Bingally 400 kV Overhead Line Tie-In

Geotechnical and Geo-environmental Desk Study

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		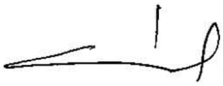	
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Revision History

Revision	Revision date	Details	Name	Position
0	September 2024	Original	Ryan Blair	Senior Planner
1	December 2024	Closure of client comments	Ryan Blair	Senior Planner
2	April 2025	Final	Ryan Blair	Senior Planner

Prepared for:

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The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between 06 May and 04 September 2024 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of change in any matter affecting the Report, which may come or be brought to AECOM’s attention after the date of the Report.

The Site walkover conducted of areas accessible to public on 10 May 2024 consisted of a general inspection of the Study Area aimed at identifying any obvious signs and potential sources of ground contamination affecting the Proposed Development areas. An environmental compliance audit and/ or detailed structural inspection of existing buildings were out with the scope of this report. Similarly, the site visit excluded detailed consideration of the ecological or archaeological aspects of the Site, and if such are believed to be of potential significance then it is recommended that specialist advice is sought.

Any risks identified in this Report are perceived risks, based on the information reviewed during the desk study and therefore partially based on conjecture from available information. The study is limited by the non-intrusive nature of the work and actual risks can only be assessed following a physical investigation of the Site. The opinions expressed in this report and the comments and recommendations given are based on a desk-based assessment of readily available information and an initial site reconnaissance by an AECOM Engineer.

Unless otherwise stated in this Report, as a formalised development plan or finalised development option was not available at the time of writing, the assessments made cover the wider development boundary.

Reference to historical Ordnance Survey (OS) maps and/or data provides invaluable information regarding the land use history of a site. However, it should be noted that historical evidence will be incomplete for the period pre-dating the first edition and between the release of successive maps and/or data.

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Tables

1 Introduction

1.1 Commission

Scottish Hydro Electric Transmission known as Scottish & Southern Electricity Networks (SSEN Transmission) ("the Client") commissioned AECOM Limited ("AECOM") to undertake a Geotechnical and Geo-environmental Desk Study for the construction of the proposed Bingally 400 / 132 kV substation, in proximity to the existing Fasnakyle Substation, and an overhead line (OHL) tie in to the existing Beauly-Denny OHL.

This report is specifically for the OHL (referred to hereafter as "Proposed Development"), as summarised below in **Section 1.2**. The desk study findings for the proposed Bingally substation and access track are discussed in a separate AECOM report titled, Bingally 400 kV Substation. Geotechnical and Geo-environmental Desk Study (AECOM 60701792-R-001 August 2024).

The proposed OHL tie-in forms part of the Ofgem Accelerated Strategic Transmission Investment (ASTI) project for the upgrade of the 2nd Beauly – Denny 275 kV circuit to 400 kV. This project, alongside several other major network upgrades in the north of Scotland, is planned to meet the UK and Scottish Government energy targets.

The Geotechnical and Geo-environmental Desk Study is required to characterise potential land quality constraints / opportunities to provide baseline data to satisfy planning conditions, provide input into the Environmental Appraisal (EA) and support for a Section 37 Application. The Site location and boundary plans are included in **Appendix A**.

1.2 Proposed Development and Planning Status

A planning application for the permission for the Proposed Development has not been submitted at the time of writing.

It is understood from the Client that the Proposed Development would comprise the following:

OHL Development

- Two new permanent towers (Tower 79R and Tower 78R) reaching a maximum height above ground level of 64 m, located along the existing Beauly – Denny OHL to make the connection into and out of the proposed Bingally substation, along the north / northwestern boundary of the proposed Bingally substation (**Figure 1a, Appendix A**). These towers would replace the existing Tower 78 and Tower 79, which would be dismantled as part of these works;
- Tower 78R would be the terminal tower with downleads connecting to two OHL gantries within the proposed Bingally substation;
- Short-term temporary OHL diversion during construction comprising two temporary towers (Tower 79T and Tower 78T) up to a maximum height of approximately 61 m. (**Figure 1b, Appendix A**);
- Temporary works areas – includes an 80 x 80 m tower working area for tension towers and 60 x 60 m tower working area for suspension towers at permanent and temporary tower positions;
- Temporary access track spurs and new permanent stone access (branching off the proposed Bingally substation access track) to facilitate the construction and maintenance of the OHL; and
- Following connection to the proposed Bingally substation, dismantling and removal of two redundant towers (Tower 79T and Tower 78T), and the two redundant existing towers (Tower 78 and Tower 79) (**Figure 1b, Appendix A**).

Construction Compounds

Temporary working areas are required to enable the construction of the permanent works. These areas would be installed to provide a safe and secure foundation for items of plant to work from.

Hardstandings for tower erection would need to support items of plant which would require an area of crushed stone laid on geotextile membrane.

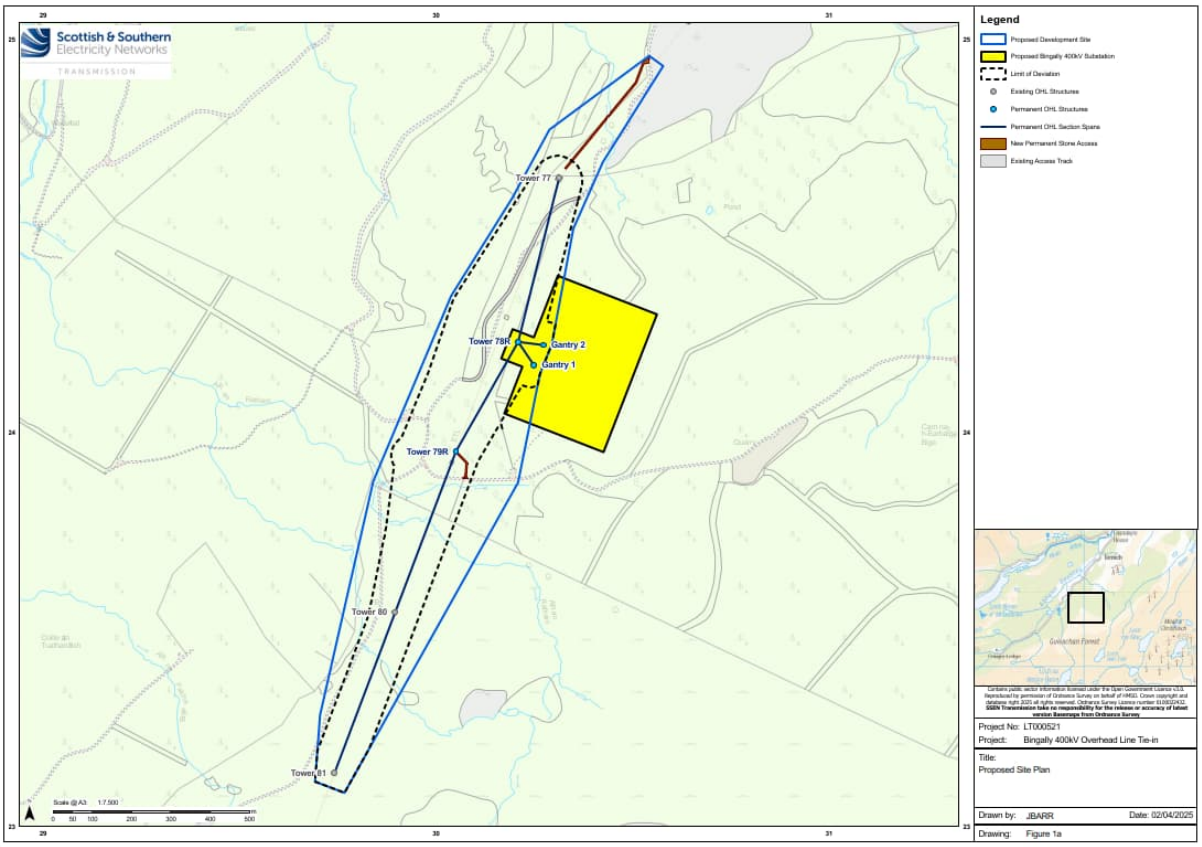
To facilitate construction works, it is currently anticipated that an 80 x 80 m working area is required at permanent and temporary tension (angled) tower sites (Tower 78T, Tower 78R, and Tower 79R / Tower 79 combined) and a 60 x 60 m working area would be required at suspension (non-angled) existing and temporary tower sites (Tower 77, Tower 78, Tower 80, Tower 81) as well as Tower 79T due to space restrictions.

An additional area remote from the OHL for offices, material storage and parking would also be required. It is assumed that an area of 0.4 hectares (ha) would be sufficient.

Equipotential Zones (EPZs) would be implemented during construction. These are work zones required to protect workers from electric shock caused by differences in the electric potential between objects in the work area. These EPZs would be constructed on flat ground created by cutting or filling, overlaid with aluminium access panels electrically bonded to the adjacent tower. The EPZ is generally set back approximately 1.5 times the tower length.

The Site Location Plan and Proposed Development Final Layout are included in **Appendix A**. The Proposed Development Final Layout is provided as **Figure 1a,** below. The proposed OHL route is shown in blue. The temporary layout for the OHL structure is shown as **Figure 1b** in **Appendix A**.

Figure 1a Proposed Site Plan



1.3 Scope and Objective of Report

The objective of this Desk Study is to characterise the environmental setting and sensitivity across the Site, along with the potential for contamination to exist and the pathways through which contamination may come into contact with sensitive receptors given the final use as an OHL. The Desk Study includes the following key activities:

- Review of aerial imagery for site layout and terrain evaluation to provide a current description of the Site's layout and setting within the local area;
- Review of historical land uses for the Site and surrounds with a particular emphasis on identifying potential on-site and off-site contamination sources, and potential for made ground;

- A review of the Site's geological, hydrological and hydrogeological setting, publicly available non-coal and coal mining records and geo-environmental information to build up an understanding of the Site setting and surrounding environmental sensitivity;
- Request and review relevant records held by the Local Authority Contaminated Land Officer and the Scottish Environment Protection Agency (SEPA) along with public regulatory records provided within Groundsure Reports purchased for the Site;
- Review of available records provided by the Client;
- Review publicly available records from consultees including (but not limited to) Historic Environment Scotland (HES) website, the Zetica bomb risk maps, UK Radon website, flooding information, the National Library of Scotland, and others to further inform the study;
- Develop an initial Conceptual Site Model (CSM) for the Site to identify the potential contamination sources, pathways, and receptors for consideration in the context of the potential development followed by a preliminary qualitative risk assessment for the Site;
- Summarise any identified geo-environmental and land quality risks; and
- Recommendations for further geo-environmental assessments, if required.

1.4 Sources of Information

The following sources of information were consulted during this assessment:

- Groundsure Enviro+Geo Insight (ref. GSIP-2024-14714-18280_A to G), dated 01 May 2024;
- The Coal Authority (https://mapapps2.bgs.ac.uk/coalauthority/home.html) (accessed August 2024);
- The British Geological Survey (BGS) (https://www.bgs.ac.uk/map-viewers/geoindex-onshore/)) (accessed August 2024);
- SEPA (https://www.sepa.org.uk/data-visualisation/water-environment-hub/) (accessed August 2024);
- SEPA Flood Risk (https://map.sepa.org.uk/floodmaps/FloodRisk/Search) (accessed August 2024);
- NatureScot (https://sitelink.nature.scot/map) (accessed August 2024);
- HES (https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/listed-buildings/search-for-a-listed-building/) (accessed August 2024);
- Zetica UXO Map (https://zeticauxo.com/guidance/risk-maps/) (accessed August 2024);
- UK Radon Map (https://www.ukradon.org/information/ukmaps) (accessed August 2024);
- Topography map (https://en-gb.topographic-map.com/map-cgt/United-Kingdom/) (accessed August 2024);
- Scottish Government Energy Infrastructure (https://www.gov.scot/policies/energy-infrastructure/energy-consents/) (accessed August 2024); and
- Google Earth satellite imagery (https://earth.google.com/web/@-3.47981663,150.00030013,-3256.63719952a,18709751.81607485d,35y,165.58670573h,0t,0r) (accessed August 2024).

Specific information sources are referenced throughout the report.

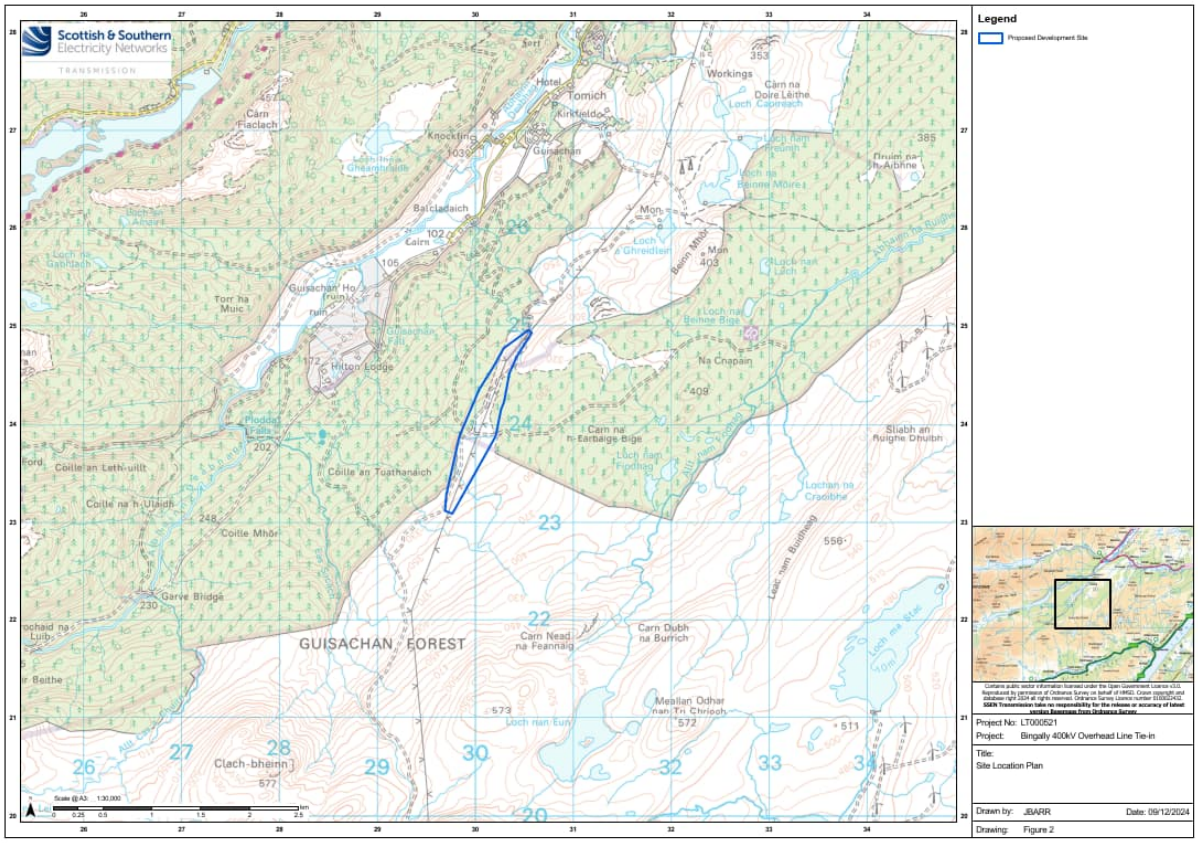
2 Site Description

2.1 Site Location

The Site is located within the central Highlands area of Scotland, to the southwest of Inverness and northwest of Loch Ness. Specifically, the Site is located approximately 2.2 km south of Tomich and 1.2 km southeast of the village of Knockfin. The National Grid Reference of the centre of the Site is NH 30133 24310 and the nearest postcode is IV4 7LZ.

The Site location is shown in **Figure 2** below and is also presented in **Appendix A**.

Figure 2 Site Location Plan



2.2 Current Site Use, Topography and Geography

2.2.1 On-Site

The Site comprises coniferous forestry land with both mature and young growth trees present, tree plantations, with forestry access tracks and roads, and open moorland. Three unnamed watercourses sourced from Allt an Rathain and Allt a Bhuachaille are present across the Site. The existing Beauly – Denny OHL passes through the centre of the Site, in a south to north direction. According to the UK topographic map[1], the Site is situated at approximate elevations varying between 278 m and 324 m above Ordnance datum (AOD). The terrain falls generally south to north across the Site.

2.2.2 Off-Site

The off-site area described below extends to a radius of 1 km;

[1] World Topographic Map, 2024. *United Kingdom topographic Map* [online] Available from: https://en-gb.topographic-map.com/map-cgt/United-Kingdom/

- **North -** An area of plantation forestry comprising predominantly coniferous woodland and unoccupied land is present to the north of the Site.
- **East –** Coniferous forest land with both mature and young growth trees, tree plantations, with forestry access tracks and roads, open moorland and unoccupied land are present to the east of the Site.
- **South –** Plantation forestry comprising predominantly coniferous woodland and unoccupied land is present to the south of the Site. The Allt an Rathain and the Allt na Faiche Bige watercourses with two unnamed watercourses are present within 250 m southwest of the Site. A holiday cottage is located approximately 830 m southwest of the Site.
- **West –** Plantation forestry comprising predominantly coniferous woodland is present to the west of the Site.

2.3 Site Walkover and Description

A site reconnaissance survey was undertaken by AECOM staff on 10 May 2024. During the walkover, observations were made on the topography, land use, drainage and potential sources of contamination identified on site.

The Site is predominantly located in an area of forestry use and unoccupied land. The Site begins at a section of the existing Beauly – Denny OHL, precisely at 2.2 km south of Tomich and continues for a further 1.5 km (approximately following the route of the OHL) through further open heathland areas. Three existing access tracks pass through the Site. These are shown on **Figure 1a** and **Figure 1b**.

A section of the east of the Site and its immediate east comprises the proposed Bingally substation site which includes open heathland with juvenile trees present sporadically across the Site elevation.

The ground level of the Site slopes gently south to north and east to west whereas the proposed Bingally substation site is generally flat. An existing access track with gravel surfacing passes through the Site, with a drainage channel running alongside the track. An old foot bridge is located at approximately 500 m northwest of the Site.

Evidence of recent ground investigation works including ground disturbance and monitoring well apparatus were noted during the walkover within the proposed Bingally substation site.

No residential dwellings are present within 500 m of the Site.

No sources of potential contamination were observed during the walkover.

Photos from the walkover are included as **Appendix B**.

3 Site History

3.1 Introduction

The following account of the historical development of the Site and its immediate surroundings are based on a review of historical OS maps and aerial photography both obtained as part of a Groundsure Report (**Appendix C**), and a review of publicly available web-based mapping services.

AECOM also notes that only indicative map scales are provided on the OS mapping. Where dates are stated, these refer to the dates of maps on which the features are present, have changed use or are no longer annotated, and do not necessarily refer to the exact dates of existence of a particular feature. Development that may have occurred between map editions is recorded as occurring on the latter published map, hence there are some limitations to the accuracy to the date of development unless supplementary evidence is available.

3.2 Historical Ordnance Survey Mapping and Aerial Photographs

A review of historical land uses within the Site and surrounding areas has been undertaken using the Groundsure maps and aerial photography and is summarised in **Table 3-1** below. It should be noted that the search has been limited to within 250 m of the Site, with only notable land uses beyond this distance included.

Where map dates are not included in the table below, there was no significant information present on those maps, or there were no apparent land use changes shown for these dates.

Table 3-1 Summary of Historical Mapping and Aerial Photography

Dates	Features within study area	Features within 250 m of study area
1872 (1:10,560, 1:10,000, 1:2500, 1:1250)	• The Site was undeveloped with mainly agricultural land and forestry across the Site; • Tracks across the Site; • A sheepfold to the west of the Site; and • The Allt an Rathain watercourse passes through the centre of the Site.	• Access tracks within 250 m from the Site; and • OHL towers within 250 m north and south from the Site. The immediate surrounding comprises agricultural land and forestry.
1901 (1:10560)	• Sheepfold no longer present; and • No other significant changes.	• More agricultural land and forestry within 250 m from the Site; and • No other significant changes.
1969 (1:10560) 1971 (1:10000, 1:2500)	• OHL towers passing through the Site, running south – north; • Additional agricultural land and forestry across the Site; • Access tracks and fords across the Site; and • No other significant changes.	• Agricultural land and forestry and access tracks.
1991 (1:10000) 1995 (1:2500)	• No significant changes.	• No significant changes.
2001 (1:10000)	• New quarry at west of the Site; and • No other significant changes.	• No significant changes.
2003 (1:1250)	• No significant changes.	• Access tracks to the east and west of the Site; and • No other significant changes.
2010 (1:10,000)	• No significant changes.	• No significant changes.
Google Earth 2024 (2016)	• Less agricultural and forestry land across the Site; and • No other significant changes.	• Less agricultural land and forestry within 250 m east and west of the Site; and • No other significant changes.

Dates	Features within study area	Features within 250 m of study area
2024 (1:10000)	• Quarry within the west of the Site no longer shown (possibly infilled); and • No other significant changes.	• No significant changes.
OS Bing Map (2024)	• The Site remains agricultural land and forestry across the Site.	• No significant changes.

3.3 Summary of Potential Historical Contamination Sources

This section summarises potential contamination on site and in the vicinity associated with historical features identified in **Section 3.2**. These include:

- Made ground associated with the construction of the existing OHL towers (on-site and off-site), paths and access tracks (on-site and off-site), surrounding plant and equipment use in the forestry industry (on-site and off-site);
- Additionally made ground may be associated with the potential infilling of the quarry (on-site). This infilling could have the potential for contaminants such as metals and inorganic compounds, pH, Polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH) including benzene, toluene, ethylbenzene, xylene (BTEX) and methyl-tert-butyl-ether (MTBE), semi volatile organic compounds (SVOCs), volatile organic compounds (VOCs), sulphates, sulphides, cyanides and phenols;
- Potential ground gas generation from infilled quarry (on-site);
- Sheepfold (on-site) could have to the potential to release contaminants such as arsenic and pesticides;
- No other significant contaminant features were identified within 250 m of the Site.

4 Existing Information Review

4.1 Introduction

Information provided to AECOM related to the proposed Bingally substation site from previous ground investigation (GI) reports, planning developments, and planning applications (i.e. Highland Council Contaminated Land Officer) have been reviewed as part of this study. Relevant information relating to the Site, geological or land quality status has been subject to a review and summary as part of this report.

4.2 Third Party Information Review

4.2.1 Jacobs, ASTI Substation Site-LT521 Fasnakyle Ground Investigation Report (April 2024)

SSEN Transmission designed a ground investigation to assess the ground / groundwater conditions and geotechnical risks, in the areas of the Site and the proposed Bingally substation site, and extreme south of the access track only[2], and provided information for detailed design. The GI was also undertaken to assist in identifying a preferred location for the proposed Bingally substation and to investigate and quantify the geotechnical and geo-environmental conditions at the Site and proposed Bingally substation site. A further aim of the investigation was to enable soil classification and derivation of geotechnical and geochemical parameters of the encountered materials for the design of the earthworks and structures associated with the proposed Bingally substation.

The GI was undertaken by Igne, formerly known as Raeburn Drilling and Geotechnical Ltd, with the findings summarised in their factual report (ref: Proposed LT521 Fasnakyle[3] 400 kV Substation, Report on Ground Investigation, 12 February 2024) for the works.

Jacobs was appointed in October 2023 by SSEN Transmission to supervise the Igne ground investigation, check the factual report and prepare a Ground Investigation Report (GIR). The ground investigation report was provided to AECOM *for review. A* copy of this report is available in **Appendix D**.

The GI has been done in the area of the Site and in the area of the proposed Bingally substation site (proposed substation site and extreme south of the access track only) which is to the immediate east of the Site. The western and southern boundaries of the Site were not investigated as part of the GI. This summary of the Jacobs UK Ltd. (Jacobs) report will reference the information relevant to the Proposed Development Site only.

A site walkover was undertaken by Jacobs across several days in November 2023, which presented similar findings to the AECOM walkover survey.

The report also reviewed details on historical mapping and environmental setting. The report identified the following key findings relevant to the Site and within a radius of 250 m:

- No historical buildings were noted within the Site and there is no indication that the area has been used for anything other than forestry in the past. Aerial imagery suggest that the commercial forest was planted prior to 1989 and was deforested in 2016.
- The Beauly – Denny OHL in the centre of the Site first appears on the OS map series 1949-1973 and has remained in the same location to the present day, including when it was upgraded to the current 400 kV / 275 kV circuits in 2015.
- Access tracks are also first shown on the OS map series 1949-1973 and were likely constructed at the same time as the Beauly – Denny OHL.
- Jacobs reviewed the BGS published geological mapping and nearby historical borehole logs (within 1 km from the Site). The description of borehole logs located within 250 m from the Site is as follow:
    - Made ground (on-site) from surface to a maximum of 0.40 m bgl (below ground level) (NH32SW1 on-site);
    - Peat (on-site / off-site) from surface to a maximum of 0.80 m bgl (NH22SE1 on-site);

[2] The full access track was not investigated as part of the recent ground investigation.
[3] The project is now referred as Bingally 400 kV substation.

- Sand and gravel (on-site / off-site) underlying the peat or made ground up to a maximum of 4.00 m bgl (NH22SE1 on-site);
- Weathered psammite / broken rock (on-site / off-site) underlying the superficial deposits between 2.50 m bgl and 3.90 m bgl (top of bedrock) (NH32SW1 on-site, NH22SE2 on-site, NH22SE3 off-site); and
- Psammite bedrock (on-site / off-site) underlying the superficial deposits or weathered psammite between 2.50 m bgl and 4.00 m bgl (top of bedrock) (NH32SW1 on-site, NH22SE1 on-site).

The report highlighted that peat is a key risk at the Site and something that will need to be addressed as part of the detailed design, with a Peat Management Plan (PMP) and a Peat Landslide Hazard Risk Assessment (PLHRA) likely to be required.

The report identified potential sources of contamination as follows:

- Discrete areas of made ground to be encountered during development works associated with the existing power line access tracks / infrastructure and forestry land use.

The report identified potential pathways and receptors as follows:

- **Construction Workers** – During the excavation works, construction workers may be exposed to subsurface soils and shallow groundwater, therefore, if present, any contaminants in both surface and deeper soils and / or groundwater may pose a potential risk through dermal contact with soil, ingestion of contaminants or inhalation of ground gas and soil vapour (primarily during below ground works / excavations);
- **Site End Users** – Future site users may be impacted by soils reused on site-for landscaping purposes which may pose a potential risk through dermal contact / ingestion of contaminants; and
- **Infrastructure on-site and off-site** – Potential to be impacted by migration of contaminants and ground gas / soil vapour through the creation of off-site migration pathways.

The report has excluded the following potential exposure pathways and subsequent receptors:

- **Water Environment** –The Water Environment (surface water and groundwater) has not been considered given the lack of potential land contamination sources and nature of the construction works proposed, as it is assumed any pathways will already be in place.

The report gives a summary of the results presented in the ground investigation factual report: Proposed LT521 Fasnakyle 400 kV Substation, Report on Ground Investigation, Igne, February 2024 (a summary is presented in **Section 4.1.2** below).

A review of the ground information has been undertaken by Jacobs to assess potential contamination risks and constraints associated with the proposed works. The land contamination assessment has been undertaken in accordance with BS 10175:2011(+A2:2017) and relevant technical guidance including Land Contamination Risk Management (LCRM[4]). The following summary is relevant to the Site and 250 m radius:

- **Risks to Construction Workers:**
  - A comparison of available soil chemical results 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 values were recorded in soils (natural deposits) for total chromium with exceedances recorded in three of the four samples analysed on the Proposed Development. 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 materials were identified within the samples screened.

- **Risk to Site End Users:**
  - There were no GAC exceedances for the commercial / industrial end use GAC value for total chromium.

[4] UK Government, 2023. *LCRM – Land Contamination Risk Management* [online]. Available at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

- **Risks to Construction Workers and End Users from Groundwater:**
    - Groundwater analysis was not undertaken during the ground investigation works. However, due to the absence of potential contamination sources, it is considered unlikely that contaminated groundwater will be encountered within the Site area.

- **Risks to Construction Workers from Ground Gas:**
    - Ground gas risk was assessed in the Jacobs report based on three rounds of gas monitoring (January to March 2024). It should be noted that additional gas monitoring has been undertaken on site;
    - For the Site and surrounding 250 m radius, methane concentrations did not exceed either the Lower Explosive Limit (LEL) of 5% v/v and Upper Explosive Limit (UEL) of 15% v/v. The short-term and long-term exposure limits for carbon dioxide, carbon monoxide and hydrogen sulphide were not exceeded;
    - For the Site and surrounding 250 m radius, depleted oxygen concentrations (below 19 % v/v) were recorded in 38 boreholes monitored with a minimum concentration of 15.400% v/v in BH183;
    - The Jacobs report stated that the results show that ground conditions at the Site are unlikely to present a potential asphyxiating or explosive risk to construction workers. However, due to the presence of peat deposits, ground gas risks may warrant further consideration during below ground or confined space working should this be undertaken; and
    - Jacobs recommended that the management of any excess peat arisings will also require appropriate consideration. Further sampling and full Waste Acceptance Criteria (WAC) testing should be undertaken to determine a provisional classification of the material for disposal in line with BS EN 12457.

- **Risks to Site End Users – Ground Gas:**
    - As no buildings are planned within the Site, the risk to end users from ground gas is not considered relevant.

AECOM Comments

The elevated concentrations of Chromium recorded during the Jacobs risk assessment is likely to be representative of background concentrations within this area of Scotland. With reference to the BGS document '*Great Glen: Regional Geochemical Atlas'* published 1987, natural background concentrations of chromium in Scotland are typically elevated. The notes within the chromium regional background map state the following:

> "*The Morar Division has a higher background (average 85 ppm* [85 mg/kg] *Cr) than the Loch Eil Division (average 65 ppm* [65 mg/kg]*), despite the presences amphibolites in the latter. This is consistent with the higher proportion of basic Lewisian detritus in the Morar Division and the increased maturity of the Loch Eil Division metasediments".*

As bedrock is present at shallow depths across the Site area, and overlying sediments are likely to have been derived to a degree from the underlying bedrock geology, the recorded concentrations of Chromium in superficial deposits of up to 22 mg/kg are not unanticipated, and likely represent natural background concentrations from natural materials within this area.

4.2.2 Igne, Proposed LT521 Fasnakyle 400 kV Substation, Report on Ground Investigation (May 2024)

SSEN Transmission commissioned Igne (formerly Raeburn Drilling & Geotechnical Limited) to undertake a GI for the LT521 Fasnakyle[3] project, in the area of the Site and the proposed Bingally substation site. The Site works were carried out under the supervision of Jacobs. The objective of the works was to provide information on the ground conditions for design and construction of the Proposed Development.

The Site work was carried out between 6 November and 23 January 2023 and in accordance with BS EN1997-2:2007, BS5930, BS10175 and in-house Igne procedures. Additionally, four rounds of gas monitoring were undertaken between January and April 2024.

The report on GI comprised borehole and trial pits records, testing records, laboratory results, photographs, and a site plan. A copy of the Igne Ground Investigation Report is available in **Appendix D**.

The total GI works included 25 boreholes sunk by a mixture of dynamic sampling, rotary open-hole and rotary core drilling methods. Six boreholes were sunk on the Site area to a maximum depth of 8.75 m bgl (BH17). A total of 38 trial pits were excavated by mechanical means, across the Site and the proposed Bingally substation area, with seven trial pits sunk to a maximum depth of 2.00 m bgl (TP26) on the Site. Additionally, 6,270 peat probes were undertaken across the Site, and alternative areas. Of the probes undertaken a limited number were undertaken within the Site, with all located in the northwestern quarter, surrounding and within the parts of the proposed Bingally substation which are located within the Site. The GI included the majority of the Site, except the western and southern sections of the Site.

Perforated standpipes were installed in three boreholes between 1.00 m bgl (BH26) and 6.750 m bgl (BH04), and in five boreholes located within 250 m surrounding site radius between 1.00 m bgl (BH18) and 7.50 m bgl (BH04). These were installed in superficial deposits and bedrock to monitor ground gas. In addition, groundwater levels were recorded during ground gas monitoring.

Recovery of disturbed samples from all exploratory holes and hand pits for geotechnical, geochemical and geo-environmental laboratory testing.

The following geo-environmental tests were carried out:

- Metals (Toxic 9 Suite);
- Inorganic Suite (pH, total cyanide and sulphate);
- Total Petroleum Hydrocarbon Criteria Working Group / Volatile Petroleum Hydrocarbon Criteria Working Group (TPHCWG / VPHCWG);
- TPHCWG Aliphatic / Aromatic Split;
- Polyaromatic Hydrocarbons (PAH) (USEPA 16);
- VOCs / SVOCs; and
- Asbestos.

The report identified the following key findings:

- Peat deposits were encountered within the Site, from the limited GI information available;
- Chemical contamination testing was carried out on four soil and two leachate samples from peat and superficial deposits, in the Site and 250 m surrounding radius;
- No asbestos containing materials were identified within the soil samples analysed; and
- Groundwater was encountered in four boreholes and five trial pits between 0.20 m (TP26, TP30) and 2.60 m bgl (BH17)].

A summary of the geological strata encountered during the GI on the Site is presented below:

- Topsoil was encountered in TP27 (on-site) only, recorded to a maximum depth of 0.20 m bgl. Topsoil was described as dark brown sandy locally spongy fibrous peaty topsoil;
- Made ground and evidence of contamination was not encountered during the GI;
- Peat was encountered from surface to a maximum depth of 2.50 m (TP17 (on-site)) within four boreholes and in six trial pits on site. Suspected peat was also encountered within peat probes undertaken locally within the Site. The peat depths estimated from the probing were typically less than 2 m in thickness, although localised areas of deeper peat were recorded. Where observed in the relevant exploratory holes within the Site, 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 to H5 / B1 to B2, although humification of up to H8 was locally recorded as well as moisture contents of up to B3;
- Superficial deposits of sand and gravel (on-site) were encountered from surface (BH14, BH16, BH23 on-site) to 3.20 m bgl (BH17 on-site). Granular Glacial Deposits were generally encountered beneath the peat or topsoil within five boreholes and five trial pits;
- Gravel was described as brownish grey sandy fine to coarse angular to subangular gravel of psammite (BH14 on-site). Sand was generally described as medium dense grey / brown very gravelly silty fine to coarse with cobbles (BH14 on-site). Gravel of psammite and granite (BH18);

- Weathered bedrock (on-site) was recorded within five boreholes beneath the peat and Granular Glacial Deposits between 0.50 m bgl (BH20 on-site) and 3.40 m bgl (BH17 on-site) (top of bedrock) and described as weak, locally medium strong and strong grey micaceous psammite slightly weathered evident as an orange brown staining on fracture surfaces or strong pinkish orange granite. Moderately weathered evident as an orange, brown staining (BH20);
- Bedrock (on-site) was encountered within four boreholes between surface (BH20 on-site) and 3.20 m bgl (BH17-on-site). Within the trial pits probable bedrock was encountered between 0.20 m (TP27-on-site) and 1.40 mbgl (TP15-on-site) (top of bedrock). Bedrock was not encountered within TP17 (on-site) and TP26 (on-site) and these holes terminated at depths of 2.50 m and 2.00 m bgl respectively. The bedrock mainly comprises psammite, and pelite with occasional igneous intrusions (granite); and
- Four rounds of ground gas monitoring (including groundwater level monitoring) were undertaken within three boreholes, with a range in atmospheric pressure between 957 (BH23) and 997 mbar (BH14) within the Site. Additionally, four ground gas monitoring were undertaken within five boreholes with a range in atmospheric pressure between 950 ppm (BH11) and 992 ppm (BH16, BH21), within 250 m radius from the Site. The following ground gas (peak levels) and groundwater results were recorded on and within a 250 m radius of the Site:
    - 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;

      [AECOM comment: the fourth round in BH18 (within 250 m radius), is not included as the gas monitoring appears to be affected by a high water level];
    - Hydrogen sulphide (H_2S) between 0 ppm and 1 ppm within the Site and within 250 m radius;
    - Carbon monoxide (CO) between 0 ppm and 3 ppm, and between 0 ppm and 2 ppm within 250 m radius; and
    - Groundwater levels were recorded in three boreholes within the Site from surface (BH23 to 0.80 m bgl (BH26) and in five boreholes located within 250 m radius between 0.25 m bgl (BH18) and 4.85 m bgl (BH11) None of the locations were recorded as dry.

4.3 Local Authority Consultation

4.3.1 Contaminated Land Officer - Consultation

AECOM requested information from the Highland Council (THC) Contaminated Land Officer relating to potentially contaminated land within the Site within a radius of no greater than 500 m from the proposed Bingally substation site and access track. A separate request was not made for the Proposed Development as the area was substantially covered in the proposed Bingally substation request. The following information has been issued to AECOM on 12 April 2024 (ref.24/07), a copy of the correspondence is available in **Appendix E**:

- THC Contaminated Land Team does hold records of two potential sources of contaminated land;
- There are no details of any potentially contaminative sources within the Site or within the 500 m immediate surrounding area;
- THC is not aware of any other recorded current or historical environmental problems within the Site and adjacent areas with regards to ground contamination or solid waste arisings;
- There are no details of any current / former landfills within 250 m of the Site;
- There are no known historical landfills within 500 m of the Site;
- There are no known areas of ecologically sensitivity in the vicinity of the Site; and
- THC is not aware of any further environmental information for the Site.

4.3.2 SEPA Freedom of Information Request

AECOM requested information from SEPA to assess any information relating to potentially contaminated land within the Site within a radius of no greater than 1 km from the proposed Bingally substation site (and access track). A separate request was not made for the Site as the area was substantially covered in the proposed Bingally substation request. The following information has been issued to AECOM on 26 April 2024 (Ref-Response to F0196906), and attached as **Appendix E**:

- SEPA does not hold any contaminated land information for the Site or surrounding area.

5 Environmental Setting

5.1 Published Geology

The following summary of the geology beneath the Site is based on a review of geological mapping available from the BGS Geoindex, published BGS 1:50,000 scale map Sheets 73 W Invermoriston (dated 2012 and 1976), and the Groundsure Report (**Appendix C**).

Extracts of the geological maps indicated above are presented below as **Figure 3** and **Figure 4**.

5.1.1 Artificial Ground

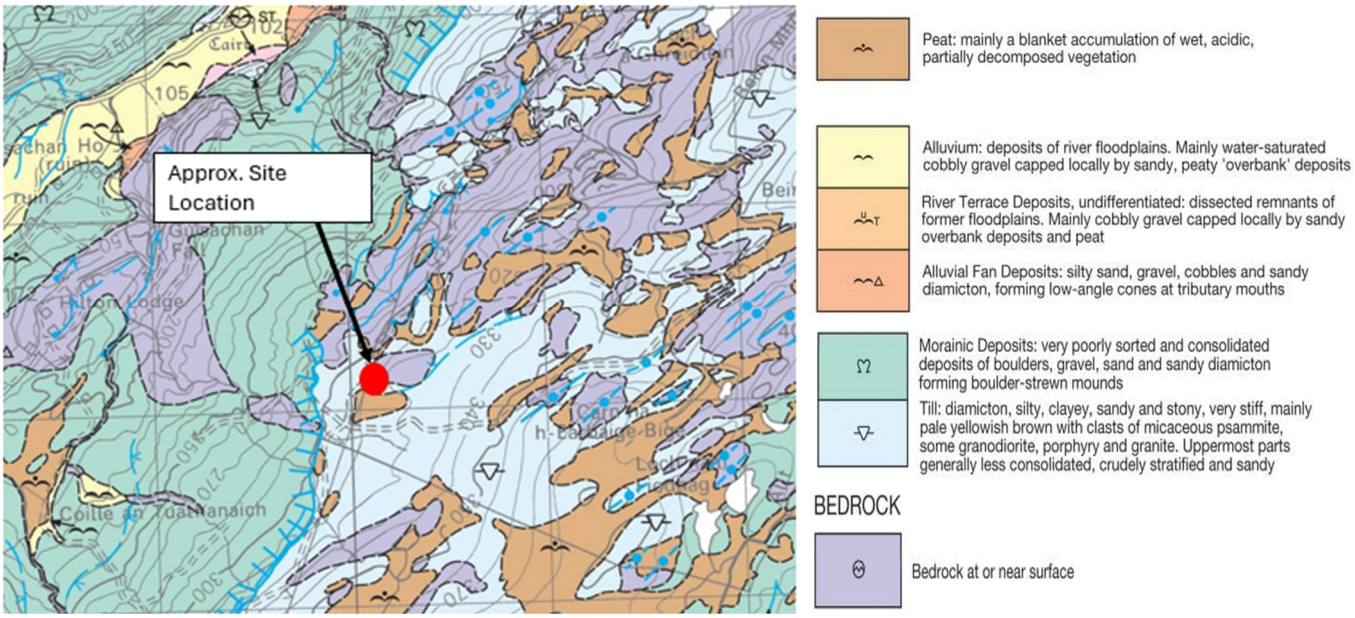
There are no BGS designated areas of made ground or artificial ground recorded on-site or within 250 m of the Site. Although no made ground is shown on published BGS mapping on the Site, localised made ground may be present associated with the construction of the OHL towers, paths and access tracks and forestry land use. Additionally made ground may be associated with the potential infilling of the historical quarry (on-site).

5.1.2 Natural Superficial Deposits

Superficial geology comprises peat and Glacial Till (Devensian-Diamicton), with some areas where superficial deposits are not indicated to be present. The superficial deposits for the Site are shown on **Figure 3** below.

Moranic Deposits (of sand, gravel and boulders)[5] are shown approximately 160 m west of the Site and within the west of the Study Area. Alluvium (of sand, gravel and boulders) are present off-site (1 km west of the Site).

Figure 3 Superficial Geology



5.1.3 Solid Geology

The bedrock geology underlying the Site comprises Tarvie Psammite Formation-Psammite (named the Upper Garry Psammite Formation on BGS 1993 map edition) from the Loch Eil Group. The bedrock geology is shown in **Figure 4** below.

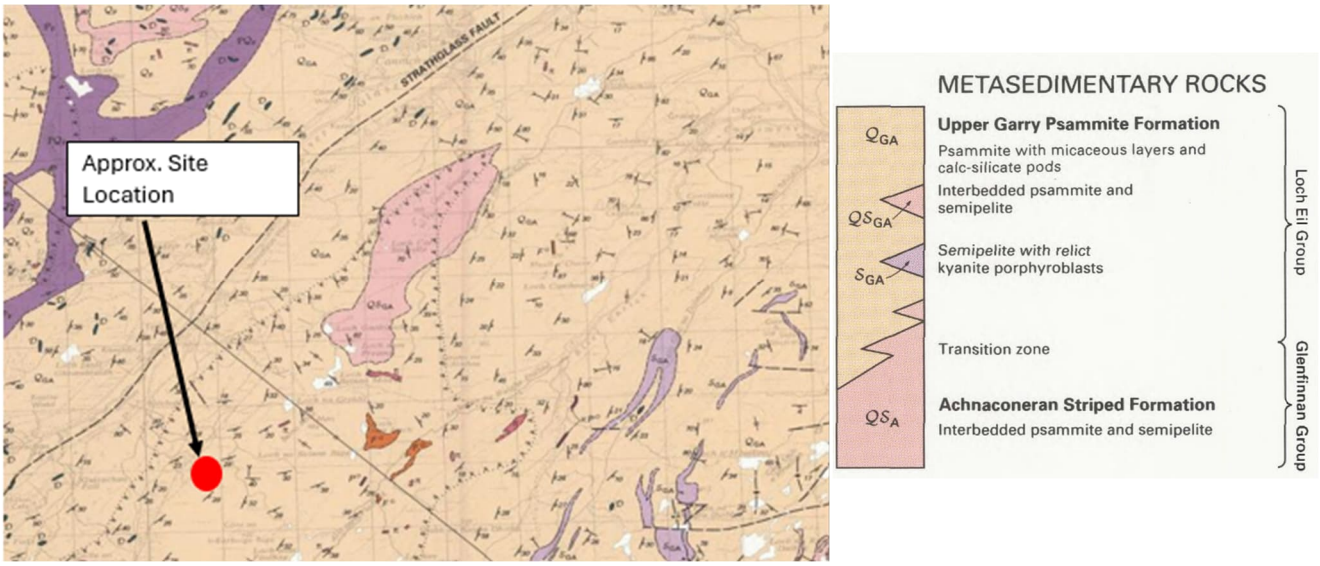
A localised areas of unnamed igneous intrusion (pre-caledonian in age) is present 230 m west of the Site. Glen Moriston Vein Complex- Pegmatite and Leucogranite is present off-site approximately 680 m west of the Site.

[5] This is named as Hummocky (Moundy) Glacial Deposits Devensian Diamicton on the BGS GeoIndex Onshore Map.

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 and large quartzite lenses occur, in particular near the base.'

Linear features of 'ice-marginal glacial single-sided meltwater channel' are shown within the north of the Site and approximately 6 m, 190 m, 330 m and 910 northwest of the Site. The 'axis of large-scale glacial flute' is shown within 1 km east and north from the Site. Pegmatitic rock veins are shown approximately 570 m west of the Site. Glacial meltwater channel centre lines (undifferentiated) are present at approximately 290 m to the west, and at 1 km northeast of the Site.

Figure 4 Solid Geology



5.2 Historical Borehole Records

Historical borehole records available on the BGS Onshore Geoindex[6] have been reviewed. Four boreholes were recorded within the south of the Site. Records of these logs are included in **Appendix F**. The four boreholes are NH32SW1, NH22SE1, NH22SE2 and NH22SE4 and are discussed in **Section 4.2**.

5.3 Mining and Quarrying

The Coal Authority website[7] determined that the Site does not lie within a Coal Authority Reporting Area and is also confirmed by the Groundsure Report (**Appendix C**).

The Groundsure Report indicates two pits within and in the vicinity of the Site:

- 'Guisachan Forest Pit' within the west of the Site for commodity of Igneous and Metamorphic Rock, and of 'ceased status'; and
- There is an additional 'Guisachan Forest Pit' located at approximately 520 m[8] east of the Site for the commodity of sand and gravel, and of ceased status.

[6] BGS, 2022. *GeoIndex Onshore* [online]. Available from: https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.177527078.2074792173.1725376621-1688325900.1725376621
[7] The Coal Authority, 2023. *The Coal Authority Map Viewer* [online]. Available from: https://datamine-cauk.hub.arcgis.com/
[8] Based on measured distance from Google Earth Pro 2024

5.4 Hydrology

The SEPA Water Environment Hub[9], the Groundsure Report (**Appendix C**) and other publicly available sources have been reviewed to identify relevant hydrological features on-site and in the surrounding area. The hydrology of the area is summarised in **Table 5-1** below.

Table 5-1 Summary of On-site and Surrounding Area Hydrology

Feature	Distance and Direction*	Flow Direction	Description
Various unnamed drains	On-site, north	South	Various unnamed ditches / drains present (NGR - NH 29843 23437).
River Allt an Rathain	On-site, southwest	Southeast	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 (NNR).
Unnamed water course	On-site, southwest	Southeast	Tributary of Allt an Rathain which it enters at approximately Sourced at NH 30224 23865.
Unnamed water course	On-site, southwest	Southeast	Sourced at NH 30123 22790 from Allt na Faiche Bige and joins Allt an Rathain at approximately NH 29465 24076. Flows adjacent to the Glen Affric NNR.
River Allt nam Fiodhag	410 m, south	South	Sourced from Allt na Sidhean, crosses OHL in between T82 and T81
Allt Bail a' Chladaich	620 m, northeast	Southeast	Sourced from Allt a' Bhuachaille, crosses OHL near T75

**All distance measured at closest point to site area.*

The watercourses noted in **Table 5-1** above are likely to be receptors as they are located within the Site or in the surrounding area. Specifically, the unnamed watercourses are in proximity to the Site. Whilst some of the above features are in close proximity to the Proposed Development area, impacts to surface water features are considered likely to be minimal.

5.5 Hydrogeology

Information from the Groundsure Report (**Appendix C**), BGS Onshore Geoindex[6] Aquifer Productivity (Scotland) GIS datasets Version 2 Revised Report[10] and the Scotland's Aquifers and Groundwater bodies[11] have been reviewed in relation to the aquifer classifications for superficial deposits and bedrock underlying the Site. These conclude that:

- Superficial deposits underlying the Site are not classified under a groundwater aquifer according to the BGS Geoindex. Similarly, the Groundsure Report does not classify the superficial deposits as a groundwater aquifer to the south of the Site; and
- According to BGS Geoindex, the bedrock of the Loch Eil Group is characterised as a low productive aquifer. With small amounts of groundwater in near surface weathered zone and secondary fractures. The Groundsure Report describes the flow as virtually all through fractures and other discontinuities.

Groundwater bodies are classified by SEPA under the Water Framework Directive (WFD), whereby water bodies in Scotland are classed as High, Good, Moderate, Poor or Bad. A search of SEPA's online database[7] was conducted regarding the groundwater quality beneath the Site. The Site includes one bedrock water body, Northern Highlands (ID: 150701) which has a 'good' overall status (2022) according to SEPA with minor fracture flow.

Groundwater flow direction within the aquifer units will likely be influenced by the local topography. Mapping indicates that the local topography falls downwards to the northwest. As such, groundwater is anticipated to flow in an approximate north westerly direction towards the River Glass. However, the nature and extent of groundwater bodies within the area is unknown, as such limited certainty can be placed on groundwater flow direction.

[9] SEPA, 2014. *Water Environment Hub* [online]. Available from: https://www.sepa.org.uk/data-visualisation/water-environment-hub
[10] BGS, 2015. *User Guide: Aquifer Productivity (Scotland) GIS datasets, Version 2. Revised Report* [online]. Available from: https://nora.nerc.ac.uk/id/eprint/509619/1/OR15003.pdf
[11] BGS, 2015. *Scotland's aquifers and groundwater bodies* [online]. Available from: https://nora.nerc.ac.uk/id/eprint/511413/1/OR15028.pdf

5.5.1 Private Water Supply

According to THC Open Map Data portal, there are no private water supplies within 1 km of the Site.

5.6 Flood Risks

The SEPA Flood Maps for planning website[12] was reviewed in order to assess potential flood risks at the Site, which are summarised below:

- **River Flooding** – the Site is not in an area of designated flood risk from river flooding, suggesting that the flood risk is <0.1% chance;
- **Coastal Flooding** - The Site is not at risk of coastal flooding;
- **Surface Water Flooding** – SEPA flood mapping indicates sporadic areas across the Site to be of low to high risk from surface water flooding; and
- **Groundwater Flooding** – SEPA does not provide information on groundwater flooding risk. The Groundsure Report indicates that the Site lies predominantly within an area of low to negligible risk of flooding from groundwater.

The above does not constitute a formal flood risk assessment, which is out with the scope of this study.

5.7 Radon

The UK Health Security Agency's UK Radon website[13] was reviewed to determine potential radon risk for the Site.

According to the website, the majority of the Site is located within an area where 1-3% of homes are above the action level for radon gas. The southwest of the Site is located within an area where radon potential is greater than 30%. Additionally, areas with radon potential of 3-5% are located approximately 330 m northwest of the Site.

The above (except for radon potential 3-5%) is also confirmed by the Groundsure Report (**Appendix C**), which propose basic protection on the majority of the Site, and full protection in areas with radon potential of greater than 30%.

It is therefore anticipated that radon protective measures will be necessary for occupied buildings should the construction of buildings within the Site be undertaken. As buildings are not proposed as part of the Proposed Development, radon is not considered further in this report.

5.8 Environmental Designated Sites and Listed Buildings

The NatureScot Viewer[14] "Sitelink" was reviewed to identify environmental designated sites.

The database indicated that there are no recorded sensitive sites including Sites of Special Scientific Interest (SSSIs), Conserved Wetland Sites (Ramsar Sites), Special Areas of Conservation (SAC), Special Protection Areas (SPAs), Local Nature Reserves (LNR), or Forest Parks within the Site. A section of the Glen Affric NNR (moorland) is located within the southwest of the Site.

The above was confirmed as part of a review of the Groundsure Report (**Appendix C**). Additionally, approximately five areas of designated ancient woodland were indicated within 1 km west of the Site. However, none are located within the Site.

PASTMAP interactive mapping service[15], which provides access to the databases of Historic Environment Scotland (HES), and the Groundsure Report was consulted regarding sites of potential historical and / or archaeological significance. No features were recorded within 1 km of the Site.

[12] SEPA, 2024. *SEPA Flood Maps* [online]. Available from: https://map.sepa.org.uk/floodmaps
[13] UK Health Security Agency, 2022. *UK maps of radon* [online]. Available from: https://www.ukradon.org/information/ukmaps
[14] NatureScot, 2024. *SiteLink Map Search* [online]. Available from: https://sitelink.nature.scot/map
[15] Historic Environment Scotland, 2024. *PastMap* [online]. Available from: https://pastmap.org.uk/map

5.9 Unexploded Ordnance

To assess the potential risks from Unexploded Ordnance (UXO) at the Site, the Zetica Unexploded Bomb Risk Map[16] was reviewed. The Zetica mapping indicated a low risk for the Site and surrounding area, which is defined by Zetica as an '*area indicated as having 15 bombs per 1,000 acres or less*'. A Zetica Pre-Desk Study Assessment (PDSA) has not recorded any WWII military activities on or affecting the Site, as presented in **Table 5-2** below. It is concluded that a detailed desk study, whilst always prudent, is not considered essential. The extended assessment is provided in **Appendix G**.

Table 5-2 Summary of WWII Military Activities On or Affecting the Site

Date	On or Affecting the Site
Pre-WWI Military Activity	
WWI Military Activity	None Identified
WWI Bombing	
WWII Military Activity on or affecting the Site	None identified on the Site. Military training is known to have taken place in rural areas of Scotland during WWII, but no readily available records have identified any such training on the Site.
WWII Bombing	During WWII the Site was located in the Landward Area (LA) of Inverness-shire, which officially recorded 94No. High Explosive (HE) bombs with a bombing density of less than 0.1 bombs per 405 hectares (ha). No readily available records have been found to indicate that the Site was bombed.
Post-WWII Military Activity on or Affecting the Site	None identified.

5.10 Soil Classification

The National Soil Map of Scotland[17] was reviewed to determine the soil type on site and within the surrounding area.

The National Soil Map of Scotland identifies the main soil types across the Site and surrounding area as 'Peaty gleys with dystrophic semi-confined peat' and 'Humus-iron podzols'.

Areas of carbon-rich soil, deep peat and peatland habitats are mapped by the Carbon and Peatland Map 2016[18]. The top two classes, 1 and 2, taken together identify the nationally important resource. The classes identified within the Site are defined as follows:

- **Class 0:** Mineral soil - Peatland habitats are not typically found on such soils;
- **Class 1:** Nationally important carbon-rich soils, deep peat and priority peatland habitat, areas likely to be of high conservation value; and
- **Class 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.

Class 0 (mineral soils) and Class 5 are the predominant soil classes across the Site and surrounding area. Localised areas of Class 1 nationally important deposits are recorded on the northeastern boundary and within the southern extent of the Site. The Class 1 soils recorded within the southern extent of the Site are recorded to extend to the south and east out of the Site, however, within the Study Area.

The National Scale Land Capability for Agriculture Map identifies the Site in a Class 6.3 - Land capable of use as rough grazings with low quality plants. The south of the Site is within a class 5.3 - Land capable of use as

[16] ZeticaUxo, 2024. *UXB RiskMap* [online]. Available from: https://zeticauxo.com/guidance/risk-maps/
[17] ESRI, 2024. *UKSO* [online]. Available from: https://mapapps2.bgs.ac.uk/ukso/home.html
[18] Scotland's environment, 2024. *Scotland's soils* [online]. Available from: https://map.environment.gov.scot/Soil_maps/?layer=1

improved grassland. Pasture deteriorates quickly. According to the DMRB LA 109 Scotland National Application these soils are classified as of low sensitivity[19].

5.11 Regulatory Database Review

This section presents a summary of current and historical regulatory database entries included within the Groundsure Report (**Appendix C**) pertaining to the Site and surrounding land within 250 m which could result in soil and groundwater contamination. For the location of the relevant sources identified below, reference should be made to the Groundsure Report.

Generally, sites with regulated processes, registered radioactive substances, licensed waste management facilities and landfills, hazardous substances, fuel station entries and selected contemporary trade directory entries within 250 m of the Site, could, depending upon the nature of their activities, represent potential sources of contamination.

Table 5-3 Summary of Regulatory Database and Records Review

Data Type	On-site	Within 250 m
Recent Industrial Land Uses	- Six[20] existing OHL towers associated with the Beauly – Denny OHL, passing through the Site.	- OHL tower at 200 m northeast
British Pits	- Guisachan Forest Pit within the west area of the Site, of igneous and metamorphic rock, and with a ceased status.	- None Recorded

[19] Highways England, 2019. *Design Manual for Roads and Bridges – LA 109 Geology and Soils* [online]. Available from: https://www.standardsforhighways.co.uk/tses/attachments/adca4c7d-4037-4907-b633-76eaed30b9c0?inline=true

[20] Three shown on Groundsure Report and three more shown on Google Earth Map. Original Groundsure Report was for the wider Proposed Development boundary including the access track and proposed substation (see separate AECOM report titled Bingally 400 kV Substation (AECOM 60701792-R-001 August 2024).

6 Preliminary Risk Assessment

6.1 General

The approach adopted by AECOM in order to assess risk associated with land contamination is in line with the Scottish Government's approach outlined in Planning Advice Note (PAN) 33 Development of Contaminated Land. The Scottish Government considers that the most appropriate approach is a 'suitable for use' one in which risks to human health and the wider environment are assessed within the context of the current or proposed use of the land in question.

The risk assessment described below follows the methodology set out in the Environment Agency's LCRM[21] guidance which was published in October 2020 and updated in 2023. The LCRM guidance has now replaced the earlier Model Procedures for the Management of Land Contamination (CLR11), which has been withdrawn. AECOM understands that at the time of writing, SEPA and the Scottish Government have not yet formally made their position clear on the published LCRM guidance. However, given that the methodology in the LCRM guidance is essentially the same as that in CLR11, the key difference being some of the terminology used, AECOM has adopted the more recent guidance in this assessment.

The basic approach to risk assessment, as followed in this report, involves four steps:

- **Hazard Identification** – establishing contaminant sources, pathways and receptors (the conceptual site model);
- **Hazard Assessment** – analysing the potential for unacceptable risks (what contaminant linkages could be present, what the effects could be);
- **Risk Estimation** – aiming to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it); and
- **Risk Evaluation** – evaluating whether the predicted risk is unacceptable.

The LCRM guidance provides the following staged approach to aid the management of land contamination:

- **Stage 1:** Risk Assessment;
- **Stage 2:** Options Appraisal; and
- **Stage 3:** Remediation.

This assessment undertakes only the Stage 1 Risk Assessment, which LCRM guidance presents as three tiers:

- Preliminary Risk Assessment (Tier 1);
- Generic Quantitative Risk Assessment (GQRA) (Tier 2); and
- Detailed Quantitative Risk Assessment (DQRA) (Tier 3).

This report has been provided to meet the requirements for a Preliminary Risk Assessment (Tier 1).

The methodology adopted is described in detail in LCRM and relies on the development of a site-specific CSM consisting of contaminant linkages. A contaminant linkage requires three components:

- A source of contamination, for example due to historical site operations;
- A pathway, a route by which receptors can become exposed to contaminants. Examples include vapour inhalation, soil ingestion and groundwater migration; and
- A receptor, a target that may be exposed to contaminants via the identified pathways. Examples include human occupiers / users of the Site, the water environment, property or ecosystems.

For a potential risk to either environmental and / or human receptors to exist, a plausible contaminant linkage involving each of these components must exist. If one of the components is absent then a contaminant linkage, and thereby a potentially unacceptable risk, is also unlikely to exist. Where all three components are present, a

[21] Environment Agency, 2023. *Land contamination risk management* [online]. Available from: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

potentially complete contaminant linkage can be considered to exist. This does not automatically imply the presence of unacceptable risk, but that further investigation of the potential contaminant linkages is required.

6.2 Initial Conceptual Site Model

The initial CSM has been developed to identify potentially complete contaminant linkages that may require further investigation to assess their existence and / or potential significance. The potential sources of contamination on or in the vicinity of the Site, receptors on or near the Site, and pathways on or near the Site are discussed within the following sub-sections.

The initial CSM assesses the potential risks / liabilities and constraints associated with the Site in its current condition, prior to any proposed redevelopment. Risks associated with the proposed redevelopment have also been assessed based on expected environmental and ecological sensitivity in line with the planning application and development description.

6.2.1 Potential Sources of Contamination

This section uses the information described in earlier sections of this report to identify potential sources of contamination on and within 250 m of the Site. Potential sources of contamination are listed in the tables below.

It should be noted that the historical use of the Site and surrounding area has presented limited potential for significant contamination to be present. Soil and groundwater contamination within the Site boundary or close proximity is considered unlikely, and should any minor contamination exist it is unlikely to represent an impact due to the absence of receptors.

Table 6-1 Potential Sources of On-site Contamination

Potential On-site Source	Potential Contaminants	Area On-Site Affected	Current / Historical
Potential made ground associated with construction of the of the existing OHL towers, and potential quarry infilling.	Metals, pH, PAHs, TPH including BTEX and methyl-tert-butyl-ether MTBE, SVOCs, VOCs, sulphates and sulphides.	OHL towers and existing OHL passing through the Site. Access tracks passing through the Site. Disused quarry within the west.	Current and Historical
Peat, made ground	Ground gas	Disused quarry within the west. Peat areas.	Current and Historical
Road and access tracks	PAH, TPH	Access tracks passing through the Site.	Current and Historical
Sheepfold	Arsenic and pesticides	West of the Site.	Current and Historical

Table 6-2 Potential Sources of Off-site Contamination (within 250 m of OHL area)

Potential Off-site Source	Potential Contaminants	Current / Historical
Potential made ground associated with construction of the existing OHL towers.	Metals and inorganic compounds, pH, PAHs, TPH including BTEX and MTBE, SVOCs, VOCs, sulphates, sulphides, phenols.	Current and Historical
Peat, made ground	Ground gas	Current and Historical
Road and access tracks	PAH, TPH	Current and Historical

6.2.2 Potential Receptors

The following potential receptors for contamination have been identified:

Table 6-3 Potential Receptors

Receptor	Description
Human Health	• Current and future site users, i.e. visitors to site (members of the public). • Future on-site construction and maintenance workers.

Receptor	Description
The Water Environment	• River Allt an Rathain River Allt nam Fiodhag River Allt nam Fiodhag; Allt Bail a' Chladaich and unnamed watercourses. Groundwater within superficial deposits. • Groundwater within the underlying bedrock aquifer (Loch Eil Group, low productivity aquifer).
The Built Environment	• Structures including concrete foundations.
Sensitive Ecological Sites	• Glen Affric (NNR - moorland), located within the southwest of the Site.

6.2.3 Potential Pathways

Potential pathways have been identified, which could link the potential sources with the potential receptors. These pathways are discussed by receptor type below in consideration of the development proposals.

Table 6-4 Potential Pathways

Pathway	Description
Human Health	• Future on-site workers by direct contact and/or ingestion of contaminated soil, dust and / or groundwater, inhalation of windblown dust. The presence of airborne dust may be exacerbated by demolition of the existing structures (towers in section 1.2) / construction work; • Visitors to the Site area using the access track; and • Inhalation of ground gas (confined spaces).
The Water Environment	• Groundwater within the superficial deposits by leaching and migration of contaminants via shallow made ground (if present) and natural superficial deposits; • Groundwater within the bedrock aquifer by leaching and migration of contaminants via shallow made ground and natural superficial deposits; • Surface water via surface water run-off, and lateral migration of contaminants via shallow deposits and service runs; and • Surface water by migration of contaminants via groundwater and introduction to river baseflow.
The Built Environment	• Concrete construction materials by direct contact with contaminated soil and groundwater (e.g. hydrocarbons) and aggressive ground conditions (pH and sulphate); and • Explosive risk from migration and build-up of ground gas within confined spaces.

6.2.4 Discounted Sources / Pathways / Receptors

The following sources, pathways and receptors are discounted from the conceptual site model with the justification presented:

Sources (off-site):

- Nearby forestry use is generally not considered as a source of contamination, given the periodic machinery use only;
- The sheepfold shown on historical map 1872 only so it is unlikely to be a source of contamination today; and
- The Site is greenfield with no past historical construction. Asbestos is not anticipated. Moreover, any buildings built after 2000 are not expected to contain asbestos[22].

Receptors:

- Private Water Supply as none within 1 km of the Site;
- Occupied buildings as none are proposed as part of the Proposed Development;
- Off-site third-party neighbours (excluding general visitors). There are no occupied buildings within 1 km of the Site; and
- Archaeological Receptors – No archaeological features have been identified within 1 km of the Site.

[22] UKHSA, 2024. *Asbestos: General information* [online]. Available from: http://Asbestos:%20general%20information%20-%20GOV.UK%20(www.gov.uk)

6.2.5 Qualitative Assessment of Source-Pathway-Receptor

Based on the information provided in this report, the following preliminary risk assessment tables have been formulated, with each identifying possible contaminants and contaminant linkages in the context of the current and Proposed Development.

At this stage, a qualitative risk assessment has been undertaken for these potential source-pathway-receptor linkages based on current DEFRA (Guidelines for Environmental Risk Assessment and Management)[23] and the CIRIA C552 Guidance[24] (see extract of the guidance in **Appendix H** including the coloured legend).

It must be noted that the following assessment is based solely on desktop study information and will require revision following any recommended intrusive site investigation works. The following assessment is based on consideration of both:

- The **likelihood** of an event (probability – takes into account both the presence of the hazard and receptor and the integrity of the pathway); and
- The **severity** of the potential consequence (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

The risks associated with potential on and off-site contaminants identified are detailed in the **Table 6-5** below. The risk assessment ratings are explained in **Appendix H**:

[23] DEFRA, 2011. *Guidelines for Environmental Risk Assessment – Green Leaves III* [online]. Available from: https://assets.publishing.service.gov.uk/media/5a79d20540f0b66d161ae5f9/pb13670-green-leaves-iii-1111071.pdf
[24] Lancefield, Mayell & Rudland, 2001. *Contaminated Land Risk Assessment – A guide to good practice* [online]. Available from: https://www.ciria.org/CIRIA/ProductExcerpts/C552.aspx

Table 6-5 Summary of Initial CSM and Risk Assessment

Source	Receptor		Exposure Pathway	Probability	Consequence	Risk Category	Justification
On-site Contamination sources including made ground associated with construction of the of the existing OHL towers, access roads and tracks, and the potential infilling of the former quarry and peat	**Human Health – On-site**	Future site users post development	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of contaminants in soil-derived dust.	Unlikely	Medium	**Low Risk**	The recent ground investigation did not encounter made ground on site. Concentrations of chromium recorded within the ground investigation which exceeded the assessment criteria are likely to be representative of natural background concentrations. Given the remote location of the Site and anticipated short duration visits, these concentrations are unlikely to represent a significant risk. For construction workers who would have increased exposure, this would be controlled by good site practice and health and safety legislation. The absence of other recorded contamination within the Proposed Development significantly reduces risks to site users in future. Whilst possible, contamination within the southern and western sections of the Proposed Development is currently unknown, it is unlikely to be present, and (if present at all) is likely to be isolated to localised areas only. Due to the location and nature of the Site, public access is expected to be limited. Ground gas risks associated with peat deposits may warrant further consideration during below ground or confined space working should this be undertaken.
			Inhalation of ground gas / vapour with explosive risk	Unlikely	Medium[25]	**Low Risk**	
		General public post development	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of contaminants in soil-derived dust.	Unlikely	Medium	**Low Risk**	
		Construction / Maintenance Workers	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of ground gas, and contaminants in soil-derived dust.	Unlikely	Medium	**Low Risk**	
	Water Environment -On-site and Off-site	Superficial and Bedrock Aquifers	Leaching of contaminants in the unsaturated zone to groundwater in underlying aquifers.	Unlikely	Medium	**Low Risk**	The recent ground investigation undertaken within the Site records groundwater strikes in four boreholes and five trial pits between 0.20 m (TP26, TP30) and 2.60 m bgl (BH17). Hydraulic continuity between shallow and deep groundwater is unknown but should be assumed. The limited extent of made ground in the Site and the absence of contamination recorded in samples and the lack of potentially contaminative historical land uses further decreases the risk to groundwater.
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Unlikely	Medium	**Low Risk**	
		Surface Water Features inc. River Allt an Rathain; River Allt	Lateral migration of contaminated groundwater with	Unlikely	Medium	**Low Risk**	Due to the presence of peat deposits and free draining soils, and the topography of the Site, the risk to surface

[25] Source severity has been downgraded to 'Medium' as ground gas sources identified have a 'Very Low or 'Low' ground gas generation potential and vapour sources are considered to be limited in potential concentration and extent. Therefore, vapour and ground gas are unlikely to generate significant concentrations capable of meeting the 'Severe' severity rating as defined in CIRIA C552.

Source	Receptor		Exposure Pathway	Probability	Consequence	Risk Category	Justification
		nam Fiodhag; Allt Bail a' Chladaich and unnamed watercourses.	discharge to surface watercourses as base flow.				water features via shallow deposits and / or surface run-off cannot be discounted. Several watercourses are present across the Site (section 5.4). However, there is limited potential of contaminants on site, which has been confirmed within the Site by the recent ground investigation.
			Discharge of contaminants entrained in surface water run-off followed by overland flow and discharge.	Unlikely	Medium	**Low Risk**	Contamination migration via granular superficial deposits is possible, though the general absence of significant potential contamination sources reduces risks. Overall risk of contaminated surface runoff and / or groundwater migration is considered to be low due to expected lack of significant sources of contamination on-site. Although some of the water features are located within the Site, with appropriate mitigation measures the risk to these are low.
	The Built Environment	Future Structures	Direct contact of contaminants in soil and / or groundwater	Unlikely	Mild	**Very Low Risk**	Whilst risks cannot be entirely discounted, potential impacts are considered unlikely due to the isolated location of the Site and the general low level of development of the surrounding area.
	Ecological Site	Glen Affric (NNR)	Direct contact of contaminants to vegetation in soil and / or groundwater	Unlikely	Mild	**Very Low Risk**	Potential impacts are considered unlikely as no contamination sources identified on The Site.
Off-site contamination sources including off-site made ground associated with construction of the existing OHL towers.	**Human Health – On-site**	Site users post development	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of ground gas, and contaminants in soil-derived dust.	Unlikely	Medium	**Low Risk**	Off-site contamination from neighbouring sources is a possibility, though the limited occupation of the Site reduces risk.
		Construction / Maintenance Workers		Unlikely	Medium	**Low Risk**	Risks to construction workers will be managed via adherence to health and safety legislation and regulations.
	The Built Environment	Existing and future structures	Direct contact of contaminants in soil and / or groundwater	Unlikely	Mild	**Very Low Risk**	Whilst risks cannot be entirely discounted, potential impacts can be managed by engineered mitigation measures.

7 Conclusions and Recommendations

7.1 Conclusions

Potential sources of contamination within the Site are considered limited and relate to made ground associated with the construction of the OHL towers (on-site and off-site), paths and access tracks (on-site and off-site). Made ground may also be associated with the potential infilling of the quarry. BGS mapping records made ground in one borehole within the southwest of the Site, possibly from track construction. However, the recent 2023 ground investigation did not encounter made ground on site. No asbestos was identified in the recent 2023 ground investigation

Contamination from these aforementioned potential sources could pose potential risks to human health, the water environment and the built environment if present, but this is considered to be unlikely. There is potential for contaminants to migrate off-site via surface water run-off and transportation through granular and organic soils. However, given the likely limited extent of contaminant sources, it is unlikely to represent a significant impact.

The water environment receptors represent the most sensitive receptors, via leaching of contaminants in the unsaturated zone to groundwater in underlying aquifers which is considered the most sensitive pathway. However, the limited extent of made ground in the area of the Site, and absence of contamination recorded in samples and the lack of potentially contaminative historical land uses further decreases the risk to groundwater. The water environment is considered at low risk, due to expected lack of significant sources of contamination on-site. Although some of the water features are located in the area of the Site with appropriate mitigation measures the risk to these are low.

Additionally, any workers / staff on-site will wear appropriate PPE and health and safety trained prior to any works being undertaken.

Finally, potential ground gas could be generated from infilled quarry (on-site) and peat deposits (on-site / off-site), with pathways to human health receptors via inhalation, migration / build-up of ground gas / explosive risk, respectively. However, the risk rating is low as the recent ground investigation records generally low concentrations of ground gas, with generally low flows. It is considered that construction workers who are required to work in confined spaces / excavations must ensure that the potential risks from ground gas are taken into account of within their health and safety practice.

Based on the available desk study information and the development end use, the Site is classified overall as having a low risk with respect to contaminated land.

Peat is recorded across much of the Site. The very limited investigation records within the Site positively identify peat deposits up to 2.50 m in thickness. Peat probing undertaken as part of the investigation around the proposed Bingally substation site, typically agrees with the exploratory holes positively identifying the peat with the probing indicating the peat is typically less than 2.0 m in thickness, although local deeper deposits are present. The depths and extents noted are based on the investigation records available which are limited to the vicinity of the proposed substation and don’t cover most of the Site. The desk-based sources indicate the peat generally falls within Class 5 peatland habitat, however, Class 1 Nationally important peatland habitats are recorded within the southern extent of the Site.

Based on the available desk study information and the Proposed Development layouts, the Site is classified as having a risk with respect to peat and peatland habitat.

7.2 Recommendations

The Geo-environmental Desk Study review has not identified unacceptable risks in accordance with LCRM guidance at the Site. However, it is possible that risks to human health and the water environment receptors are present on-site without having been recorded or reported. It is recommended that the following further work / assessment is undertaken to constrain potential risks and liabilities:

- Submission of this report to THC Contaminated Land Officer to obtain their approval of the report's findings. Furthermore, the scope of the Geo-environmental Desk Study has provided a preliminary characterisation of the Site's risk profile. However, as with all desk based studies there is a degree of uncertainty associated with them. In addition, as with any site there may be localised differences in made ground thicknesses, the presence of obstructions and physical or chemical composition, and unrecorded surface or ground disruptions and site activities. It is recommended that the Client and their construction contractors have an unexpected contamination strategy in place throughout the construction of the Proposed Development. If contamination is identified at any point during construction work then contact should be made with a suitably competent environmental consultant for further risk assessment to be undertaken.

The Desk Study has identified peat is present within the Site and underlying the proposed works covered by this report. Peat can pose a significant risk to the works throughout all phases and is required to be assessed and considered further, especially as Class 1 Nationally important peat and peatland habitats have been recorded within the Site. As such, the following recommendations for the peat are provided:

- Undertake further peat investigation (e.g. peat probing) to cover the full extent of the proposed infrastructure relating to the proposed works.
- Undertake an Environmental Appraisal to assess the significance the proposed works may have on the peatland.
- The design for the proposed works should aim to avoid the excavation and removal of peatland and the proposed layouts should look to avoid areas of deep peat (>1.0 m in thickness) where possible.
- A Peat Management Plan (PMP) should be undertaken to provide details on the volumes of peat estimated to require removal as part of the works and how the peat will be reused. The PMP shall also provide details and guidance on how peat will be excavated, handled, stored, reused, etc. The PMP will require updating throughout each phase of the works.
- A Peatland Landslide Hazard and Risk Assessment (PLHRA) in accordance with Energy Consents Unit guidance document Peat Landslide Hazard and Risk Assessment: Best Practice Guide for Proposed Electricity Generation Developments (April, 2017) should be undertaken. This will identify any areas where an unacceptable risk of a peat landslide is present and provide mitigation measures to reduce the risk and / or impact of such an event.

Appendix A Figures

Scottish & Southern Electricity Networks

TRANSMISSION

Tower 77

Tower 78R

Gantry 2

Gantry 1

Tower 79R

Tower 80

Tower 81

Pond

Quarry

Carn na h-Earbaige Bige

Waterfall

Rathain

Allt an Rathain

Coille an Tuathanaich

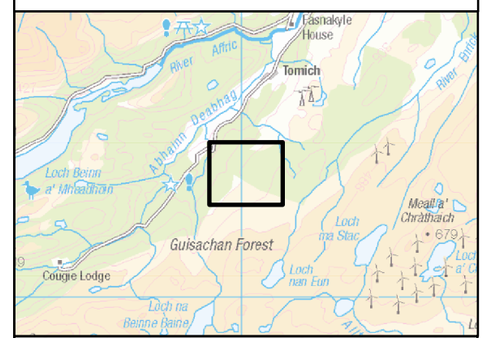
Allt na Faiche Bige

Scale @ A3: 1:7,500

0 50 100 200 300 400 500 m

Legend

- Proposed Development Site
- Proposed Bingally 400kV Substation
- Limit of Deviation
- Existing OHL Structures
- Permanent OHL Structures
- Permanent OHL Section Spans
- New Permanent Stone Access
- Existing Access Track



Project No: LT000521

Project: Bingally 400kV Overhead Line Tie-in

Title:
Proposed Site Plan Permanent Arrangement

Drawn by: JBARR Date: 02/04/2025

Drawing: Figure 1a

Scottish & Southern Electricity Networks

TRANSMISSION

29 30 31

25 24 23

Tower 77
Tower 78T
Tower 78
Tower 79T
Tower 79
Tower 80
Tower 81

Waterfall
Rathain
Pond
Quarry
Carn na h-Earbaige Bige
Coille an Tuathanaich
Allt an Rathain
Allt na Faiche Bige

Scale @ A3: 1:7,500

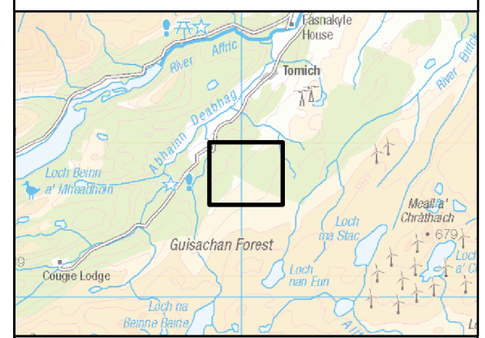
0 50 100 200 300 400 500 m

Legend

- Proposed Development Site

Permanent Layout

- Proposed Bingally Substation
- Limit of Deviation
- Existing OHL Structures
- Temporary OHL Structures
- Temporary OHL Section Spans
- Site Compound
- Tower Working Area (60 x 60 m)
- Tower Working Area (80 x 80 m)
- Equipotential Zone
- Proposed Bingally Substation Access Track
- New Permanent Stone Access
- Temporary Access Track Spurs
- Culvert



Project No: LT000521

Project: Bingally 400kV Overhead Line Tie-in

Title:

Proposed Site Plan Temporary Arrangement

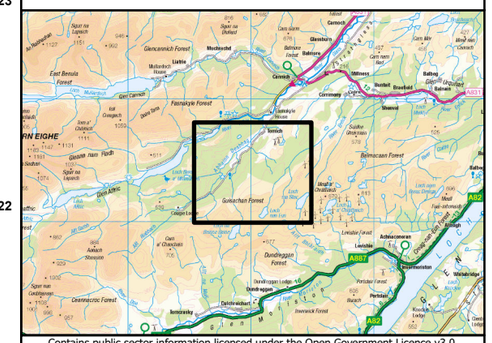
Drawn by: JBARR Date: 02/04/2025

Drawing: Figure 1b

Scottish & Southern Electricity Networks
TRANSMISSION

Legend

Proposed Development Site



Project No: LT000521

Project: Bingally 400kV Overhead Line Tie-in

Title:
Site Location Plan

Drawn by: JBARR Date: 09/12/2024

Drawing: Figure 2

Scale @ A3: 1:30,000

0 0.25 0.5 1 1.5 2 2.5 km

Appendix B Site Photographs

PHOTOGRAPHIC LOG

Client Name: SSEN Transmission	Bingally Overhead Line	Project No. 60701792

Photo No. 1	Date: 10/05/2024

New substation development area (proposed Bingally substation only)

(facing east)

Photo No. 2	Date: 10/05//2024

New substation development area (proposed Bingally substation only)

(facing north-east)

PHOTOGRAPHIC LOG

Client Name: SSEN Transmission	Bingally Overhead Line	Project No. 60701792

Photo No.	Date:
3	10/05/2024

New substation development area (proposed Bingally substation only)

(facing south)

Photo No.	Date:
4	10/05/2024

New substation development area (proposed Bingally substation only)

(facing south-east)

PHOTOGRAPHIC LOG

Client Name: SSEN Transmission	Bingally Overhead Line	Project No. 60701792

Photo No. 5	Date: 10/05/2024

Monitoring well on the new susbtation development area (proposed Bingally substation only)

(facing west)

Photo No. 6	Date: 10/05/2024

Off-site gravelly access track with drainage running channel alongside the track, to the north-west of the Proposed Development.

(facing north)

PHOTOGRAPHIC LOG

Client Name: SSEN Transmission	Bingally Overhead Line	Project No. 60701792

Photo No.	Date:
7	10/05/2024

Existing pylon associated with Beauly Denny transmission.

(Photo captured looking towards the north)

Photo No.	Date:
8	10/05/2024

Offsite old foot bridge across burn to the north-west of the new substation development area (proposed Bingally substation only)

(facing west)

Appendix C Groundsure Report

Appendix D SSEN Transmission Desk Study

Appendix E Local Authority Consultation

Appendix F BGS Borehole Records

Appendix G Zetica Pre-Desk Study Assessment (PDSA)

Pre-Desk Study Assessment

Site:	Fasnakyle Substation, Knochfin, Scotland
Client:	AECOM
Contact:	Oceane Mbaguta
Date:	4th September 2024

Pre-WWI Military Activity on or Affecting the Site	None identified.
WWI Military Activity on or Affecting the Site	None identified.
WWI Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: ■ Transport infrastructure and public utilities.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	None identified.
WWII Military Activity on or Affecting the Site	None identified on the Site. Military training is known to have taken place in rural areas of Scotland during WWII, but no readily available records have identified any such training on the Site.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: ■ Transport infrastructure and public utilities.
WWII Bombing Decoys (within 5km of Site)	None.
WWII Bombing	During WWII the Site was located in the Landward Area (LA) of Inverness-shire, which officially recorded 94No. High Explosive (HE) bombs with a bombing density of less than 0.1 bombs per 405 hectares (ha). No readily available records have been found to indicate that the Site was bombed.
Post-WWII Military Activity on or Affecting the Site	None identified.
Recommendation	A detailed desk study, whilst always prudent, is not considered essential in this instance.
Further information	For information about Zetica's detailed UXO desk studies and other UXO services, please visit our website: www.zeticauxo.com. Details and downloadable resources covering the most common sources of UXO hazard affecting sites in the UK can be found **here**. If you have any further queries, please don't hesitate to get in contact with us at uxo@zetica.com or 01993 886 682.

This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary.

It should be noted that where a potentially significant source of UXO hazard has been identified on the Site, the requirement for a detailed desk study and risk assessment has been confirmed and no further research will be undertaken at this stage. It is possible that further in-depth research as part of a detailed UXO desk study and risk assessment may identify other potential sources of UXO hazard on the Site.

Appendix H Approach to Risk Assessment

H.1 Risk Assessment Principles

Current best practice recommends that the determination of hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Environment Agency guidance on LCRM.

For a risk to be present, there must be a viable contaminant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway.

Assessments of risks associated with each of these contaminant linkages are discussed in the following sections.

Using criteria broadly based on those presented in the CIRIA C552 guidance ("Contaminated land risk assessment, a guide to good practice"), the magnitude of the risk associated with potential contamination at the Site has been assessed. To do this an estimate is made of:

- The magnitude of the potential consequence (i.e. severity);
- The magnitude of probability (i.e. likelihood); and

The severity of the risk is classified according to the criteria in Table H-1.

H.2 Risk Assessment Framework

Table H-1 Description of Severity of Risk

Severity	Definition	Examples (as defined by CIRIA C552)
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism for4ming part of such ecosystem (note: the definitions of eco9logical systems within the Draft Circular on Contaminated Land, DETR, 2000).	• High concentrations of cyanide on the surface of an informal recreation area; • Major spillage of contaminants from site into controlled water; and • Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied). –
Medium	Chronic damage to human health ("significant harm" as defined in DETR,2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution) a significant change in a particular ecosystem, or organism forming part of such ecosystem (note: the definition of ecological systems system within Draft Circular on Contaminated Land, DTR, 2000)	• Concentration of a contaminant from site exceed the generic, or site-specific assessment criteria; and • Leaching of contaminants from a site to a major or minor aquifer. – Death of a species within a designated nature reserve
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings / structures / services or the environment.	• Pollution of non-classified groundwater; and • Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability) –
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expensive to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) easily repairable effects of damage to buildings, structures and services	• The presence of contaminants at such concentrations that protective equipment is required during site works; and • The loss of plants in a landscaping scheme – Discolouration of concrete

The probability of the risk occurring is classified according to the criteria in Table H-2.

Table H-2 Likelihood of Risk Occurrence

Likelihood	Definition
High	There is a pollutant linkage and an event that either appears very likely in the short-term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur; and Circumstance are such that an event is not inevitable, but possible in the short-term and likely over the long term.
Low	There is a pollution linkage and circumstances are possible under which an event could occur.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown in Table H-3.

Table H-3 Risk based on Comparison of Likelihood and Severity

		Severity			
		SEVERE	**MEDIUM**	**MILD**	**MINOR**
Likelihood	**HIGH**	Very High	High	Moderate	Moderate / Low
	LIKELY	High	Moderate	Moderate / Low	Low
	LOW	Moderate	Moderate / Low	Low	Very Low
	UNLIKELY	Moderate / Low	Low	Very Low	Very Low

Further definitions of each risk category as well as potential action that might be required – as described within CIRIA C552 – are as follows:

Very high risk

There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening;

This risk, if realised, is likely to result in a substantial liability; and

Urgent investigation (if not undertaken already) and remediation are likely to be required.

High risk

Harm is likely to arise to a designated receptor from an identified hazard;

Realisation of the risk is likely to present a substantial liability; and

Urgent investigation (if not undertaken already) is likely to be required and remedial works may be necessary in the short-term and are likely over the longer term.

Moderate risk

It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild;

Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability; and

Some remediation works may be required in the longer term.

Low risk

It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

Very low risk

There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.