03), and grey very sandy slightly silty fine and medium angular and subangular (BH28). Sand

was generally described as medium dense grey / brown very gravelly silty fine to coarse with cobbles. Gravel of psammite, pelite and granite (BH18, BH25).

Bedrock Geology

12.5.16 According to the BGS, the Site is underlain by the Tarvie Psammite Formation (named the Upper Garry Psammite Formation on BGS 1993 paper map) from the Loch Eil Group. The Tarvie Psammite Formation of psammite and semipelite is shown off-site to the east of the Site. Localised areas of unnamed igneous intrusion (pre-caledonian in age) are present within 1 km west of the Site. The Glen Moriston Vein Complex - Pegmatite and Leucogranite is present off-site approximately 70 m southeast, at 490 m northeast, and at 740 m southwest of the Site.

12.5.17 The Tarvie Psammite Formation is defined by BGS as 'Predominantly psammite, thin-bedded, siliceous to micaceous. Local, thin semipelite beds are muscovite-rich and locally migmatitic. Large quartzite lenses occur, in particular near the base.'

12.5.18 The Strathglass Fault is oriented approximately northeast-southwest and is shown to be approximately 250 m west of the Site at its closest point.

12.5.19 The bedrock geology for the Site and surrounding area is presented in **Volume 2**, **Appendix A Figures**, **Figure 12-4**.

12.5.20 The 2024 ground investigation Factual Report by Igne recorded bedrock similar to the mapping data. A summary of the geological strata encountered during the ground investigation is presented below:

- Weathered bedrock was recorded beneath the peat and Granular Glacial Deposits between surface (BH04) and 7.60 m bgl (BH25) (top of bedrock) and described as highly weathered evident as a localised reduction of strength on fracture surfaces, sand infilling between fracture surfaces and locally recovered as gravel (BH25).
- Bedrock was encountered within all boreholes between surface (BH19 and BH20) and 7.60 m bgl (BH25). Probable bedrock in the trial pits was encountered between 0.30 m (TP09) and 2.90 m bgl (TP28) (top of bedrock). Bedrock was not encountered within TP11, TP17, TP26 and TP36, and these holes terminated at depths of 1.50 m, 2.50 m, 2.00 m and 1.40 m bgl respectively. The bedrock is described as psammite, and pelite with occasional igneous intrusions (granite).

Historical Borehole Records

12.5.21 Seven historical borehole records available on the BGS Onshore Geoindex viewer are recorded in (or within close proximity to) the Site (NH32SW1, NH22SE1, NH22SE2, NH22SE4, NH32NW54, NH32NW55, NH32NW56, NH32NW57). The historical borehole records encountered the following general sequence:

- Made ground from surface to a maximum of 0.40 m bgl (NH32SW1);
- Peat from surface to a maximum of 1.10 m bgl (NH32NW54);
- Sand and gravel underlying the peat up to a maximum of 4.00 m bgl (NH22SE1);
- Weathered psammite / broken rock underlying the superficial deposits between 1.10 m bgl and 3.90 m bgl (top of bedrock) (NH32SW1, NH22SE2); and
- Psammite bedrock underlying the superficial deposits or weathered psammite between 1.30 m bgl and 4.00 m bgl (top of bedrocks) (NH32NW57, NH22SE1).

12.5.22 The historical borehole records are included in the Geotechnical and Geo-environmental Desk Study Report (**Volume 3, Appendix H Phase 1 Geotechnical and Geo-environmental Desk Study**).

Mining and Quarrying

12.5.23 The Coal Authority website indicates the Study Area does not lie within a Coal Authority Reporting Area and no mine entries are recorded within the Study Area.

12.5.24 The Groundsure Report indicates non-coal mining areas of vein mineral commodities to be present in the vicinity of the Site. The vein minerals recorded by the Groundsure Report are noted as unlikely to cause difficult ground conditions and at a level where they do not need to be considered.

12.5.25 The Groundsure Report indicates four quarries and pits in the vicinity of the Site. All of which have a ceased status. 'Guisachan Forest Pit' located to the east of the proposed Bingally Substation site was for the commodity of sand and gravel and is of ceased status. There is an additional 'Guisachan Forest Pit' approximately 220 m west of the proposed Bingally Substation site for the commodity of Igneous and Metamorphic Rock, and of is of ceased status. Historical sand pits are shown towards the northern extent of the proposed access track, at 208 m northeast and at 358 m northwest of the Site from the historical OS mapping (dated 1901) included in the Groundsure Report. These are also considered to be of ceased status.

12.5.26 Additionally, the BGS records 'Fasnakyle Bridge Pit' (which the Groundsure Report records as being for the commodity of sand and gravel and is of ceased status) and 'Guisachan Quarry' (which is recorded to be inactive by the BGS) located approximately 750 m west and 820 m southwest of the Site respectively.

12.5.27 A review of the BGS Mineral Occurrences layer indicates no significant mineral occurrences are recorded within the 1 km of the Site. Further review of the mineral layers of the BGS indicates no potentially significant minerals are present within 1 km of the Site. No minor resources are recorded by the BGS to be present within or in close vicinity to the Site.

12.5.28 Review of THC's mineral audit 2015 - 2016[64] indicates no active quarries within the Site.

Land Contamination - Radon

12.5.29 The UK Health Security Agency Radon Affected Area Mapping was reviewed as part of the desk study to determine potential radon risks for the Study Area.

12.5.30 The radon mapping shows the majority of the Site including the proposed Bingally Substation footprint is located within an area where 1-3% of homes are above the action level for radon gas. However, localised areas within the west and north of the Site comprise areas with radon potential of 3-5%. Localised areas within the east and north of the Site are shown with a radon potential of greater than 30% which correspond to the proposed access track and the western limits of the substation site only. Localised areas to the immediate west and southwest of the Site show a radon potential of 5-10% and 30% respectively. Based on these radon levels, it is anticipated that full radon protection

[64] Highland Council, Minerals Audit 2015-16 [Online]. Available: https://www.arcgis.com/apps/webappviewer/index.html?id=80b35ea0385a44728b6e4dacc07a4719

measures will be necessary for occupied buildings within the Site. This is further described in **Section 12.7.16**.

Land Contamination - Historical and Current Land Use

12.5.31 A review of the past land use of the Proposed Development and surrounding area was undertaken as part of the **Geotechnical and Geo-environmental Desk Study** (**Volume 3**, **Appendix H Phase 1 Geotechnical and Geo-environmental Desk Study**) which included OS mapping and aerial photography. The Study Area covered by the review included the Site and a 250 m offset.

12.5.32 Within the Study Area, the earliest OS mapping (1872) shows land as undeveloped with mainly rural / forestry. A sheepfold is shown within the west of the Site. The sheepfold is no longer present on the 1901 OS map edition. Pylon towers with overhead lines passing through the Study Area are present on the 1969 OS map edition, as well as access tracks and fords. A new quarry is shown within the west of the Site on OS map editions 2001 until 2024 (quarry is now possibly infilled). Additional access tracks are shown within 250 m from the Site. The surrounding land mainly comprises agricultural land and forestry.

12.5.33 Sources of contamination based on the historical land use which may impact the Site include:

- On-site:
  - Made ground associated with the construction of the pylon towers, paths and access tracks, surrounding plant and equipment used in the forestry industry, and potential infilling of the quarry;
  - Potential ground gas generation from the infilled quarry and the presence of peat deposits; and
  - Radon gas – naturally occurring.
- Off-site (within 250 m of the Site):
  - Made ground associated with the construction of the pylon towers, paths and access tracks, surrounding plant and equipment use in the forestry industry.
  - Potential ground gas generation from the infilled quarries / pits and the presence of peat deposits; and
  - Radon gas – naturally occurring

12.5.34 No other significant contaminant features were identified within 250 m of the Site.

Land Contamination - Soil Chemistry

12.5.35 The 2024 Ground Investigation Factual Report by Igne included test results from geo-environmental soil samples. Information on the laboratory test results and human health risk assessment is included in the Geotechnical and Geo-environmental Desk Study (**Volume 3**, **Appendix H Phase 1 Geotechnical and Geo-environmental Desk Study**). No visual or olfactory evidence of contamination was noted during the ground investigation.

12.5.36 Chemical contamination testing was carried out on 26 soil and 2 leachate samples from peat and superficial deposits. The testing included: Metals (Toxic 9 Suite), pH, total cyanide, sulphate, Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) Aliphatic / Aromatic Split, Polyaromatic Hydrocarbons (PAH) (USEPA 16), Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs) and asbestos.

12.5.37 The Jacobs ASTI Substation Site-LT521 Fasnakyle Ground Investigation Report (April 2024) did not note any exceedances of the Acute Generic Assessment Criteria (AGACs) which are considered appropriate for short-term risk to construction workers. Exceedances of residential (without plant uptake) GAC (Generic Assessment Criteria) values were recorded in soils (natural deposits) for total chromium with exceedances recorded in three of the four samples analysed on the Site. A maximum concentration of 22 mg/kg was recorded in BH14 at 0.50 m bgl which was taken from gravelly very silty fine to coarse sand with cobbles. No other test results were recorded above the GAC and no asbestos containing material was identified within the samples screened.

12.5.38 A review of BGS background geochemical bedrock values suggest that the elevated chromium detected during the ground investigation is likely to be representative of natural background concentrations within the wider Great Glen Regional area. As bedrock is present at shallow depths across the Site, and overlying sediments are likely to have been derived from the underlying bedrock geology, the recorded concentrations of chromium in superficial deposits up to 22 mg/kg could be feasible. The residential (without plant uptake) GAC used by Jacobs in their risk assessment analysis is also considered highly conservative for the Proposed Development.

Land Contamination - Ground Gas

12.5.39 Four rounds of ground gas monitoring (including groundwater level monitoring) were undertaken within 3 boreholes within the Site. Additionally, 4 monitoring rounds were undertaken within 5 boreholes within 250 m of the Site boundary. The following measurements (peak levels) were recorded:

- Methane (CH_4) at 0% v/v (by volume);
- Carbon dioxide (CO_2) between 0 % v/v and 0.50% v/v (BH23) within the Site, and between 0% v/v and 2.20% v/v (BH11) within 250 m radius;
- Oxygen (O_2) between minimum 15.00% v/v (BH14) and 19.60% v/v (BH23) within the Site and between 16.40% v/v (BH11) and 20.10% v/v (BH16) within 250 m radius;
- Hydrogen sulphide (H2S) between 0 ppm and 1 ppm for both the Site and 250 m radius;
- Carbon monoxide (CO) between 0 ppm and 3 ppm within the Site and between 0 ppm and 2 ppm within 250 m radius;
- Groundwater levels were recorded in 3 boreholes within the Site from surface (BH23 to 0.80 m bgl (BH26) and in 5 boreholes located within 250 m radius between 0.25 m bgl (BH18) and 4.85 m bgl (BH11); and
- Atmospheric pressure ranged between 950 and 992 mbar.

12.5.40 Methane was not detected during the gas monitoring but carbon dioxide and depleted oxygen concentrations were recorded. Gas flows were generally low. The Geotechnical and Geo-environmental Desk Study (**Volume 3**, **Appendix H Phase 1 Geotechnical and Geo-environmental Desk Study**) identified peat and made ground as potential on-site sources of ground gas.

Preliminary Conceptual Site Model and Risk Assessment

12.5.41 The risk assessment methodology followed is set out in the Environment Agency's LCRM[65] guidance. The Geotechnical and Geo-environmental Desk Study includes a preliminary

[65] Environment Agency's Land Contamination Risk Management (LCRM) Guidance. [Online] Available: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

CSM based on plausible complete pollution linkages. A qualitative risk assessment has been undertaken for these potential source-pathway-receptor linkages based on current DEFRA guidance (Guidelines for Environmental Risk Assessment and Management)[66] and CIRIA C552[67] guidance. Low risk ratings or above which were identified in the preliminary CSM have been further considered for the effect assessment.

12.5.42 Groundwater analysis was not undertaken during the ground investigation, however, due to the lack of contamination sources, it is considered unlikely that contaminated groundwater will be encountered within the Site.

12.5.43 In general, the majority of potential risks were assessed as low or very low with the exception of radon which was assessed as a moderate risk. Radon risks will require management via the installation of radon protection measures within occupied buildings.

12.5.44 Ground gas monitoring concluded that short-term and long-term exposure limits for carbon dioxide, carbon monoxide and hydrogen sulphide were not exceeded. The preliminary CSM and risk assessment concluded that ground gas generation potential and vapour sources are considered to be limited in potential concentration and extent. The risk from ground gases were very low and low risk. However, due to the presence of the peat deposits, ground gas risk may warrant further consideration during below ground or confined space working, should this be undertaken. Although considered unlikely, occupied buildings could potentially be impacted by ground gas.

Hydrogeology

12.5.45 The Site underlies one groundwater aquifer according to the Hydrogeological Map of Scotland[68], the Loch Eil Group. This aquifer has been designated as a low productivity 2c aquifer with flow essentially through fractures and other discontinuities, and mainly within the upper weathered zone.

12.5.46 The Loch Eil Group is within the larger Precambrian North aquifer. **Table 12-11** shows the aquifer properties. The Precambrian North aquifer is weakly mineralised and with variable redox conditions. Groundwater flow tends to follow local surface water catchments[69], however data and information on the flow direction is limited. The vulnerability is likely to be classed as 5, meaning the aquifer is vulnerable to most pollutants with rapid impacts in most cases[70].

12.5.47 There is limited groundwater level data available, however from borehole records on BGS GeoIndex, groundwater levels appear to be around 8-13 m bgl (BGS Reference: NH22SE14, NH22SE13). These boreholes are approximately 1.5 – 1.8 km from the Site. Groundwater level data from a borehole investigation has ranged from 0.1 to 3.2 m bgl[71].

[66] Cranfield University and DEFRA, Guidelines for Environmental Risk Assessment and Management - Green Leaves III, Nov 2011. [Online] Available: https://assets.publishing.service.gov.uk/media/5a79d20540f0b66d161ae5f9/pb13670-green-leaves-iii-1111071.pdf

[67] Construction Industry Research and Information Association (CIRIA), C552 Contaminated land risk assessment, guide to good practice, 2001.

[68] Hydrogeological Map of Scotland. [Online]. Available: https://www.bgs.ac.uk/datasets/hydrogeological-maps-of-scotland/

[69] British Geological Society. [Online]. Available: https://nora.nerc.ac.uk/id/eprint/511413/1/OR15028.pdf

[70] BGS, 2024. *Hydrogeological Map of Scotland* [online]. [Accessed 4 September 2024]. [Online]. Available: https://www.bgs.ac.uk/datasets/hydrogeological-maps-of-scotland/

[71] Fairhurst. LT521 Bingally 400kV Substation, Drainage Strategy Report: Substation Platform, BING4-LT521-SEBAM-DRAI-ZZ-RPT-C-0001

Table 12-11 Aquifer properties of the Precambrian North

	Transmissivity (m^2/d)	Specific Capacity ($m^3/d/m$)	Operational Yield (m^3/d)
Moine	0.2 (1)*	0.7-1.8 (2)*	23-32. Median 38 (4)*

**Number of values indicated in brackets*

12.5.48 There may also be pockets of groundwater within the permeable sands and gravels of other overlying superficial deposits present such as within Till-Diamicton, Glaciofluvial deposits, alluvium and River Terrace Deposits. This could occur particularly where superficial deposits are found at significant thickness. As the Strathglass Sand and Gravel superficial aquifer underlies the River Glass it is likely to be in continuity with the River and provide some baseflow to it. Within other superficial deposits flow would likely follow the topography of the surface and underlying bedrock.

WFD Groundwater Bodies

12.5.49 Groundwater aquifers in Scotland have been divided into water bodies according to the River Basin Management Framework. The Site includes one bedrock water body, Northern Highlands (ID: 150701) which has an area of 9382.3 km^2 and a 'good' overall status (2022) according to SEPA with minor fracture flow. It has had a classification of 'Good' since 2012 and is described as having a very low to low productivity (see **Table 12-13**).

12.5.50 Along the River Glass is the Strathglass Sand and Gravel (ID: 150763) water body. This is a superficial aquifer which is dominated by intergranular flow. It has an area of 19.23 km^2 and a 'good' overall status (2022) which it has maintained since 2012. It is described as having a moderate to high productivity.

12.5.51 All of Scotland's groundwater bodies have been designated as Drinking Water Protected Areas. The different protected areas within the Study Area are in association with the underlying aquifers. **Table 12-12** summarises the Drinking Water Protected Areas (Groundwater). These are all found within the Sub Basin District North Highland. The Drinking water protected Area (DWPA) (Groundwater) dataset represent the individual groundwater bodies in Scotland. These have been identified by the Scottish Environment Protection Agency in line with the requirements of the Water Environment (DWPA) (Scotland) Order 2013[72]. The dataset is required to fulfil the requirements of the European Union Water Framework Directive[73].

12.5.52 All groundwater receptors are shown in **Volume 2, Appendix A, Figure 12-5**.

Table 12-12 Groundwater Drinking Protection Zones

Protected Area Name	Protected Area ID	EPI teams	Risk Assessment	Water Dependent
Northern Highlands	150701	North Highland, W Highlands & Argyll, Hebrides & C. H/land	Green	Yes
Glass Valley	150763	Hebrides & C. H/land	Green	Yes

[72] Scottish Statutory Instruments, 2013. The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013. [Online] Available: The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013

[73] European Commission, 2000. Water Framework Directive [Online]. Available: https://environment.ec.europa.eu/topics/water/water-framework-directive_en

Table 12-13 WFD Groundwater Bodies

RBMP Parameter	Northern Highlands (ID: 150701) (2022)	Strathglass Sand and Gravel (ID: 150763) (2022)
Overall status	Good	Good
Quantitative status	Good	Good
Saline Intrusion	Good	Good
Surface Water Interaction	Good	Good
Water balance	Good	Good
Chemical status	Good	Good
Chem – Surface Water Interaction	Good	Good
Specific pollutants	Good	Good
Chromium	Good	Good
Zinc	Good	Good
Manganese	Good	Good
Other Substances	Good	Good
Nitrate	Good	Good
Priority substances	Good	Good
Cadmium	Good	Good
Lead	Good	Good
Drinking Water Protected Area	Good	Good
Priority substances	Good	Good
Atrazine	Good	Good
Simazine	Good	Good
Other Substances	Good	Good
Epoxyconazole	Good	Good
Nitrate	Good	Good
General tests	Good	Good
Priority substances	Good	Good
Atrazine	Good	Good
Simazine	Good	Good
Trichloroethene	Good	Good
Benzene	Good	Good
Specific pollutants	Good	Good
Chromium	Good	Good
Other Substances	Good	Good
Electrical Conductivity	Good	Good
Epoxyconazole	Good	Good
Nitrate	Good	Good
Free Product	Good	Good
Vinyl Chloride	Good	Good
Water quality	Good	Good

Groundwater Dependent Terrestrial Ecosystems

12.5.53 GWDTEs have been identified throughout the Site through UKHab and NVC surveys which were carried out in May and June 2024. GWDTEs are wetlands that are highly dependent on groundwater for water supply and that can support a variety of ground plants. Further

detail on GWDTEs is provided in **Volume 1, Chapter 8** Error! Reference source not found. a nd within **Volume 2**, **Appendix A Figures**, **Figure 8-4**.

12.5.54 The following National Vegetation Classification (NVC) vegetation communities were identified within the Study Area that are recognised as indicators that a habitat is likely to be highly or moderately groundwater dependant according to SEPA (2017)[74]:

- Potentially highly groundwater dependent:
  - M6c;
  - M10a;
  - M23b;
  - W4; and,
  - CG10.
- Potentially moderately groundwater dependent:
  - M15a;
  - M15 and M15b; and
  - M25a and b.

12.5.55 The results of a basic hydrological assessment undertaken in the field revealed that many of the potential GWDTE within the area surveyed are in good condition and may depend on groundwater (at least in part) for their maintenance. Notwithstanding, the GWDTE within the Site are often associated with ombrotrophic deep peat, and in these situations, it is likely that the hydrology of the GWDTE are largely (or perhaps entirely) maintained by surface water associated with rain-fed systems. Groundwater levels from the 16 boreholes and 24 trial pits in the Peat and Granular Glacial Deposits was relatively shallow between 0.10 m (TP34) and 3.20 m bgl (BH28). Therefore, it is likely that the habitats outlined below are dependent on groundwater.

12.5.56 Wet woodlands (W4) are probably dependent on groundwater to maintain their condition. These GWDTE were found in isolated areas, often on the break of slopes (maybe pertaining to a possible change in lithology) or in a mosaic with dry woodlands (in one woodland large parcel). It should be assumed that groundwater flows are present that have given rise to the wet woodlands on the Site.

12.5.57 Potentially highly / moderately GWDTE are present as spring / flush M10a or in flushed rush-dominated mires down from a break in a slope (M23b), where the hydrological regime is near natural. In these situations, it is probable that the potential GWDTE are dependent on groundwater to maintain their condition. Also, CG10 (that is present in one highly localised area) most likely relies on sub-surface feed from alkaline waters.

12.5.58 Other habitats are located within depressions in sloping peatlands (M6c), within small valleys and / or associated with mapped watercourses (M25a and M25b); these are most likely to be surface water fed systems.

12.5.59 Regarding heathlands, M15a wet heaths are in particular likely to be (at least in part) sustained by groundwater. However, many of the heathland GWDTE pertain to species-poor communities (e.g. M15 and M15b wet heathlands) which are regarded as ubiquitous in the Scottish Highlands. In addition, M15c wet heathland is not likely to be groundwater-

[74] SEPA, 2017. *Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems* [online]. [Accessed 29 August 2024]. [Online]. Available: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf

fed, as these habitats were mostly present on rocky high ground, which is almost certainly rain-water fed.

12.5.60 Both the Northern Highlands and the Strathglass Sand and Gravel Groundwater Body are likely to support GWDTEs within the Study Area.

Surface Water

12.5.61 Surface water features (and their attributes) within the Study Area are described in this section. Under the WFD, 'water bodies' are the basic management units, defined as all or part of a river system or aquifer. Water bodies form part of larger 'river basin districts' (RBD), for which RBMPs are used to summarise baseline conditions and set broad improvement objectives. For Scotland, all water bodies are considered within the same RBMP[75]. This baseline is presented by each water body, noting that some features are present within the catchments of designated WFD water bodies rather than being designated as a WFD water body in their own right.

12.5.62 For the purposes of this assessment, WFD and ordinary watercourses within the red line boundary around the Site have been identified. Water features have been identified by a review of online OS maps and aerial imagery shown in **Table 12-14**. Water features are also shown in **Volume 2**, **Appendix A, Figure 12-6**.

12.5.63 The Site is situated within the River Beauly Catchment (ID: 19) and within the River Glass sub-catchment.

12.5.64 The River Glass is sourced from multiple rivers including convergence of the River Affric and Abhainn Deabhag. The River Affric is sourced from Loch Beinn a' Mheadhoin (NH 27391 27573) and Abhainn Deabhag is sourced from NH 18778 17241. These rivers flow northeast and converge at NH 31072 28754, forming the River Glass. The River Glass continues to flow northeast before converging with the River Farrar at NH 40786 39900 to form the River Beauly. The River Glass is also part of the and River Affric - Cannich to Loch Beinn a Mheadhoin (ID 20210) WFD waterbody. The Site sits upgradient on the southern side of Abhainn Deabhag and the River Glass. The access track will cross approximately eight tributaries of Abhainn Deabhag and the River Glass. The water features within the red line boundary and the River Glass sub-catchment are described below in **Table 12-14**.

12.5.65 Q95s (the flow that is exceeded 95% of the time) in the area were only available for the River Glass at Fasnakyle (1.19 m3/s) and the River Glass at Kerrow Wood (8.614 m3/s).

12.5.66 The River Glass was observed on the walkover as having a shallow riverbank on the far side of the river and steeper on the near side. Vegetation cover was sparse to moderate and consisted of mainly grasses and trees. Features of the River Glass are a number of

[75] SEPA, The River Basin Management Plan for Scotland 2021 – 2027. [Online]. Available: https://www.sepa.org.uk/media/594088/211222-final-rbmp3-scotland.pdf

large meanders which take the route closer to the Site, around Fasnakyle House, before veering back to the side of the valley from which Photo 1 below was taken.

Photo 1 River Glass at NGR NH 324 307, looking SE (downstream). Taken on 9th June.

12.5.67 Also observed on the walkover was the flood plains of River Abhainn Deabhag. The Flood plains were vegetated with grass and sparse trees, and a small pond was observed (**Photo 2**). Further information on Abhainn Deabhag is in WFD Classified Water Bodies **Section 12.5.73** below.

Photo 2. River Abhainn Deabhag (in the distance – flows into River Glass Approximate NGR NH297 259).

12.5.68 Allt Bail a'Chladaic is a small watercourse sourced from around NH 34054 30370 and appears to flow into a manmade drainage system at NH 33656 30840. This then possibly flows into the River Glass at NH 34206 31150.

Photo 3 Allt a' Bhuachaillie Looking Upstream. Approximate NGR NH306 253

Photo 4 Receptor F10, tributary of Allt an Rathain. looking upstream. Approximate NGR NH 297 241.

12.5.69 **Table 12-14** lists all of the water features identified in the baseline alongside their national grid reference (NGR), a description summary, proximity to the Proposed Development and

whether they have been scoped in or out for further assessment. All water features listed below will be assessed, including scoped out features, during pre-construction surveys to identify any other flow pathways not identified below. All features will be mitigated against all temporary construction impacts through the implementation of CEMP and the Water Management Plan (WMP).

Table 12-14 Water Features within the red line boundary and the River Glass catchment

Name	ID	NGR	Description	Proximity to the Proposed Development	Scoped In/Out
Unnamed Watercourses	F1	NH 34965 31326	Sourced from NH 34965 31326, tributaries of the River Glass which it enters at NH 34800 31745 and NH 34847 31752 (approximately 609 m downstream).	Crossing proposed access track at NH 34935 31384.	**Scoped In** Proximity to works
Kerrow Burn and tributaries	F2	NH 34747 30961	Sourced from the convergence of two water courses which are sourced from approximately NH 35079 30770 and NH 33621 29874. Enters the River Glass at NH 34480 31314.	Crossing proposed access track and earthworks (embankment slope) at NH 34747 3096. A tributary to Kerrow Burn is situated approximately 10 m from earthworks associated with Temporary Compound Area 5.	**Scoped In** Proximity to works
Allt a Chlachain	F3	NH 34054 30370	Sourced from around NH 34054 30370 and appears to flow into a manmade drainage system at NH 33656 30840. This then possibly flows into the River Glass at NH 34206 31150.	Situated within 200 m downgradient of proposed access track.	**Scoped In** Proximity to works
Allt Bailen a h-Aibhne and tributaries	F4	NH 32955 29082 and NH 32684 28986	Sourced from NH 33140 27876 and flows into the River Glass at NH 32009 29507. Includes at least one tributary.	Crosses the proposed access track around NH 32955 29082 and a tributary at NH 32684 28986. Both also cross earthworks (embankment slope). Proposed filling in of watercourse approximately NGR of NH 32955 29082.	**Scoped In** Proximity to works
Allt Currachan and tributaries	F5	NH 32282 27645	Sourced from three lochans include Loch na Bienne Moire (NH 32576 26551), Loch nam Freumh (NH 32795 26893) and Loch Caoireach (NH 32510 27196). Then flows into Abhainn Deabhag at NH 31031 27715. According to	Crosses proposed access track and earthworks (embankment slope) at NH 32282 27645	**Scoped In** Proximity to works

Name	ID	NGR	Description	Proximity to the Proposed Development	Scoped In/Out
			OS Maps[76], Allt Currachan also has a number of waterfalls.		
Unnamed Watercourse and tributaries	F6	NH 31933 26717	Sourced from NH 32194 26743 and likely flows into Allt an Fhasaich Mhoir. Has multiple tributaries and small pond/lochans associated to it (flows thru Tomich).	Crosses proposed access track and earthworks (embankment slope) at NH 31933 26717	**Scoped In** Proximity to works
Allt an Fhasaich Mhoir	F7	NH 31557 26006	Sourced from Loch a' Ghreidlein at NH 31947 26044 and flows into Abhainn Deabhag at NH 30642 27390 (flows thru Tomich)	Crosses proposed access track and earthworks (embankment slope) at NH 31557 26006	**Scoped In** Proximity to works
Allt Bail a'Chladaich and tributairies	F8	NH 31452 25195 and NH 30466 24567	Sourced from around NH 31539 23873 and convergences with Allt a' Bhuachaillie at NH 30012 26002. Flows into Abhainn Deabhag at NH 29694 26160.	Crosses proposed access track and earthworks (embankment slope) at NH 31452 25195.	**Scoped In** Proximity to works
Allt a' Bhuachaillie and tributaries	F9	NH 30885 25496	Sourced from around NH 30885 25496 and convergences with Allt Bail a'Chladaich at NH 30012 26002. Flows into Abhainn Deabhag at NH 29694 26160.	Drainage from the proposed substation site will be directed into this water course at approximately NH 30466 24567.	**Scoped In** Proximity to works
Unnamed Watercourse	F10	NH 30224 23865	Tributary of Allt an Rathain which it enters at approximately Sourced at NH 30224 23865.	Drainage from the proposed substation site will be directed into this water course at approximately NH 30224 23865. 135 m from substation and earthworks (cut slope).	**Scoped In** Proximity to works
River Glass	F11	NH 34863 31767	WFD classified waterbody as part of the River Affric - Cannich to Loch Beinn a Mheadhoin (ID 20210) and River Beauly - Beauly Firth to Cannich is a river (ID: 20209) WFD waterbodies. It is sourced at approximately NH 31057 28743 at the confluence of the River Affric and Abhainn Deabhag. It becomes the River Beauly at NH408399.	142 m from existing access road and 232 m from earthworks (embankment). Within red line boundary.	**Scoped In** Proximity to works, WFD waterbody.

[76] OS Maps [Online]. Available: https://explore.osmaps.com/?lat=57.308349&lon=-4.787015&zoom=14.4389&style=Leisure&type=2d

Name	ID	NGR	Description	Proximity to the Proposed Development	Scoped In/Out
Abhainn Deabhag	F12	NH 28827 25646	Abhainn Deabhag is a WFD classified waterbody with 'Good' status. It is sourced from the Allt Riabhach at approximatley NH 24215 21097 and joins the River Glass at NH 31071 28745.	Abhainn Deabhag is not within the red line boundary. However, it is a receptor for several receptors listed above and there is a potential pathway. It is approximately 0.99 km from the red line boundary at its closest point.	**Scoped In** WFD waterbody, potential pathway
Allt an Rathain	F13	NH 29857 23873	Sourced at NH 30289 23271, tributary of Allt na Sidhean which it flows into at NH 28875 24490. Flows adjacent to the Glen Affric National Nature Reserve.	Allt an Rathain is not within the red line boundary. However, it is a receptor for F10 which flows into it at NH 29857 23873, 264 m from the SuDS location.	**Scoped In** Flows into WFD waterbody, Potential pathway
Various unnamed drains	F14	NH 30378 24170	Various unnamed ditches / drains present. May be associated with access tracks for existing OHL and / or deer stalking operations.	Various within the Site.	**Scoped In** Proximity to works
Abhainn Deabhag Drinking Water Protected Area (surface)	F15	NH 30224 23865	Drinking Water Protected Area for surface water (ID:20235) associated with the Abhainn Deabhag water feature. Follows a length of 24.09 km.	Within the Site.	**Scoped In** Proximity to works, protected area

WFD Classified Water Bodies

12.5.70 The water features listed in **Table 12-14** drain into three WFD water bodies: Abhainn Deabhag (ID: 20235) and the River Affric - Cannich to Loch Beinn a Mheadhoin (ID: 20210) and River Beauly - Beauly Firth to Cannich (ID: 20209). Both the River Affric - Cannich to Loch Beinn a Mheadhoin and River Beauly - Beauly Firth to Cannich WFD waterbodies include the River Glass, a receptor of a number of watercourses mentioned above.

12.5.71 The River Beauly - Beauly Firth to Cannich (ID: 20209) is located in the far east of the Study Area. It has a main stem of 31.9 km and is designated as a heavily modified water body due to physical alterations that cannot be addressed without a significant impact on water storage for hydroelectricity generation. It has a classification of 'Good ecological potential' which it has maintained since 2007.

12.5.72 River Affric - Cannich to Loch Beinn a Mheadhoin WFD waterbody includes the River Affric and the River Glass. It has a length of 10.2 km and has been designated as a heavily modified waterbody on account of physical alterations that cannot be addressed without a significant impact on water storage for hydroelectricity generation. It also has a 'Good Ecological Potential' classification from 2022 (Cycle 3). Modelled hydrology and hydrology (medium/high flows) have a classification of Poor.

12.5.73 Abhainn Deabhag has a length of 20.4 km and also has a 'Good' classification from 2022 (Cycle 3) which it has maintained since 2008. The Study Area is also within the Abhainn Deabhag (ID: 20235) Drinking Water Protected Area (Surface).

12.5.74 Refer to **Table 12-15** for an overview of the WFD Surface Water Bodies.

Table 12-15 WFD Surface Water Bodies

River Basin Management Plan (RBMP) Parameter	Abhainn Deabhag (2022)	River Affric - Cannich to Loch Beinn a Mheadhoin (2022)	River Beauly - Beauly Firth to Cannich (2022)
Overall status	Good	Good Ecological Potential	Good Ecological Potential
Pre-HMWB status	Good	Moderate	Moderate
Overall ecology	Good	Moderate	Moderate
Physico-Chem	High	N/A	Good
Temperature	High	N/A	High
Reactive phosphorus	High	N/A	High
Dissolved Oxygen	High	N/A	High
Acidity	High	N/A	Good
pH	High	N/A	Good
Biological elements	High	High	High
Invertebrate animals	High	N/A	High
Macroinvertebrates (RiCT/WHPT)	High	N/A	High
Macroinvertebrates (ASPT)	High	N/A	High
Macroinvertebrates (NTAXA)	High	N/A	High
Fish	High	High	High
Fish ecology	N/A	N/A	N/A
Fish barrier	High	High	High
Hydromorphology	Good	Moderate	Moderate
Morphology	Good	Good	Good
Overall hydrology	High	Moderate	Moderate
Modelled hydrology	High	Poor	Moderate
Hydrology (medium/high flows)	High	Poor	Moderate
Hydrology (low flows)	High	Moderate	High
Water quality	High	N/A	Good

Water Quality

12.5.75 There are no surface water samples result from any of the water features listed in **Table 12-16** within the Study Area.

12.5.76 There is one groundwater sampling site located at 'Tomich WTW, Abs from emergency BH, Cannich, Beauly' (NH 31060 28340). Samples were taken in May 2018, August 2022 and February 2023[77]. Data is generally limited and most determinands recorded have only one sample taken.

[77] Information from Freedom of Information request to SEPA

12.5.77 A summary of results and average Environmental Quality Standards (EQS) are shown in **Table 12-16**. In general, determinands are below EQS which indicate the aquifer has a relatively good quality.

Table 12-16 SEPA Chemistry Data Groundwater

Determinand	Units	Tomich WTW, Abs from emergency BH, Cannich, Beauly (Ground Water)			Environmental Quality Standard[78] (EQS)
		Average of Results	*Min of Results*	*Max of Results*	
Alkalinity (as CaCO3)	mg/L	16.8	14.8	19.1	
Aluminium *	µg/L	11	11	11	15
Ammoniacal Nitrogen (as N)	mg/L	0.0	0.0	0.0	
Arsenic *	µg/L	2	2	2	50
Atrazine *	ng/L	2.8	2.8	2.8	0.6
Bentazone *	ng/L	24.6	24.6	24.6	500
Cadmium *	µg/L	0.0	0.0	0.0	
Calcium *	mg/L	5.6	5.6	5.6	
Chloride	mg/L	11.9	10	13.8	250,000
Chromium *	µg/L	0.5	0.5	0.5	
Copper *	µg/L	1.5	1.5	1.5	1
Electrical conductivity (25°C)	µS/cm	85.7	83.7	86.9	
Iron *	mg/L	0.0	0.0	0.0	1,000
Lead *	µg/L	3.3	3.3	3.3	1.2
Magnesium *	mg/L	1.6	1.6	1.6	
Manganese *	mg/L	0.0	0.0	0.0	123
Nickel *	µg/L	0.9	0.9	0.9	4
Nitrate (as N)	mg/L	0.0	0.0	0.0	
Nonionised ammonia (as N) *	mg/L	0.0	0.0	0.0	
Organic Carbon *	mg/L	0.7	0.7	0.7	
Oxygen - dissolved	mg/L	6.2	4.8	7.6	
Oxygen - dissolved - % saturation	%	53.9	40.8	66.9	

[78] SEPA, 2020. Supporting Guidance (WAT-SG-53). Environmental Quality Standards and Standards for Discharges to Surface Waters. [Online]. Available: https://www.sepa.org.uk/media/152957/wat-sg-53-environmental-quality-standards-for-discharges-to-surface-waters.pdf

Determinand	Units	Tomich WTW, Abs from emergency BH, Cannich, Beauly (Ground Water)			Environmental Quality Standard[78] (EQS)
pH	pH units	6.3	6.2	6.4	
Reactive Phosphorus (as P)	mg/L	0.0	0.0	0.0	
Sample Temperature	°C	9.15	8.4	9.9	
Sodium *	mg/L	9.4	9.4	9.4	
Sulphate (as SO4)	µg/L	2.5	2.4	2.6	400,000
Suspended Solids (105°C) *	mg/L	2	2	2	
Total Oxidised Nitrogen (as N)	mg/L	0.6	0.4	0.8	
Vanadium *	µg/L	0.4	0.4	0.4	
Zinc *	µg/L	33.3	33.3	33.3	10.9

*Determinand only has one sample recorded.

Private Water Supplies

12.5.78 Using data downloaded from THC's Open Map Data portal it can be seen that there are at least four PWS within the 1 km Study Area. They are listed in **Table 12-17**. However, it should be noted that often the locations provided by the council may correlate to the property rather than the actual PWS source.

12.5.79 There are no PWS identified within the Site. However, a survey was sent out to residents of Tomich, approximately 1 km from the Site to gain details of any other PWS that may be in the area which are not recorded on THC's Open Map Data portal and any other relevant information. Five responses were returned from the survey.

- One PWS is located at NH 29933 26103, Sawmill. It is a 60 m groundwater borehole which is used for domestic purposes with 'good' water quality. It is situated 1.12 km downgradient from the Site at its closes point.
- A second PWS is located at NH 28067 24572, Plodda Lodge. The source is a borehole of unknown depth and use is domestic. It was noted that water quality when tested in July 2024 was 'good'. It is situated 2.06 km downgradient from the Site at its closes point.
- A third PWS is located at NH 28300 24400, Plodda Cottage, which is sourced from surface water and has been used for the past 30 years. It is 1.58 km downgradient from the Site at its closest point.
- The Old Stables situated at NH 28400 25000, uses a groundwater borehole which has a depth of 35 m. it is used daily for domestic purposes. It is 1.79 km downgradient from the Site at its closest point.

- The final PWS is located at NH 31500 26800, The Fank. The source is a spring and use is domestic. It is noted in the homeowner's response that the water rises from a 'very fine silica sand'. The supply use is expected to increase due to a new house being built which will use the same supply. It is situated approximately 0.43 km downgradient from the Site at its closes point.

Table 12-17 PWS within the 1 km Study Area

Name	Source	National Grid Reference	Source	Use	Distance from the Site	Scoped In / Out
PWS Lillie Oak	Highland Council's Open Map Data	NH 31268 27941	Unknown	Domestic	0.86 km downgradient	Scoped out No identifiable pathway
PWS SSE Substation - Fasnakyle	Highland Council's Open Map Data	NH 31969 29977	Borehole	Substation	1 km downgradient	Scoped out No identifiable pathway
PWS Invercannich Farm	Highland Council's Open Map Data	NH 34300 32300	Spring	Domestic	0.83 km downgradient	Scoped out No identifiable pathway
PWS Higher Crochail	Highland Council's Open Map Data	NH 36190 32459	Spring	Domestic	0.97 km downgradient	Scoped out No identifiable pathway
PWS Sawmill	Survey	NH 29933 26103	Borehole	Domestic	1.12 km downgradient	Scoped out No identifiable pathway
PWS Plodda Lodge	Survey	NH 28067 24572	Borehole	Domestic	2.06 km downgradient	Scoped out No identifiable pathway
PWS Plodda Cottage	Survey	NH 28300 24400	Surface Water	Domestic	1.58 km downgradient	Scoped out No identifiable pathway
PWS The Old Stables	Survey	NH 28400 25000	Borehole (Primary) Lake/Pond (Secondary)	Domestic	1.79 km downgradient	Scoped out No identifiable pathway
PWS The Frank	Survey	NH 31500 26800	Spring	Domestic	0.43 km downgradient	Scoped In Proximity to works

Other Abstractions

12.5.80 From data provided by SEPA there are no CAR Licenses identified within the Study Area. This includes public water abstractions operated by Scottish Water.

Aquatic Ecology and Protected Species

12.5.81 There is limited information on aquatic ecology and protected species within the Study Area. However, thirteen otter (*Lutra lutra*) records within 1 km of the Site all originating from the same 1 km grid square (NH 3430) were identified, located within the Site near the River Affric. The River Affric and the Abhainn Deabhag represents highly suitable otter habitat. Also identified was a record of water vole (*Arvicola amphibius*), 0.65 km west of the Proposed Development near the River Enrick headquarters. Water voles are known to use small upland watercourses. Therefore, there is the potential for water vole to be present within the Site, and the limited potential for the presence of otter within the Site.

12.5.82 No records of any notable fish (i.e. fish species that are European protected species or are listed on Schedule 5 of the Wildlife and Countryside Act or listed on the Scottish Biodiversity List) were returned from the desk study.

12.5.83 The River Affric, the Abhainn Deabhag and the River Enrick headwaters have been classed by Marine Scotland[79] as rivers supporting Atlantic salmon. Brown trout has also been noted to inhabit the River Glass[80].

12.5.84 A survey from the Ness and Beauly Fisheries trust conducted several Electro-fishing surveys back in 2018[81]. They carried out salmon and trout juvenile stock tests at 33 sites in the Beauly system. Overall, it was found the River Glass had excellent habitat for salmon and recorded good densities for salmon fry. However, there were low densities of trout parr recorded.

12.5.85 More information on ecology is provided in **Volume 2, Chapter 8 Ecology.**

Flood Risk

12.5.86 Within the Study Area there is no risk of groundwater or coastal flooding.

12.5.87 At the far east of the Site where the Study Area encroaches on the River Glass, there is a small area of medium and high risk of flooding. However, this is unlikely to have an effect on the Site. The nearest works (improvement to existing access road) is 140 m upgradient of the extent of the flood risk.

12.5.88 There are small areas of low, medium and high risk of surface water flood risk within the Study Area. These tend to be situated on the existing access track at the east of the site, and small areas around the receptor F7.

12.5.89 Flood risk is not assessed in this chapter. Flood Risk is assessed in a separate Flood Risk Assessment (FRA) which will be submitted separately as part of the planning application submission.

Other Designations

12.5.90 The Glen Affric National Nature Reserve is located 0.2 km southwest of the Site. It consists of pinewoods, lochs, moorland and species including otter. The Allt an Rathain watercourse

[79] Marine Scot. [Online] Available: https://data.marine.gov.scot/

[80] Trout and Salmon Fishing, Glen Affric. [Online]. Available: https://kerrow-house.co.uk/trout-salmon-fishing-glen-affric/

[81] Ness and Beauly Fisheries Trust. River Beauly Catchment, Electro-fishing Results 2018. [Online] Accessed 18 November 2024] Available At: https://beauly.dsfb.org.uk/files/2019/05/Beauly-E-fishing-report-2018.pdf

runs adjacent to this designated site. The nearest designated site relating to geology is Strathglass GCR located approximately 238 m north of the Proposed Development.

12.5.91 There are no other designations within the Study Area, including but not limited to Nitrate Vulnerable Zones (NVZ), SSSI or SAC.

12.6 Sensitivity of Receptors

12.6.1 **Table 12-18** lists the receptors for surface water and groundwater and their corresponding sensitivity.

Table 12-18. Sensitivity of Surface Water and Groundwater Receptors

Receptor	Water Quality Sensitivity	Hydromorphology Sensitivity
Northern Highlands WFD Groundwater Body	**High** - Low productivity WFD status aquifer. May support few PWS in weathered zones and fractures therefore considered have a high sensitivity due to the direct human receptors. It is also within a drinking water protected area and supports some GWDTE.	N/A
Strathglass Sand and Gravel WFD Groundwater Body	**High** - Moderate to High productivity, relatively small aquifer (19.2 km^2). It supports some GWDTE and provides baseflow to the River Glass. It is likely to be in continuity with the River Glass.	N/A
Private Water Supplies	**High** - Direct human receptor.	N/A
Unnamed Watercourses (F1)	**Medium** - A relatively small watercourse which flows into the River Glass with 'Good' status.	**Low – Minor**, relatively unmodified watercourse.
Kerrow Burn and tributaries (F2)	**Medium** - A relatively small watercourse which flows into the River Glass with 'Good' status.	**Low – Minor** watercourse, existing road crossing.
Allt a Chlachain (F3)	**Medium** - A relatively small watercourse which flows into the River Glass with 'Good' status.	**Low – Minor**, relatively unmodified watercourse.
Allt Bailen a h-Aibhne and tributaries (F4)	**Medium** - A relatively small watercourse which flows into the River Glass with 'Good' status.	**Low – Minor**, relatively unmodified watercourse.
Allt Currachan and tributaries (F5)	**Medium** - Relatively small tributary of Abhainn Deabhag which has is 'Good' WFD status and a surface drinking water protected area classification.	**Low – Minor** watercourse with hydro scheme.
Unnamed Watercourse and tributaries (F6)	**Medium** - Relatively small tributary of Allt an Fhasaich Mhoir which does not have its own WFD status. Within Abhainn Deabhag surface drinking water protected area.	**Low – Minor**, relatively unmodified watercourse.
Allt an Fhasaich Mhoir (F7)	**Medium** - Relatively small tributary of Abhainn Deabhag which has is 'Good' WFD status and a surface drinking water protected area classification.	**Low – Minor**, relatively unmodified watercourse.
Allt Bail a'Chladaich and tributairies (F8)	**Medium** - Relatively small tributary of Abhainn Deabhag which has is 'Good' WFD status and a surface drinking water protected area classification.	**Low – Minor**, relatively unmodified watercourse.
Allt a' Bhuachaillie and tributaries (F9)	**Medium** - Relatively small tributary of Abhainn Deabhag which has is 'Good' WFD status and has surface drinking water protected area classification.	**Low – Minor**, relatively unmodified watercourse.

Receptor	Water Quality Sensitivity	Hydromorphology Sensitivity
Unnamed Watercourse (F10)	**Medium** - Relatively small tributary of Allt an Rathain which does not have its own WFD status. Within Abhainn Deabhag surface drinking water protected area.	**Low – Minor**, relatively unmodified watercourse.
River Glass (F11)	**High** - 'Good' status WFD waterbody upstream, 'Good ecological potential' status downstream. Q95s of >1.19 and 8.614 m^3/s. Has salmon and trout.	**Low** - Classed as heavily modified waterbody.
Abhainn Deabhag (F12)	**High** - 'Good' status WFD waterbody and has surface drinking water protected area classification.	**Medium** - 'Good' hydromorphology status.
Allt an Rathain (F13)	**Medium** - Flows alongside nature reserve, tributary of Allt na Sidhean which does not have WFD status. Within Abhainn Deabhag surface drinking water protected area.	**Low** – Minor, relatively unmodified watercourse.
Various unnamed drains (F14)	**Medium** - May flow alongside nature reserve and into other watercourses. Within Abhainn Deabhag surface drinking water protected area.	**Low** - Minor, relatively unmodified watercourse.
Abhainn Deabhag Drinking Water Protected Area (surface) (F15)	**Very High** - Drinking water protected area which encompasses the entirety of the Site. Direct human receptor.	N/A

12.6.2 **Table 12-19** lists the various peat classes and their corresponding sensitivity.

Table 12-19 Sensitivity of Peat and Mining Receptors

Receptor	Soils Sensitivity
Class 1 Carbon and Peatland Habitat, in the south of the Proposed Development and in the vicinity of the proposed substation. It is also located directly adjacent to the Proposed Development to the south and southeast.	**High Sensitivity** – receptor is Class 1 Carbon and Peatland Habitat.
Class 2 Carbon and Peatland Habitat, located in the centre of the Proposed Development, beneath the proposed access track and off-site to the immediate central east.	**High Sensitivity** – receptor is Class 2 Carbon and Peatland Habitat.
Class 5 Carbon and Peatland Habitat, within the Proposed Development to the south and surrounding area to the east, surrounding the Class 1 Carbon and Peatland Habitat.	**Medium Sensitivity** – receptor is Class 5 Carbon and Peatland Habitat.
Mining & Quarrying	**Negligible Sensitivity** - Minimal sources within Proposed Development and Study Area.
Peat deposits as identified by the BGS sporadically located throughout the Proposed Development.	**Medium Sensitivity** – receptor is identified from source out with the 2016 Carbon and Peatland Map.
Peat deposits as identified by investigations undertaken for both the proposed substation and proposed access track, which don't fall into the receptors above and which are estimated to be throughout the Proposed Development.	**Medium Sensitivity –** receptor is identified from source out with the 2016 Carbon and Peatland Map.

12.6.3 **Table 12-20** lists receptors for geology and land contamination and their corresponding sensitivity within 250 m of the Site.

Table 12-20 Sensitivity of Geology and Contamination Receptors

Receptor	Sensitivity
Geology Strathglass Geological Conservation Review (GCR), approximately 238 m north of the Proposed Development.	**Very High Sensitivity** - receptor is very rare with no potential for replacement.
Contamination Human Health: • Current and future site users, i.e. visitors to site (members of the public) and substation engineers. • Future on-site construction and maintenance workers.	**High Sensitivity** - human health receptor is considered high sensitivity (area can be considered as public open space).
Contamination Surface Water - various as **Table 12-18**.	**Medium – High Sensitivity**
Contamination Groundwater - various as **Table 12-18**.	**Medium – Very High Sensitivity**

12.7 Assessment of Effects, Mitigation and Residual Effects

Project Details

12.7.1 Detailed description of the Proposed Development is provided in **Volume 1, Chapter 3 Description of the Proposed Development** of the Voluntary EA. The elements with relevance to geology, soils, the water environment and contaminated land are as follows:

- Excavation of soil / bedrock material to allow construction of the substation;
- Construction of the access track;
- Set up of temporary construction compounds;
- Construction of the substation and associated infrastructure including use of potentially contaminating materials during construction works; and
- Removal, handling / re-use and temporary storage of excavated soils/rock during earthworks.

12.7.2 The key activities relevant to geology during the operational phase of the Proposed Development are as follows:

- Storage and use of potentially contaminating materials (e.g. oils in transformers); and
- Drainage / SuDS around the proposed substation site.

Mitigation By Design (Embedded Mitigation)

12.7.3 The following section describes the mitigation and monitoring that is proposed to avoid, minimise, reduce and compensate for predicted adverse effects to acceptable levels or to ameliorate non-significant effects in accordance with good practice.

12.7.4 There is a small number of potential water quality, morphological, hydrological and drainage impacts that could occur as a result of the Proposed Development. With mitigation however, the potential impacts could be avoided, minimised and/or reduced.

Mitigation measures that have been designed into the Proposed Development and are therefore considered as 'embedded mitigation' have been taken into consideration in the assessment of the significance of effects on the water environment, geology and soils. Land contamination issues are also addressed through embedded mitigation in connection to radon.

Construction

Temporary Drainage Strategy

12.7.5 Temporary drainage at the platform area has been designed to collect and control surface water run-off during the construction phase of works. This includes conveyance ditches around the temporary laydown areas, temporary piped crossings under access tracks, and temporary settlement lagoons to remove silts and suspended solids prior to discharge.

12.7.6 The proposed settlement lagoons have been designed in accordance with CIRIA C648[82] & C649[83]. The design will provide a discharge rate for construction works for up to 1 in a 10-year return period.

Excavations

12.7.7 Earthworks will involve cut and fill groundworks at the proposed substation site to achieve a level platform. Cut slopes will likely be constructed mainly at the eastern section of the substation platform with embankments at the western section. Excavations will also be required to accommodate site drainage and water management which will involve the construction of a new SuDS pond designed to manage surface water runoff from the site area. The access tracks and underground utilities/services are also included in excavation works.

12.7.8 Excavations are likely to encounter various soils, peat and bedrock. A cut-fill exercise would be undertaken to minimise import or export of materials for the development proposals.

12.7.9 Excavations are also likely to encounter groundwater as levels in the area are relatively shallow. In this case dewatering and pumping may be required, for which a CAR license should be obtained.

Materials and Storage

12.7.10 Three laydown / stockpile areas have been designated for material storage, Additionally, Temporary Compound 5 will include a temporary storage area for excavated materials. (refer to **Volume 2, Appendix A, Figure 3-3).**

12.7.11 Materials are to be a mix of site won and locally sourced materials. Concrete will be delivered to site pre-mixed to reduce to risk of spillage. Hardcore and earthworks materials for the construction of the Site would be a combination of site won, through cutting of the existing surface to construct the platforms and locally imported materials.

[82] Civil Infrastructure Initiative (CIRIA) Control of water pollution from linear construction projects. Technical guidance (C648) 2006. [Online] Available: https://www.ciria.org/CIRIA/ProductExcerpts/C648.aspx

[83] Civil Infrastructure Initiative (CIRIA) Control of water pollution from linear construction projects. Site guide (C649), 2006. [Online] Available: https://www.ciria.org/ci/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=C649&Category=BOOK

12.7.12 All oils, lubricants or other chemicals will be stored in an appropriate secure container in a suitable storage area, with spill kits provided at the storage location and at places across the Site.

12.7.13 In order to avoid pollution impacts to watercourses / waterbodies during construction, all refuelling and servicing of vehicles and plant will be carried out in a designated area which is bunded and has an impermeable base. This will be situated at least 50 m away from any watercourse.

12.7.14 A CEMP would be produced, which will include details of pollution control measures during construction, as required by statutory authorities, and stipulating adherence to Scottish SEPA Guidance on Pollution Prevention (GPP). These are included in **Section 12.8.12**.
Land Contamination-General

12.7.15 At present ground investigation has only been undertaken within the proposed substation site to support the planning application and design. Further ground investigation should be undertaken along the proposed access track to determine ground conditions and identify any potential contamination.

12.7.16 Controls should be adopted during the earthworks to ensure any occurrences of potential contamination are identified and investigated. If visual or olfactory evidence of other potential contamination is observed during earthworks then work should stop and further advice be requested.

Land Contamination - Radon

12.7.17 Radon risks will require management via the installation of radon protection measures within occupied buildings. These measures may include measures such as the installation of a radon membrane and design of venting (see BRE publication, Radon: Guidance on protective measures for new buildings[84]).

Geology, Peat & Soils Environment

12.7.18 A Geotechnical Risk Register will be compiled for the Proposed Development which will include risks relating to the peat and any instability. The Geotechnical Risk Register should be prepared by the Designer during the design process and maintained and updated by the Principal Contractor during the construction phase. The Geotechnical Risk Register should then be maintained and updated by the owner and operator of the Proposed Development throughout its operation and into decommissioning.

12.7.19 As peat is recorded to be present within the Site and the proposed works will disrupt the peat, a Peat Management Plan (PMP) and Peat Landslide Hazard and Risk Assessment (PLHRA) will be required. A PMP and PHLRA have been produced for the purposes of the Voluntary EA and are included within Technical **Volume 3, Appendix I Peat Management Plan** and **Volume 3, Appendix J Peat Landslide Hazard Risk Assessment**, respectively. The PMP provides best practice for excavating, handling, storing, transporting and reusing the peat. The PMP further identifies how the peat will be reused and identifies peat restoration areas proposed as part of the Proposed Development to compensate the peat areas lost as a result of the works. The PLHRA provides best practice in relation to preventing peat instability. The PMP & PLHRA provided as part of this Voluntary EA will be

[84] British Research Establishment (BRE). Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects) 2023.

updated following consent being granted and provided to the relevant parties for comment and acceptance.

12.7.20 In relation to the prevention and minimising of peat disturbance the PMP provides details on the design development and how the presence of peat was an important aspect of this. Of particular note is the proposed access track leading into the proposed substation location making use of existing tracks, upgraded where required, where possible and slightly deviating from the existing alignment to suit swept path analysis. Where new access tracks are proposed, consideration to floating the track was considered, however, due to the shallow depth of peat identified was not possible.

12.7.21 Geotechnical supervision throughout the construction works by a suitably experienced and competent Geotechnical Engineer or Engineering Geologist will also be undertaken to monitor for signs of peat instability and ensure best practice and methodologies as identified within the PMP and PLHRA are followed.

12.7.22 As only peat probing has been undertaken along the proposed access track to the substation, further intrusive investigation will be undertaken by the Applicant to prove ground conditions, and the presence and characteristics of the peat present prior to its detailed design.

Other Mitigation

12.7.23 Mitigation measures will be implemented through the use of a CEMP which will cover all the receptors associated with the Proposed Development. The adoption of the applicable GEMPs prepared by the construction contractor, will reduce the probability of a pollution incident occurring and reduce the magnitude of any incident due to a combination of good site environmental management procedures, including minimising storage of soil volumes, soil management, staff training, availability of contingency equipment. Further information on the relevant GEMPs is available in **Volume 1, Chapter 3 Description of the Proposed Development**.

12.7.24 The SSEN Transmission's GEMPs (**Volume 3, Appendix S GEMPs and SpPPs**) applicable to this chapter are:

- GEMP Working In or Near Water;
- GEMP Contaminated Land;
- GEMP Watercourse Crossings;
- GEMP Private Water Supplies;
- GEMP Working with Concrete;
- GEMP Oil Storage and Refuelling;
- GEMP Waste Management;
- GEMP Soil Management;
- GEMP Working in Sensitive Habitats; and
- GEMP Bad Weather.

12.7.25 The CEMP will be submitted prior to commencement of construction activities to the SEPA and THC for approval and will form part of the contractor documents between the applicant, and the appointed construction contractor.

Operation

Permanent Drainage Design

12.7.26 A Drainage Strategy Report had been prepared for the Proposed Development by Fairhurst, on behalf of the Applicant. This report will be submitted separately as part of the planning application submission.

12.7.27 In general, the drainage strategy aims to collect and divert natural run-off and run-off from the substation platform. Then treat runoff within SuDS basins, cut-off drains and ditches. Runoff from hard standing roofs, roads and bunded areas within the substation fence line will be discharged into the proposed drainage swales following suitable treatment.

12.7.28 Two new SuDS basins and filter drains will both be used to treat runoff. The SuDS basins have been designed for up to a 1:200-year return period with the inclusion of an additional 42% climate change allowance as per SEPA recommendations.

12.7.29 The SuDS ponds have been designed according to CIRIA, The SuDS Manual (C753) to manage the surface water run-off from the proposed substation site. Both SuDS basins have been designed to a depth of 1.5 m, with a 1.2 m depth for water storage and an overall volume of 7000 m^3. SuDS basin A discharges into receptor F9 and SuDS basin B discharges into receptor F10.

12.7.30 Surface water runoff from building roofs and pumped flows from bunds will be drained into the pipework which will be sized to prevent any surface flooding during a 1 in 1000-year flooding return period.

12.7.31 A swale will be constructed at the base of the substation platform in order to collect discharge from the substation. The swale will discharge directly to the watercourse. Discharge rates have been calculated to be 130 l/s. This is the equivalent of pre-development Greenfield run-off rate.

12.7.32 Inlets and outlets to the swales and pond shall be made using pre-cast concrete.

Foul Drainage

12.7.33 Foul drains are to be 100 mm diameter and will drain by gravity to a Klargester BA Biodisc 750 package treatment plant.

Water Crossings and Realignments

12.7.34 Channel crossings and realignments have been designed to accommodate a 1 in 200-year return period, as well as additional consideration for climate change. The culvert type will be piped, as piped crossings require a headwall at the inlet and outlet it is viewed as an improvement to existing baseline conditions.

12.7.35 A tributary of Allt an Rathain has been proposed for realignment due to the realignment of the forestry track to the south of the platform. This will result in a new culvert for the watercourse under the realigned forestry track.

12.7.36 Geomorphology has been considered during the design. The channel realignments have introduced 'natural' meandering where possible.

Assessment of Construction Effects

12.7.37 The Proposed Development has the potential to cause adverse effects to geology, soils and the water environment during construction and operation phases in the absence of the embedded mitigation measures discussed above. This section presents the findings of the assessment of effects for the construction phase.

Effects on the Water Environment

12.7.38 During the construction phase there is a potential for adverse effects on the water environment from site run-off contaminated by excessive fine sediments (including potential wash out of fine sediment from temporary spoil storage, embankments, and access tracks), which may reduce the water quality, smother habitats and physically impact aquatic organisms, chemical spillages and physical changes to the form and function of water features as a consequence of:

- Vegetation clearance, topsoil / subsoil stripping and stockpiling;
- Small scale earthworks including the construction of embankments and cut slopes;
- General construction activities including runoff and activities at temporary construction compounds, the movement of other vehicles, and their maintenance and the washing out of fine sediments;
- The batching and use of concrete and other cementitious products including the washing out of plant and equipment;
- Hardstanding areas; and
- Construction of permanent and temporary access tracks.

Effects on Groundwater

Groundwater – Effects to Levels and Flow

12.7.39 Where foundation works are determined to take place, groundwater levels must be considered. Excavation to depth where the groundwater is exposed may provide direct routes for potential contaminants to leach into groundwater. Where excavations will encounter the water table, dewatering and pumping may be required. The deepest excavations to be undertaken are for the substation platform at a depth of 8.4 m bgl.

12.7.40 Due to the relatively small area of the foundations, groundwater flow and direction is unlikely to be impacted due to relatively large size of the aquifer. However, due to the shallow depth of the groundwater dewatering and pumping may be required, for which a CAR license should be obtained. With the implementation of the CEMP, impacts are likely to be negligible. Therefore, for the Northern Highlands WFD Groundwater Body and Strathglass Sand and Gravel WFD Groundwater Body there is a temporary negligible adverse impact resulting in a **minor** (not significant) effect.

Groundwater – Effects to Quality

12.7.41 There could be impacts from contaminated run-off from fuels, hydraulic fluids, solvents, paints, plant, machinery, detergents and other potentially polluting substances from the construction phase. These could wash into the areas of bare earth from vegetation removal and foundation works.

12.7.42 However, with the implementation of CEMP these impacts are likely to be negligible. Therefore, for the Northern Highlands WFD Groundwater Body and Strathglass Sand and Gravel WFD Groundwater Body there is a negligible adverse impact resulting in a **minor** (not significant) effect.

Groundwater- Effects to PWS

12.7.43 As a result of the impacts stated above in Groundwater- Effects to Levels and Flow and Groundwater - Effects to Quality, there could be impacts on PWS arising from the works. Contaminants entering groundwater may also enter PWS and have effect water quality. Changes in groundwater levels and flow may also impact supply to the PWS. However, by the adoption of measures outlined in the CEMP, impacts from both groundwater effects to quality and effects to levels and flow are expected to be negligible. There is one PWS which has been scoped in, The Fank, which is situated approximately 0.43 km downgradient from the Site at its closest point. It is proposed that regular monthly monitoring takes place at this PWS by the contractor for a minimum of six months pre-construction and during the construction period to check for any changes in either quality or levels. The testing suite should include physio-chemical parameters, major ions and anions, heavy metals, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, volatile and semi volatile organic compounds, phenol and nutrients such as phosphorus and nitrogen. This suite to be kept under review after the pre-construction stage and amended in consultation with SEPA. With the use of the CEMP and monitoring, the impact is likely to be temporary negligible adverse impact which has a **minor** (not significant) effect on this high sensitivity PWS.

Effects to Surface Water

Construction site run-off – Sediment Runoff

12.7.44 Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates. The water environment and the flora and fauna that it supports may be adversely affected by excessive fine sediment contained within construction site run-off, dewatering activities or from works directly affecting water features. Surface water runoff from the temporary compound areas, stockpiles, access tracks and mud deposited on the main road accesses to the Proposed Development are also all potential sources. Other potential sources of fine sediment contaminated water include that which is generated by the construction activities themselves (e.g. vehicle washing), debris from the use of overland conveyors to move spoil from below ground works to temporary stockpile locations, dewatering of excavations, and from works directly within water features themselves.

12.7.45 Generally, excessive fine sediment in run-off is chemically inert and affects the water environment through smothering riverbeds and plants, temporarily changing water quality (e.g. increased turbidity and reducing photosynthesis), and by causing physical and physiological adverse impacts on aquatic organisms (e.g. abrasion, irritation etc.). However, where powdered grouts and cements are used this may also contaminate site run-off if not carefully used and may result in significant changes in pH and have other toxic effects on fauna and flora (for example, cement is quite high in chromium). Sediment in run-off may also be a vector for other chemicals, with hydrocarbons known to have a high affinity to adsorb to the surface of sediment particles, although the risk of chemical

spillages is primary considered separately in the next section. In addition, sediment-laden run-off also has the potential to impact fish present in any watercourses.

12.7.46 Construction access routes will involve trackway over the ground to allow access of vehicles. Small amounts of earthworks and the construction of a drainage system will be undertaken to achieve a level area for construction. However, these impacts are likely to be temporary and are likely to have a **minor adverse** (not significant) effect.

12.7.47 Trackways will lead to compaction beneath access routes, reducing the permeability and infiltration capacity. This could see increased run-off and erosion. The same effects would be observed with foot pathways by trampling, in addition to the destruction of habitat and flora. Mitigation measures outlined within **Section 12.8.15** should be taken to address these impacts. This mitigation measures should also be included within the CEMP.

12.7.48 To allow such substances to enter a watercourse could be in breach of the Pollution 13 Prevention and Control (Scotland) Regulations 2012[85], the Environment Act 2021[86], and Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003[87], and therefore measures to control the storage, handling and disposal of such substances will need to be in place prior to and during construction.

12.7.49 **Table 12-21** outlines the impact and effects of sediment runoff to water features.

[85] Scottish Statutory Instruments (2012). Pollution Prevention & Control (Scotland) Regulations 2012.[Online]. Available: https://www.legislation.gov.uk/ssi/2012/360/contents/made

[86] Scottish Statutory Instruments (2021). Environment Act 2021. [Online]. Available: https://www.legislation.gov.uk/ukpga/2021/30/contents

[87] Scottish Statutory Instruments (2003). The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003. [Online]. Available: https://www.legislation.gov.uk/ssi/2003/531/contents/made

Table 12-21. Impact and Effects of Sediment Runoff to Water features

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
Unnamed Watercourses (F1)	NH 34965 31326	Crossing proposed access road at NH 34935 31384.	Medium	Negligible adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track and vegetation clearance. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain negligible adverse impact only.	Negligible adverse (not significant)
Kerrow Burn and tributaries (F2)	NH 34747 30961	Crossing proposed access track and earthworks (embankment slope) at NH 34747 3096.	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. One key risk area includes the earthworks associated with the Temporary Compound 5, which are located approximately 10 m from the tributary to Kerrow Burn. During period of high rainfall there could be larger amount of sediment washed into the water feature. Therefore, with standard mitigation, It is predicted to have a short term, temporary, uncertain Moderate Adverse (significant) impact	**Moderate adverse (significant)**
Allt a Chlachain (F3)	NH 34054 30370	Situated within 200 m downgradient of proposed access track.	Medium	Negligible adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track and vegetation clearance. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain negligible adverse impact only.	Negligible adverse (not significant)
Allt Bailen a h-Aibhne and tributaries (F4)	NH 32955 29082 and NH 32684 28986	Crosses the proposed access track around NH 32955 29082 and a tributary at NH 32684 28986. Both also cross earthworks (embankment slope).	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
		Proposed filling in of watercourse approximately NGR of NH 32955 29082			
Allt Currachan and tributaries (F5)	NH 32282 27645	Crosses proposed access track and earthworks (embankment slope) at NH 32282 27645	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)
Unnamed Watercourse and tributaries (F6)	NH 31933 26717	Crosses proposed access track and earthworks (embankment slope) at NH 31933 26717	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)
Allt an Fhasaich Mhoir (F7)	NH 31557 26006	Crosses proposed access track and earthworks (embankment slope) at NH 31557 26006	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)
Allt Bail a'Chladaich and tributairies (F8)	NH 31452 25195 and NH 30466 24567.	Crosses proposed access track and earthworks (embankment slope) at NH 31452 25195.	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
Allt a' Bhuachaillie and tributaries (F9)	NH 30885 25496	Drainage from the Proposed Development will be directed into this watercourse at approximately NH 30466 24567.	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance, earthworks and construction of the substation. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)
Unnamed Watercourse (F10)	NH 30224 23865	Drainage from the Proposed Development will be directed into this watercourse at approximately NH 30224 23865. 135 m from substation and earthworks (cut slope).	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance, earthworks and construction of the substation. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)
River Glass (F11)	NH 34863 31767	142 m from existing access road and 232 m from earthworks (embankment). Within red line boundary.	High	Negligible adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track and vegetation clearance. Sediment runoff could also occur from works associated to temporary compound and earthworks. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain negligible adverse impact only.	Minor adverse (not significant)
Abhainn Deabhag (F12)	NH 28827 25646	Abhainn Deabhag is not within the red line boundary. However, it is a receptor for several receptors listed above and there is a potential pathway. It is	High	Negligible adverse impact - Some sediment-runoff could indirectly wash from upgrades to the existing track or new access track, construction associated with the substation and drainage, and vegetation clearance. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain negligible adverse impact only.	Minor adverse (not significant)

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
		approximately 0.99 km from the red line boundary at its closest point.			
Allt an Rathain (F13)	NH 29857 23873	Allt an Rathain is not within the red line boundary. However, it is a receptor for F10 which flows into it at NH 29857 23873	Medium	Negligible adverse impact - Some sediment-runoff could indirectly wash from upgrades to the existing track or new access track, construction associated with the substation and drainage, and vegetation clearance. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain negligible adverse impact only.	Negligible adverse (not significant)
Various unnamed drains (F14)	NH 30378 24170	Various within the Site.	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)
Abhainn Deabhag Drinking Water Protected Area (surface) (F15)	NH 30224 23865	Within the Proposed Development	Very High	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compounds. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only. However, due to its Very High sensitivity there is a Moderate Adverse (significant) effect with reference to **Table 12-9.**	**Moderate adverse (Significant)**

Construction site run-off – spillage risk

12.7.50 During construction, fuel, hydraulic fluids, solvents, grouts, paints and detergents and other potentially polluting substances will be stored and/or used on the Site. Leaks and spillages of these substances could pollute nearby surface water features if their use is not carefully controlled and if spillages enter existing flow pathways. Like excessive fine sediment in construction site run-off, the risk is greatest where works occur close to and within water features.

12.7.51 To allow such substances to enter a watercourse could be in breach of the Pollution 13 Prevention and Control (Scotland) Regulations 2012[88], the Environment Act 2021[89], and Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003[90], and therefore measures to control the storage, handling and disposal of such substances will need to be in place prior to and during construction.

12.7.52 As with the risk from construction site run-off, the risk to the water environment is greatest where these activities occur close to and within water features. displays the impacts and effects of spillage risk to surrounding water features.

12.7.53 **Table 12-22** outlines the impacts and effects of spillage and risk to water features.

[88] Scottish Statutory Instruments (2012). Pollution Prevention & Control (Scotland) Regulations 2012. [Online]. Available: https://www.legislation.gov.uk/ssi/2012/360/contents/made

[89] Scottish Statutory Instruments (2021). Environment Act 2021. [Online]. Available: https://www.legislation.gov.uk/ukpga/2021/30/contents

[90] Scottish Statutory Instruments (2003). The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003. [Online]. Available: https://www.legislation.gov.uk/ssi/2003/531/contents/made

Table 12-22 Impacts and Effects of Spillage Risk to Water features

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
Unnamed Watercourses (F1)	NH 34965 31326	Crossing proposed access road at NH 34935 31384.	Medium	Negligible adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain negligible adverse impact is predicted.	Negligible adverse (not significant)
Kerrow Burn and tributaries (F2)	NH 34747 30961	Crossing proposed access track and earthworks (embankment slope) at NH 34747 3096.	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track. Temporary Compound 5 is situated approximately 30 m from a tributary of the Kerrow Burn. However, all COSHH and material storage will be situated in the northwest corner of the compound (over 50 m from watercourse). This is the furthest point from watercourse. Therefore, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.	Minor adverse (not significant)
Allt a Chlachain (F3)	NH 34054 30370	Situated within 200 m downgradient of proposed access track.	Medium	Negligible adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain negligible adverse impact is predicted.	Negligible adverse (not significant)
Allt Bailen a h-Aibhne and tributaries (F4)	NH 32955 29082 and NH 32684 28986	Crosses the proposed access track around NH 32955 29082 and a tributary at NH 32684 28986. Both also cross earthworks (embankment slope). Proposed filling in of watercourse approximately NGR of NH 32955 29082	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.	Minor adverse (not significant)

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
Allt Currachan and tributaries (F5)	NH 32282 27645	Crosses proposed access track and earthworks (embankment slope) at NH 32282 27645	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.	Minor adverse (not significant)
Unnamed Watercourse and tributaries (F6)	NH 31933 26717	Crosses proposed access track and earthworks (embankment slope) at NH 31933 26717	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.	Minor adverse (not significant)
Allt an Fhasaich Mhoir (F7)	NH 31557 26006	Crosses proposed access track and earthworks (embankment slope) at NH 31557 26006	Medium	Minor adverse impact - Some sediment-runoff could indirectly and directly wash from upgrades to the existing track or new access track, vegetation clearance and earthworks. Sediment runoff could also occur from works associated to temporary compound. However, this will likely only be small amounts, and with standard mitigation, is predicted to have a short term, temporary, uncertain minor adverse impact only.	Minor adverse (not significant)
Allt Bail a'Chladaich and tributaries (F8)	NH 31452 25195 and NH 30466 24567.	Crosses proposed access track and earthworks (embankment slope) at NH 31452 25195.	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.	Minor adverse (not significant)
Allt a' Bhuachaillie and tributaries (F9)	NH 30885 25496	Drainage from the Proposed Development will be directed into this water course at approximately NH 30466 24567.	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks, and vegetation clearance, and construction of the substation. However, with the implementation of good practice and	Minor adverse (not significant)

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
				standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.	
Unnamed Watercourse (F10)	NH 30224 23865	Drainage from the Proposed Development will be directed into this water course at approximately NH 30224 23865. 135 m from substation and earthworks (cut slope).	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks and vegetation clearance, and construction of the substation. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.	Minor adverse (not significant)
River Glass (F11)	NH 34863 31767	142 m from existing access road and 232 m from earthworks (embankment). Within red line boundary.	High	Negligible adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain negligible adverse impact is predicted.	Minor adverse (not significant)
Abhainn Deabhag (F12)	NH 28827 25646	Abhainn Deabhag is not within the red line boundary. However, it is a receptor for several receptors listed above and there is a potential pathway. It is approximately 0.99 km from the red line boundary at its closest point.	High	Negligible adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, substation and drainage, and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain negligible adverse impact is predicted.	Minor adverse (not significant)
Allt an Rathain (F13)	NH 29857 23873	Allt an Rathain is not within the red line boundary. However, it is a receptor for F10 which flows into it at NH 29857 23873	Medium	Negligible adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, substation and drainage, and vegetation clearance. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain negligible adverse impact is predicted.	Negligible adverse (not significant)
Various unnamed drains (F14)	NH 30378 24170	Various within the Site.	Medium	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks and vegetation clearance, and construction of the substation. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted.at.	Minor adverse (not significant)

Water Feature	NGR	Direction and Distance to the Development	Sensitivity	Impact	Effect
Abhainn Deabhag Drinking Water Protected Area (surface) (F15)	NH 30224 23865	Within the Site boundary	Very High	Minor adverse impact - Chemical spillages could occur during works to upgrade the existing track or construction of new track, earthworks and vegetation clearance, and construction of the substation. However, with the implementation of good practice and standard mitigation measures, a direct, short term, temporary, uncertain minor adverse impact is predicted. However, due to it Very High sensitivity there is a Moderate Adverse (significant) effect with reference to **Table 12-9**.	**Moderate adverse (Significant)**

Outfalls

12.7.54 During construction there is the potential for impacts on the hydromorphology of F9 and F10 from the construction of the new outfall for the drainage system. This could require intrusive works and physically impact the ditch. The size of the outfalls (700 mm diameter pipe) is relatively small, and F9 and F10 both have a low importance for hydromorphology.

12.7.55 Overall, physical works are considered to give a localised minor impact against hydromorphological sensitivity for F9 and F10. As low importance receptors this results in a **negligible** (not significant) effect.

Culverts and Crossings

12.7.56 There is potential for adverse impacts to the hydromorphology of surface water features from construction works, particularly from the upgraded and new watercourse crossings, but also from fine sediment deposition that may be introduced into the channel via surface water runoff from where the soil may become compacted due to the movement of construction vehicles. Watercourse crossings also have the potential to prevent movement of coarse sediment, which could lead to excess accumulation upstream and starvation of supply downstream that could trigger localised erosion. For the new culverts and any potential upgrades effects are likely to be permanent.

12.7.57 There is currently limited information on planned water crossings/culverts. However, according to the Flood Risk Assessment (submitted separately as part of the planning application submission) culverting will take place at the tributary of Allt an Rathain (F10) and Allt a' Bhuachaille (F9). Both of these receptors are relatively small tributaries with low hydromorphology sensitivity.

12.7.58 There is no detailed construction methods for culverting, however it is also shown in the Drainage Strategy (submitted separately as part of the planning application submission) that a pipe culvert is to be used. The Flood Risk Assessment also states that to accommodate potential impacts from the culverts on the conveyance of water within the channel, proposed culverts have been designed to convey the 1 in 200-year return period flows with an appropriate freeboard included, as per the SSE guidelines for operational areas (SSEN, SP-NET-CIV-502).

12.7.59 Watercourses visited on the site visit were noted to have a bedrock or step pool typology and very limited superficial deposits, such as in **Photo 3** and **Photo 4**. This means that there will be limited coarse, transportable material that can be eroded into the channel. The receptors also have small catchments above the crossings and so it is not anticipated that there will be excess sediment accumulation or downstream erosion. Therefore, new watercourse crossings are unlikely to significantly impact sediment transport processes. Therefore, the magnitude of impact is assessed to be minor adverse, which given the low importance of the receptors for hydromorphology, results in a **negligible** (not significant) effect.

12.7.60 There is the potential for existing culverts to be upgraded or widened, although currently there is no information on this. In this case it is anticipated that the potential impacts to the watercourse from the upgraded culverts and associated vegetation clearance would consist of small amounts of sediment run-off and the potential for spillages. This may have a temporary local negligible adverse impact, and therefore, the magnitude of effect is assessed to be **negligible adverse** (not significant).

Realignment of Tributary of Allt an Rathain

12.7.61 The tributary of Allt an Rathain (F10) has had realignment proposed to accommodate the realignment of the proposed forestry access track.

12.7.62 As a result of the realignment of F10 and associated piped crossing, impacts to sediment deposition may occur. Changes to the hydromorphology of the watercourse may lead to changes to the movement of coarse sediment, which could lead to excess accumulation upstream and starvation of supply downstream that could trigger localised erosion. Fine sediment deposition that may be introduced into the channel via surface water runoff from where the soil may become compacted due to the movement of construction vehicles.

12.7.63 During the site visit no watercourses in the area were noted to be particularly silty or sandy, indicating that there will be limited coarse, transportable material that can be eroded into the channel. Therefore, changes to the hydromorphology of F10 are not anticipated to significantly impact sediment transport processes. Therefore, the magnitude of impact is assessed to be minor adverse, which given the low importance of the receptor for hydromorphology, results in a **negligible** (not significant) effect.

12.7.64 During the design considerations for channel realignments, any activities proposed within the site that may affect the natural environment, including channels, may require a SEPA – Water Environment CAR (Scotland) application.

Filling in of Allt Bailen a h-Aibhne

12.7.65 The downstream channel of Allt Bailen a h-Aibhne (F4) is proposed to be filled in. This will be a permanent change that results in the loss of part of the attribute. Upstream this could lead to excess sediment accumulation due to changes to the water flow and result in localised erosion, further increasing sedimentation of the receptor. It is anticipated that this will result in a moderate adverse impact, which given the low importance for hydromorphology of the watercourse results in a **minor** (not significant) effect.

12.7.66 F4 is a tributary of the River Glass (F11), which may be impacted by the filling in of F4. However, the River Glass is a relatively large river with many tributaries and a low importance for hydromorphology. Therefore, the filling in of F4 on the River glass is likely to be a negligible adverse impact, which results in a **negligible** (not significant) effect.

Effects on Geology and Soils

12.7.67 During the construction phase of the Proposed Development, the works (inclusive of any site clearance or preparation works e.g. access tracks) have the potential to result in loss of soils and bedrock. Shallow soils and locally shallow bedrock will require excavation to allow construction of the Proposed Development. These activities can result in the below effects without any suitable mitigation and control measures:

- Over compaction of soils cause by the use of heavy machinery on site;
- Structural deterioration of soil materials during excavation, soil handling, storage and replacement;
- Erosion and loss of soils during soil handling, storage and replacement;
- Disturbance and loss of deposits of peat;
- Ground disturbance as a result of heavy machinery and traffic on site; and
- Ground instability.

12.7.68 Sensitivity and magnitude of impacts on geology and soils are discussed in sections below.

Effects on Superficial Geology

12.7.69 The superficial geological deposits permanently removed from excavations are traditionally considered to represent a source of construction materials for use as general fill materials for engineering works. The materials generated from the excavations will be classified into two broad groups for engineering design and construction purposes. These two groups are "acceptable" in the as-dug condition, or "unacceptable" in the as-dug condition. Unacceptable materials may be rendered into acceptable material (i.e. meets the required performance criteria and engineering properties required to satisfy engineering design standards) by treatment and modification. Alternatively, excavated materials could be suitable in an as-dug condition for use as landscape fills in environmental screening, landscape integration, environmental restoration, or minor works associated with SuDS ponds and the like.

12.7.70 Where excavated materials are considered suitable for re-use as general fill material, the excavated superficial geology deposits will provide material for the proposed Bingally Substation platform and proposed access track construction. Excavated material will only be removed off-site if there is a surplus of excavated material in excess of the volumes required to form the designed engineering works and the environmental integration works. A detailed cut/fill exercise will be carried out to assess the required volumes and the re-use suitability of excavated materials. In some design situations the ground is too weak or too compressible to adequately support the new platform, the track, and other load-bearing elements of the works. In these situations, in-situ improvement of superficial geological deposits by engineering measures may be necessary in order to avoid additional excavations of the weak ground and importation of special fill materials from commercial quarries. In these circumstances the geological resource is not removed but it is partially altered from its natural condition by these ground improvement techniques. So, the near-surface superficial geology is permanently and irreversibly impacted but the material resources are not wasted as they are put to use as construction materials. The mineral composition of the materials that are not modified by additives will remain unchanged. Any material storage area on site will be bunded so that the material is stable and unlikely to slip or slide. Material storage areas will be undertaken to avoid multiple handling of stored areas and moving of stockpiles.

12.7.71 Disturbance of superficial geological deposits will be limited to the permanent works boundaries and the construction of the contractor's temporary compounds. Careful site design will be applied to minimise compaction of superficial deposits.

12.7.72 There could be impacts on soils from contaminated run-off from fuels, hydraulic fluids, solvents, paints, plant, machinery, detergents and other potentially polluting substances from the construction phase. However, these impacts will be mitigated by installing secondary containment or bunds around the storage area.

12.7.73 In general for the construction phase of the works, the soils (excluding peat) across the Site can be described as having **low** sensitivity. In terms of the magnitude of impact on the underlying superficial deposits below the Site, any changes to the characteristics of the underlying superficial deposits are considered to be **minor adverse** due to the relatively small footprint of the Site compared with the total available scale of this common widespread resource feature. The significance of effect is considered as **negligible.**

Effects on Peat

12.7.74 Peat has been identified within the Site which will be affected by the proposed works. The peat identified ranged from Class 1 & 2 Nationally Important Peatland habitats ('**high**' sensitivity) to Class 5 peatland habitats & peat recorded through other sources e.g. BGS, probing, etc. ('**medium**' sensitivity). Peat probing within the Site at proposed infrastructure locations identified the majority of the peat deposits to be <1.0 m in depth, although localised deep deposits (>1.0 m in thickness) were also identified. The design of the Proposed Development typically looked to avoid the areas of Nationally Important peat, although where the Proposed Development does go through this is due to utilising an existing access track which is proposed to be upgraded. The design of the Proposed Development also looked to avoid areas of deep peat (>1.0 m in thickness), where technically possible. In relation to the proposed access track, an existing access track is to be used where possible and upgraded. Due to the alignment of the existing access track diversions to straighten the track are required. Areas of new access track are required to connect the A831 to the existing track, however, the length of new access track and therefore peat disturbance is limited to an extent due to partially utilising the existing track.

12.7.75 Peat instability has been assessed as part of the Voluntary EA and is included within the PLHRA in **Volume 3, Appendix J Peat Landslide Hazard Risk Assessment**. The peat instability identified as part of the PLHRA indicated generally negligible to unlikely risk of peat instability, although localised areas of likely and probable were recorded. Subject to updating the PLHRA post consent and design maturity following further information becoming available and using suitable mitigation measures as highlighted in the PLHRA, the Proposed Development should have no residual effects on peat instability.

12.7.76 Ground Investigation records available indicates the peat to be generally amorphous, although the Von Post scale of generally H4 to H5 would suggest the peat has some structure. All the peat excavated as part of the Proposed Development is to be reused within the Site, which includes peatland restoration areas. Proposals for peat management and re-use are included in the PMP contained in **Volume 3, Appendix I Peat Management Plan.**

12.7.77 Considering the above and the Embedded Mitigation for the Proposed Development, the potential magnitude of impact on the peat identified ('high' to 'medium' sensitivity) is considered to be 'minor adverse' for the area around the substation ('medium' sensitivity), due to its relative size and the works required; 'negligible' for the access track, where the Class 2 Peatland habitats are recorded ('high' sensitivity) as the works required are to a lesser extent; and negligible in relation to the Class 1 peatland habitats due to the works avoiding those areas. The significance of effect on the peat is therefore assessed as '**minor**' **(not significant)**. For extra vigilance the Class 1 and 2 Nationally Important peatlands and areas of deep peat not underlying proposed infrastructure shall be demarcated onsite and the working areas during construction controlled to minimise the chances of these areas being disturbed.

Effects on Bedrock Geology

12.7.78 Based on geological mapping and the 2024 ground investigation findings by Igne, the anticipated bedrock beneath the Site is the Tarvie Psammite Formation of psammite and semipelite. Shallow bedrock was recorded in a number of the ground investigation exploratory holes and it is anticipated that excavation of bedrock will be necessary as part of the earthworks. It is anticipated that excavation of the bedrock will be undertaken using conventional earthworks toothed buckets and rippers, particularly where weathered rock is present.

12.7.79 There are no recorded geological sensitive sites including SSSIs, SAC's etc. within or close to the Site. There is a GCR site (Strathglass) at approximately 240 m north of the Site. However, due to the distance from the Site, the GCR is unlikely to be impacted from the works and is therefore not considered further.

12.7.80 The sensitivity of the bedrock geology is considered as low. In terms of magnitude of impact at any cutting locations identified above, where bedrock would be exposed, features of geological interest may be present. The development impacts in this regard may be considered **minor (beneficial)**, depending upon what is exposed. Outwith the cutting features identified above, the removal of bedrock can be considered **minor (adverse).** The significance of effect is considered as **negligible.**

Effects on Mineral Resources

12.7.81 No mining or mineral resources of significance have been identified within the Site. The magnitude of effect on the superficial or bedrock geology which may be of use as aggregate, as a result of the construction activities and the Site is considered to be **negligible** as the reduction in extent of these deposits will be minimal considering their widespread occurrence.

12.7.82 Although historic and now ceased quarries and pits have been identified within the Site, the works generally do not remove the quarry or pit and as such, these could be reopened in the future if considered required. The quarries and pits identified all typically extracted similar minerals and therefore where an existing quarry is obscured as a result of the works, a different quarry could be explored/used instead. As such, the magnitude of effect of the existing quarries and pits is considered to be **negligible**.

12.7.83 The mineral resources within the Site and Study Area were considered to have a **negligible** sensitivity. Given the above and the assessed sensitivity the significance of effect is considered as **negligible**.

Effects on Land Contamination

12.7.84 During the construction phase, excavations and earthworks have the potential to disturb contaminated materials and create new pathways which may allow pollutant linkages to develop. However, based on the site history, the walkover and 2024 Igne ground investigation findings, it is unlikely that potential contamination will be an issue during the construction works. The CSM and risk assessment included in the **Geotechnical and Geo-environmental Desk Study** show the majority of potential risks assessed as low or very low (with the exception of radon which has been addressed under embedded mitigation). No visual or olfactory evidence of contamination was noted during the ground investigation.

12.7.85 The baseline sensitivity of human health receptors is considered high as the area can be considered as public open space. Also, construction workers may be directly exposed to potential contaminants in soil and groundwater (if present). The sensitivity of surface waters and groundwater are considered medium to very high. As potential contamination has not been identified within or close to the Site, the magnitude of impact is assessed as no change**.** Hence, the significance of effect is considered as **neutral**.

Assessment of Operational Phase

12.7.86 This section presents the findings of the assessment for the operational phase. Due to the nature of the Proposed Development, operational residues and emissions are very limited. Minimal operational emissions are expected to soil or water (with the exceptions of small

amounts of foul drainage from welfare facilities). Waste would be limited to that generated from maintenance activities and staff welfare facilities.

12.7.87 During operation, oil filled super grid transformers will be bunded and have adequate containment to prevent release of oils into the surface water drainage system, soil, or underlying geology and aquifers. Oil-water interceptors will be used to mitigate for potentially oily drainage.

Water Environment

12.7.88 During the operational phase there is a potential for adverse effects on the water environment from site run-off contaminated by excessive fine sediments (including potential wash out of fine sediment), which may reduce the water quality, smother habitats and physically impact aquatic organisms, chemical spillages and physical changes to the form and function of water features as a consequence of:

- Access roads; and
- Drainage systems (both overland flows and direct discharge into existing watercourses).

Effects on Surface Water

12.7.89 There is a low risk that small quantities of oil or fuel may be spilled from service vehicles and the routine maintenance of fixed plant. This risk would apply permanently and for the long term during the operation of the Proposed Development, but any impact would be more temporary, short term and unlikely to occur.

12.7.90 Oil filled super grid 400 / 132 kV transformers will be bunded and have adequate containment to prevent release of oils into the surface water drainage system, soil or underlying geology. Therefore, there is very little opportunity for accidental spillages.

12.7.91 The Drainage Strategy Report[91] has applied the SuDS Manual's Simple Index Approach to demonstrate the suitability of the proposed SuDS treatment train for surface water runoff and spillages. Both the roads and the substations have been selected to have a low hazard level. Then using SuDS Basins and filter drains (see **Section 12.7.5**) will allow for 'sufficient' treatment.

12.7.92 Therefore, it is likely that there will be a negligible impact on all surface water receptors, resulting in a **negligible** (not significant) for low and medium sensitivity receptors and **minor** (not significant) to high sensitivity receptors.

Effects On Groundwater

12.7.93 The change in distribution of groundwater recharge locally is expected to be negligible in terms of its effect on water abstraction and baseflow to rivers. During operation there is likely a negligible adverse impact on the high importance receptors, resulting in a **minor** (not significant) effect.

Effects of Hydromorphology

<u>Outfalls</u>

12.7.94 There is the potential for impacts on Allt a' Bhuachaillie and tributaries (F9) and Unnamed Watercourse (F10) due to the new outfall for drainage. The size of the outfalls (700 mm

[91] Drainage Strategy Report: Subtation Platform: **BING4-LT521-SEBAM-DRAI-ZZ-RPT-C-0001**

diameter pipe) is relatively small, and F9 and F10 both have a low importance for hydromorphology.

12.7.95 Overall, physical works are considered to give a localised minor impact against hydromorphological sensitivity for F9 and F10. As low importance receptors this results in a **negligible** (not significant) effect.

Geology and Soils

Superficial Geology

12.7.96 Superficial deposits will be temporarily exposed within excavations within the Proposed Development, either above rock exposures or as superficial deposits alone. Hard cover or landscaping will be placed over superficial deposits within the proposed substation site. Cuttings along the proposed track upgrade sections will expose superficial deposits with vegetation cover likely to be encouraged on exposed slopes. Soils are also likely to be temporarily exposed to allow construction of the compound laydown areas. The exposed superficial deposits are likely to be covered relatively soon after construction.

12.7.97 For the operational phase of the works the superficial deposits across the site can be described as having **low** sensitivity. In terms of the magnitude of impact on the underlying superficial deposits, any changes to the characteristics of the underlying superficial deposits are considered to be **negligible** due to the relatively small footprint of the Proposed Development compared with the total available scale of this common widespread resource feature. The significance of effect is considered as **negligible.**

Peat

12.7.98 Once the Proposed Development has been constructed, it is not expected that the peat or carbon rich soils will be impacted. There is a risk of a peat landslide within the operational phase, although the mitigation considered in the construction phase should take cognisance of this and reduce the likelihood and impacts on the operational phase. As such, the magnitude of impact during the operation phase is therefore expected to be **negligible**.

Bedrock Geology

12.7.99 There are no long-term impacts considered on the integrity of the bedrock geology, hence the sensitivity for this is low. The magnitude of impact during the operation phase on the characteristics of the bedrock geology are considered negligible, as permanent removal or changes made to bedrock are considered to be limited in extent. The significance of effect is considered as **negligible**.

Mining and Mineral Resources

12.7.100 The operational phase of the Proposed Development is not expected to impact on the mining and mineral resources, and as such have been assessed with a significance of effect as **negligible**.

Land Contamination

12.7.101 Once the substation and track have been constructed, the majority of potential pollutant linkages will be broken by the road construction acting as a barrier to infiltration of any potential contaminants. Contaminated materials should be removed if encountered during the construction works. There is also potential for accidental leakages of fuels, liquids and

stored oils during the operations phase. Accidental spillages measures should be included within the preparation of a protocol for oil and fuel storage and operations on site. Secondary containment or bunds should be incorporated in the design for all fuel storage areas. As the presence of contamination is unlikely to impact the operation of the Proposed Development, the magnitude of impact is assessed as **no change**.

12.8 Cumulative Effects

12.8.1 The assessment of likely cumulative effects is based on developments identified in the surrounding area. Cumulative developments identified are those that are reasonably foreseeable - i.e. in the public domain e.g. at scoping stage or has been consented but not yet under construction / constructed at the point of writing the assessment / at submission.

12.8.2 Inter-relationship cumulative effects have been assessed qualitatively where committed development is proposed that could have cumulative effects with water features that may be affected by the Development, either during construction or operation phases.

12.8.3 The intra-relationship cumulative effects assesses where a single receptor is affected by multiple aspects of a project, which can lead to potential worsening of effects on the receptor. This includes where sources different components of the project are combined to be of greater significance than when considered individually.

12.8.4 **Table 12-23** below lists all the committed developments in the wider area around the Site of the Proposed Development that have been considered by this Voluntary EA.

Table 12-23. List of Developments and Potential Cumulative Impacts

Development	Planning Reference and Description	Potential for Cumulative Impact
Intra Cumulative Effects		
Proposed Bingally OHL Immediately adjacent to the existing Beauly – Denny OHL, approximately 2.2 km south of Tomich and 5.4 km south of the existing Fasnakyle Substation Overlaps the southern extent of the Site	09 August 2024 – Does not constitute EIA development ECU Reference: ECU00005145 The installation of two new towers (including a temporary diversion requiring two temporary towers) to facilitate the tie-in of the existing Beauly-Denny overhead line into the proposed Bingally 400 kV substation.	Cumulative impacts associated with the construction and operation phase of the development due to their proximity to each other / interface. This development would occur simultaneously and within the Site.
Proposed Bingally to Fasnakyle UGC / OHL connection Between the Proposed Development and the existing Fasnakyle Substation Connects to the Proposed Development	Not in the planning system The installation of an UGC / OHL to connect the Proposed Development to the existing Fasnakyle Substation.	Cumulative impacts associated with the construction and operation phase of the development due to their proximity to each other / interface. This development would occur simultaneously and within the Site.
Proposed Tomchrasky Wind Farm OHL connection Between the proposed Tomchrasky wind farm and the Proposed Development	Not in the planning system The installation of an OHL connection from Tomchrasky Wind Farm to the Proposed Development.	Cumulative impacts associated with the construction and operation phase of the development due to their proximity to each other /

Development	Planning Reference and Description	Potential for Cumulative Impact
Connects to the Proposed Development		interface. This development would occur simultaneously and within the Site.
Inter Cumulative Effects		
Fiodhag Wind Farm Land 2.5 km east of Tomich and 12 km northwest of Fort Augustus Overlaps the southeastern extent of the Site	Scoping Report submitted 11 November 2019 ECU Reference: ECU00001969 Construction and operation of a wind farm comprising up to 46 turbines with a maximum blade tip height of 149.9 m and a combined installed capacity of between 180-280 MW	Cumulative impacts associated with the construction and operation phase of the development due to their proximity to each other / interface. This development would occur within the Site.
Fasnakyle Energy Storage Land 150 m East of Tigh Na Bradhan Fasnakyle Cannich Approximately 500 m west of the Site	Under consideration, EIA not required. THC Reference: 23/04100/FUL Erection and operation of a BESS and associated infrastructure	Cumulative impacts associated with the construction and operation phase of the development due to their relative proximity to each other.
Kerrow Farm BESS Land 250 m east of Fasnakyle Power Station, Fasnakyle Cannich Approximately 580 m west of the Site	EIA not required 16 March 2023 THC Reference: 23/01025/SCRE Erection and operation of a BESS, multiple containerised storage units, associated infrastructure, control building, switch room, lights and associated works	Cumulative impacts associated with the construction and operation phase of the development due to their relative proximity to each other.
Chrathaich Wind Farm Land 3615M NW Of Burnside Bhlaraidh Glenmoriston 3 km east of the Site	EIAR submitted 11 July 2023 ECU reference: ECU00004704 Erection and operation of a wind farm for a period of 30 years, comprising of 14 wind turbines with a maximum blade tip height of 149.9m, access tracks, borrow pits, substation, control building, and ancillary infrastructure.	No due to distance.
Erection of OHL Land 140 m SW of Dog Falls, Glen Affric, Cannich 3.7 km west of the Site	Consented, EIA not required ECU Reference: ECU00004569 (original application: ECU00004792) Erection of small two span spur and free standing pole for communications mast on the 33 kVA OHL by Benevean Dam, Tomich	No due to distance.
Cnoc Farasd Wind Farm Land 2 km northeast of The Lodge, Buntait, Glenurquhart, Drumnadrochit	Scoping Report submitted ECU Reference: ECU00005214 A wind farm consisting of 9 turbines up to 220m tip height, battery	No due to distance.

Development	Planning Reference and Description	Potential for Cumulative Impact
4 km east of the Site	storage and associated infrastructure.	

12.8.5 Providing all developments adopt and implement best practice mitigation measures, the risk of significant cumulative effects can be reduced and minimised through standard best practices, to an extent to which they can no longer be considered significant.

12.8.6 For the installation of the two towers and temporary diversions to facilitate the tie-in of the existing Beauly-Denny overhead line into the proposed Bingally 400 kV Substation, which is under a separate planning application but being constructed simultaneously, the combination of this and Proposed Development may result in a greater disturbance of the peat deposits. This is not thought to be significant given the proposed works associated with the overhead lines is significantly smaller than that of the Proposed Development. However, to mitigate against any cumulative effects and greater disturbance to the peat as a result of both developments, a combined PMP and PLHRA has been undertaken to cover both schemes.

Standard Mitigation

12.8.7 The mitigation listed in this section will be implemented in accordance with the CEMP and Water Management Plan (WMP), and reflect any conditions imposed by SEPA or other statutory consultees through the consenting and future CAR application processes.

Control of water environment risks

12.8.8 A CEMP referring to a range of standard mitigation measures will be prepared and implemented by the Contractor as necessary to protect the water environment from pollution and physical impacts during construction works.

12.8.9 Pollution prevention mitigation measures that accord with legal compliance and good practice guidance are to be implemented to:

- Control and minimise the risk of pollution to surface waters and groundwater by managing construction site runoff and the risk of chemical spillages;
- Control the storage, handling and disposal of potentially polluting substances during construction;
- Manage water removed from excavations to ensure to protect nearby water features from any pollution risk but also to support flows if there is a risk of reductions to baseflow;
- If necessary, provide compensatory discharges to surface water features or GWDTEs that are groundwater fed to minimise impacts on the water level and flows to these receptors and any third-party users; and
- Avoid and minimise the risk of damage to physical form and processes of water features.

Secondary consents

12.8.10 The construction of the Proposed Development will be undertaken in accordance with good practice as detailed below. It is assumed that all temporary works will be carried out under the necessary consents/permits (e.g. CAR licences as required under the Water

Environment (Controlled Activities) Regulations 2011[92], and that the contractor will comply with any conditions imposed by any relevant permission. It is assumed that that the contractor will ensure all permits / consents in place for works in, or near watercourses.

Standard good practice

12.8.11 There are many ways in which construction pollution risks to the water environment can be dealt with. All works to be undertaken in line with the CEMP for the Proposed Development, which shall be developed in the design phase and refined for the consented project in advance of and during construction. Central to this will be a programme of water quality monitoring (described later under 'Additional Mitigation) and the implementation of a temporary drainage system. The temporary drainage system will be prepared in accordance with good practice guidance. There will be no direct discharges to groundwater or surface waters without appropriate treatment (where required to meet consent standards); the Contractor will ensure that there is adequate space to ensure that appropriate drainage control measures can be implemented for the duration of the construction works; and all secondary consents will be complied with. Further details are provided in the following sections.

12.8.12 The design is to follow best practise outlined by the construction environmental management plan. The Guidance of Pollution Prevention (GPP) on the NetRegs website[93] cover a number of environmental issues relating to construction including:

- GPP 4: treatment and disposal of wastewater where there is no connection to the public sewer;
- GPP 5: works and maintenance in or near water;
- GPP 8: safe storage and disposal of used oils;
- GPP 20: dewatering underground ducts and chambers;
- GPP21: pollution incident response planning; and
- GPP22: dealing with spills.

12.8.13 The CEMP for the Proposed Development should include details and consideration of the peat deposits and peatland habitats identified within the area. A site specific PMP has been produced for the Proposed Development and the CEMP should make reference to this document as it relates to managing the peat deposits throughout the construction period.

Mitigation - Management of groundwater Activities

12.8.14 As a minimum the Principal Contractor will adhere to the following mitigation measures:

- A Development of groundwater control would be implemented to ensure water levels in adjacent water features are maintained and any discharge is of a suitable quality.
- A programme of water monitoring of the dewatering discharges.
- If discharging water to a nearby watercourse, the rate of discharge will need to be agreed with the relevant authority to ensure that there is no unacceptable increase in flood risk or risk of scour. Any discharge will need to be undertaken with the agreement of the relevant statutory regulator and will need to comply with the pollution prevention requirements set out in the future CEMP.

[92] GOV.UK. Controlled water activities (CAR) consents (Scotland) [Online]. Available: https://www.gov.uk/find-licences/controlled-water-activities-car-consents-scotland#:~:text=Apply%20for%20this%20licence&text=Protection%20Agency%20website-,You%20must%20be%20authorised%20by%20the%20Scottish%20Environment%20Protection%20Agency,impact%20on%20the%20water%20environment.

[93] NetRegs. Guidance for Pollution Prevention (GPP) documents. [Online]. Available: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/

- Managing the risk from groundwater flooding through appropriate working practices (during excavations) and with adequate plans and equipment in place for de-watering to ensure safe dry working environments.

Mitigation of Sediment Runoff

12.8.15 Mitigation measures to management run-off are detailed in the WMP and are therefore not repeated here in detail. Below is a summary of measures:

- Avoidance of wet weather working where practical, especially site clearance, earthworks and works to water features;
- Appropriate separate storage of topsoil/subsoil and materials, and at least 20 m from water features on flat ground;
- Any earth bund / stockpile to be present for longer than two weeks will be either seeded, covered using geotextiles, or other pressures provided to ensure it is not a source of excessive fine sediment in runoff to water features;
- The implementation of a temporary drainage system and other measures to manage pollution risk during construction (e.g., fabric silt fences, lagoons, bunds, straw bales, sandbags, lamella clarifiers or other proprietary measures as may be required) etc.;
- Any dewatering of excavations will include measures where necessary to filter the water prior to discharge to a watercourse or ground (there shall be no discharge of any construction site runoff to existing ponds); and
- The control of mud deposits at entry and exits to the Site using wheel washing facilities and / or road sweepers operating during earthworks or other times as considered necessary.

12.8.16 Construction works directly affecting water features will require careful management and the implementation of stringent working practices and mitigation.

12.8.17 Any works in the channels of smaller watercourses will be undertaken in a dry working environment, where possible, with flow temporarily over-pumped or flumed or isolated from the working area using sand / pea gravel bags or other similar and inert barrier.

Mitigation of Spillage Risk

12.8.18 To prevent chemicals, fuels / oils and other such substances from entering the water environment, measures to control the storage, handling and disposal of these substances would be put in place prior to and during construction. The CEMP and WMP provide detailed information relating to the control of spillages and leaks, and these are not repeated here. However, in summary they include:

- Spill kits will be available on the site in watertight containers (e.g. works near watercourses) and carried on all mobile plant. They would be regularly checked and topped up, especially after use. Appropriate training would be given to all construction workers in their use;
- Storage of fuel and chemicals would be in accordance with GPP 8: Safe storage and disposal of used oils;
- Surface water drains on local roads or within the Site compound area will be identified by the Contractor and where there is a risk that fine particulates or spillages could enter them, they would be protected (e.g. covers or sandbags);
- Any containers / tanks of contaminating substances (e.g. fuel) onsite would be leak-proof and kept in a safe and secure building or compound from which they cannot leak, spill or be open to vandalism. The containers would be protected by temporary impermeable bunds (or drip trays for small containers) with a capacity of 110% of the

maximum stored volume. Areas for transfer of contaminating substances (including refuelling areas) would be similarly protected;

- Any permanent oil storage tanks and temporary storage of 201 litres or more of oil in drums and mobile bowsers, and ancillary pipe work, valve, filters, sight gauges and equipment requiring secondary containment, e.g. bunding or drip trays;
- No oil would be stored within 20 m of a watercourse and potentially further if ground is angled towards a water body except for fixed / large plant associated with the construction of new bridges / culverts or hand tools;
- Where possible re-fuelling will be undertaken in designated areas within main compounds or satellite compounds. It is possible that refuelling of mobile plant may be required by mobile fuel bowser. This will not be undertaken within 20 m of a water feature, and only on flat land (or otherwise a greater distance and other measures may be required subject to an on-site risk assessment) and with a drip tray/plant nappy. Certain semi-mobile very large plant (e.g. crane) may need to be located close to watercourses and potentially within 20 m. Due to the difficulties in moving plant such as this they may need to be refuelled in situ. Again, a site-specific risk assessment will need to be undertaken by the Contractor;
- Biodegradable hydraulic oils would be used where possible in all plant and only in equipment working in or over watercourses;
- Any plant, machinery or vehicles would be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place off site if possible or only at designated areas in the site compound;
- All fixed plant used on the Site to be self-bunded;
- Mobile plant to be in good working order, kept clean and fitted with plant 'nappies' at all times;
- An Emergency Response Plan or similar titled plan would be prepared and included in the CEMP;
- Spill kits and oil absorbent material to be carried by mobile plant and located at high-risk locations across the Site and regularly topped up;
- All construction workers would receive spill response training;
- Construction waste / debris are to be prevented from entering any surface water drainage or water feature; and

12.8.19 Any site welfare facilities would be appropriately managed, and all foul waste disposed of by an appropriate contractor to a suitably licensed facility. The main compound will have accommodation and welfare facilities. It is expected that a suitably sized storage tank will be provided that would be periodically pumped out by a specialist contractor so that the water could be disposed of at a suitably licensed waste facility.

12.8.20 There may be localised lowering / control of groundwater required to enable the construction of the shafts and tunnel.

12.8.21 To minimise the impact of any groundwater control activities during construction on the water receptors, a Construction Groundwater Control Strategy will need to be prepared by the Contractor at the detailed design stage. Furthermore, best practice mitigation measures will be followed to avoid and or minimise impact on groundwater and will be included in the Final CEMP. The mitigation measures will be informed by the findings from the ground investigation which will provide information of site-specific ground conditions, including groundwater quality and quantity data.

Additional Mitigation

Water Quality and Flow Monitoring

12.8.22 A Water Quality and Flow Monitoring Plan and subsequent delivery of that monitoring is proposed for any works directly to a water body should be monitored before, during and after construction.

12.8.23 A water quality monitoring programme could ensure that mitigation measures are operating as planned and managing the risk of water pollution. The purpose of the monitoring programme will also be to ensure that should pollution occur it is identified as quickly as possible and appropriate action is taken in line with the Emergency Response Plan. To support the construction phase monitoring, a pre-construction baseline will need to be determined.

12.8.24 The water quality monitoring programme will be developed by the Principal Contractor in consultation with SEPA and other relevant stakeholders during the process of obtaining CAR licences for works affecting, or for temporary discharges to, the water features and watercourses in and around the Development. Water quality monitoring will be required of all potentially affected water features and may include daily visual and olfactory observations or after heavy or prolonged rainfall, in situ monitoring using a calibrated hand-held probe, and potentially grab samples on a regular or ad hoc basis for analysis at an accredited laboratory.

12.8.25 A key water feature which will require monitoring is Kerrow Burn (F2). Due to the close proximity between the water features and the earthworks for Temporary Compound 5 (10 m), there is potential sediment-laden runoff to enter the watercourse. Specifically, turbidity should be monitored downstream of the earthworks and specified within a Water Quality and Flow Monitoring Plan. Similarly, F10, F12 and F13 will directly and indirectly receive drainage water from the proposed Bingally substation. F2, F10, F12 and F13 should be at a minimum included in any monitoring plans. However, the monitoring plan does not need to be limited to these features. Should turbidity be recorded downstream of the Site, an emergency response plan should be implemented.

12.8.26 To ensure that monitoring during construction is effective it will be necessary to carry out pre-construction monitoring. There is no guidance on how long or frequent this should be, but it is recommended that as a minimum there are six to twelve monthly visits taking in a range of flow and weather conditions. The scope of pre-construction water quality monitoring, and monitoring during construction will be set out in the Water Quality and Flow Monitoring Plan, pursuant to a pre-commencement planning condition.

12.9 Residual Effects

12.9.1 All identified impacts are described after standard and embedded mitigation as negligible adverse or minor adverse (not significant).

12.9.2 It is expected that there will be minimal impacts from the operation of the substation due to the nature of the Proposed Development, limited residual effects of construction and operation and emissions.

12.9.3 **Table 12-24** presents a summary of the residual effects of the construction and operation of the Proposed Development on the water quality and hydromorphology of surface and groundwater bodies.

12.9.4 By applying effective working practices and the construction mitigation measures mentioned above, the potential impacts on geology, soils, the water environment and land contamination are considered to be not significant. No additional mitigation measures required outside of the Proposed Development design, the embedded and additional mitigations measures proposed and discussed in this chapter of the Voluntary EA.

Table 12-24. Summary of Residual Effects

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Northern Highlands WFD Groundwater Body	Water Quality- Run-off	Minor	Implementation of CEMP and WMP	Minor	Not Significant
	Levels and Flow- Foundations	Minor	Implementation of CEMP and WMP	Minor	Not Significant
Strathglass Sand and Gravel WFD Groundwater Body	Water Quality- Run-off	Minor	Implementation of CEMP and WMP	Minor	Not Significant
	Levels and Flow- Foundations	Minor	Implementation of CEMP and WMP	Minor	Not Significant
Private Water Supplies	Water Quality- Run-off	Minor	Implementation of CEMP and WMP Monitoring before, during and after construction	Minor	Not Significant
	Levels and Flow- Foundations	Minor	Implementation of CEMP and WMP Monitoring before, during and after construction	Minor	Not Significant
Unnamed Watercourses (F1)	Water Quality - Sediment Laden Run-off	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Kerrow Burn and tributaries (F2)	Water Quality - Sediment Laden Run-off	Moderate	Implementation of CEMP, WMP and embedded mitigation. Water Quality Monitoring will also be implemented.	Minor	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Allt a Chlachain (F3)	Water Quality - Sediment Laden Run-off	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Allt Bailen a h-Aibhne and tributaries (F4)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Hydromorphology – Filling in of downstream channel	Minor	Implementation of CEMP, WMP and embedded mitigation	Minor	Not Significant
Allt Currachan and tributaries (F5)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Unnamed Watercourse and tributaries (F6)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Allt an Fhasaich Mhoir (F7)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Allt Bail a'Chladaich and tributairies (F8)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Hydromorphology - culverts	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Allt a' Bhuachaillie and tributaries (F9)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Minor	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
	Water Quality- SuDS	Minor	Implementation of CEMP, WMP and embedded mitigation	Minor	Not Significant
	Hydromorphology - SuDS	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Hydromorphology - culverts	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Unnamed Watercourse (F10)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality- SuDS	Minor	Implementation of CEMP, WMP and embedded mitigation	Minor	Not Significant
	Hydromorphology - SuDS	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Hydromorphology - culverts	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Hydromorphology - Realignment	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
River Glass (F11)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Abhainn Deabhag (F12)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Allt an Rathain (F13)	Water Quality - Sediment Laden Run-off	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Hydromorphology - Culverts	Negligible	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Various unnamed drains (F14)	Water Quality - Sediment Laden Run-off	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
	Water Quality - Spillage Risk	Minor	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Abhainn Deabhag Drinking Water Protected Area (surface) (F15)	Water Quality - Sediment Laden Run-off	Moderate	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not significant
	Water Quality - Spillage Risk	Moderate	Implementation of CEMP, WMP and embedded mitigation	Negligible	Not Significant
Geology (Superficial and Bedrock)	- Over compaction of soils cause by the use of heavy machinery on site; - Structural deterioration of soil materials during excavation, soil handling, storage and replacement; - Erosion and loss of soils during soil handling, storage and replacement; - Disturbance and loss of deposits of peat; - Leakages from fuel and chemical storage areas in the Proposed Development; - Ground disturbance as a result of heavy machinery and traffic on site; - Ground instability; and - Inhalation of dust and dermal contact with soils of workers and the public.	Negligible	Implementation of CEMP and embedded mitigation	Negligible	Not Significant
Peat		Minor to negligible	Implementation of CEMP and embedded mitigation	Minor to negligible	Not Significant

Receptor	Description of Effect	Effect	Additional Mitigation	Residual Effects	Significance
Land Contamination	Excavations and earthworks	No change	Implementation of CEMP and embedded mitigation	Negligible	Not significant
Mining and Quarrying	- Sealing of resource. - Loss of resource.	Negligible	Implementation of CEMP and embedded mitigation	Negligible	Not significant