Fort Augustus 400kV Upgrade

Geo-environmental Desk Study

Scottish & Southern Energy Networks

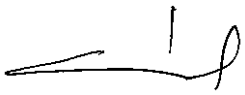
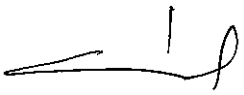
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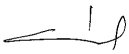
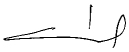
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Any risks identified in this Report are perceived risks, based on the information reviewed during the desk study and therefore partially based on conjecture from available information. The study is limited by the non-intrusive nature of the work and 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 and are based on the broad development of the site for substation use only.

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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1. Introduction

1.1 Commission

AECOM Limited has been commissioned by Scottish & Southern Electricity Networks (SSEN) to undertake a Geo-environmental Desk Study for a proposed development site within the Fort Augustus substation at Auchterawe, Scotland.

SSEN is proposing to upgrade the Fort Augustus substation to accommodate 400kV substations (referred to hereafter as “the proposed development”) in proximity to the existing Fort Augustus substation. SSEN is proposing to upgrade the existing Beauly-Denny 275 kV circuit to 400 kV to mirror the ratings of the existing 400 kV circuit which runs along the route. The works to be delivered form part of the Ofgem Accelerated Strategic Transmission Investment (ASTI) project for the upgrade of the 2nd Beauly – Denny 275kV circuit to 400kV. This project, alongside several other major network upgrades planned in the north of Scotland, is planned to meet the UK and Scottish Government energy targets.

The Geo-environmental Desk Study is required to characterize potential land quality constraints / opportunities, to provide input to the existing planning application and provide baseline data for input into the proposed Environmental Appraisal. The site location and boundary plans are included in **Appendix A**. This report presents the findings in relation to the proposed development (also referred to as “the site”).

1.2 Proposed Development and Planning Status

The proposed development comprises the upgrading of the existing Beauly-Denny 275kV circuit to accommodate a 400kV circuit, specifically comprising the following elements:

- Upgrade of existing 275/132kV 240MVA super grid transformers at Fort Augustus to 400/132kV 240MVA super grid transformers-SGTs (with superfluous equipment removed from site);
- Four 400kV bays for interconnector circuits (two at existing busbar and two at new busbar);
- Two 400kV reactors and associated switchgear bays including an indoor Gas insulated switchgear (GIS) substation;
- Two bays for future generator connections;
- Further space provision for two future bays; and
- Removal of the southwest SUDS pond which will be backfilled as part of the Loch Lundie Overhead line works (different consent).

The pylon tower which is within the boundary of the proposed development as shown on the Site Boundary Plan in **Appendix A** is required to be moved to the south, outside of the proposed development Site, but still within the wider substation area.

The Proposed Development is part of a wider development scheme that includes two phases of development. Phase 1 of this development scheme comprises two additional buildings, substation equipment, surrounding roadways and earthworks bunds to the west of the site, this phase of development is completed. Phase 2 was a 275Kv upgrade project which is now superseded by a 400kV development scheme, which is the subject of this report. Both development phases are covered under Highland Council Planning Application 18/00760/FUL. The planning application for the wider development does not include conditions for the contaminated land assessment.

1.3 Scope and Objective of Report

The objective of the Geo-environmental 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 proposed re-development options. The Geo-environmental 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 (including available BGS borehole records), 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 an Envirocheck Report purchased for the site;
- Review of available records provided by the Client;
- Review of UXO information available in public domain;
- Develop a preliminary 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 identified geo-environmental and land quality risks; and
- Provide recommendations for further work.

1.4 Sources of Information

The following bodies were consulted during the assessment:

- Landmark Envirocheck; (323724286_1_1, 7 November 2023);
- FUGRO Report on Ground Investigation Without Geotechnical Evaluation Fort Augustus Substation Redevelopment (G181010U, 25 September 2018);
- Scottish & Southern Electricity Networks LT0000519Fort Augustus 400Kv upgrade. Contract: Environmental Impact Assessment/Environmental Assessment (1085-05-18, Scope Particular Requirements);
- Raeburn Drilling & Geotechnical Ltd LT519 Fort Augustus 400KV Substation Upgrade Report on Ground Investigation (26491, 20 November 2023);
- SLR Consulting *RE: Fort Augustus – Peat Management'* (Ref. 428.00660.00052, 19 June 2018).
- Highland Council – Contaminated Land Officer (23/16, 9 November 2023);
- SEPA Response to F0196245 (06 December 2023);
- The Coal Authority (CA); (Interactive Map Viewer | Coal Authority (bgs.ac.uk))
- British Geological Survey (BGS); (GeoIndex – British Geological Survey (bgs.ac.uk))
- Scottish Environment Agency (SEPA); (Water Environment Hub (sepa.org.uk))
- Scottish Environment Agency (SEPA); Water Classification Hub (sepa.org.uk)
- SEPA Flood Risk (https://map.sepa.org.uk/floodmaps/FloodRisk/Search);
- NatureScot; (https://sitelink.nature.scot/map)
- Historic Environment Scotland (HES); (Designations Map Search (arcgis.com))
- Zetica UXO Map (Risk Maps | Zetica UXO)
- UK Radon Map (UKradon - UK maps of radon)

Specific information sources are referenced throughout the document.

2. Site Description

2.1 Site Location

The site is situated in approximately 2.3km southwest of Fort Augustus and to the northeast of Auchterawe community at National Grid Reference NH 35695 08320, at the Fort Augustus Substation Auchterawe Road, PH32 4BT. A site location plan and the site boundary plan are included in **Appendix A**.

2.2 Current Site Use, Topography and Geography

The site is predominantly unoccupied grassland, with a pylon tower and associated temporary construction compound buildings in the centre. There are areas used as temporary car parks for construction workers in the northeast and northwest of the proposed development. The following roads give access to the site-the A82 road from Inchnacardoch via the U1671 (Great Glen Way) to the west and U1663 (Jenkins Park and Auchteraw Road) to the east. These roads extend into the car parks located within the northeast of the site, and southeast of the pylon tower.

Within the surrounding area, a SUDS pond is located adjacent to the southwest, and the proposed development is located within a Landscape Character Type (LCT) 225/2019, the Broad Steep-Sided Glen. Characterised by a broad, linear, steep sided, V-shaped glen and deep loch. Large scale conifer forests with small areas of open moorland, small patches of broad-leaved woodlands, agricultural land on less steep slopes, a few settlements with a well-defined core, located at glen intersections. The wider substation area is surrounded to the, south, west and east by plantation forestry, woodland and conifers. The woodland that surrounds the site is predominantly woodland of Sitka Spruce, Lodge Pole Pine, Douglas Fir and Norway Spruce. There are overhead line transmission wayleaves that cut through the woodland to the north and south. The most notable transmission line is the 400kV Beauly to Denny line which traverses the area along a northwest/southeast axis.

Beyond the wider substation area on the northwest side, the valley floor is comprised of open fields, with residential properties located along the public road. This area is separated from the existing substation by an area of plantation forest (approximately 100m to 300m in width) cut through by narrow wayleaves. A further area of plantation forest is found to the southeast extending outwards from the surrounding broader extent. To the west of this a broad, open wayleave of rough grass and heather are present. To the north there is an area of open field comprising permanent pasture.

The proposed development site is on low slope at an angle of 5 degrees, with gradient direction north-west to south-east. The ground levels vary between 43.2m and 38.4m AOD.

2.3 Specific Site Information

Table 2.1 below gives a summary of existing information provided by the Client in relation to the current use of site and the wider substation. The Client provided site description information for the various features both on-site and in the surrounding area, this has been used to measure relative distances (where shown) to the various features highlighted.

Table 2.1 Information Provided by the Client

On Site	Off-Site
• Existing Car Park within the northeast.	• Adjacent substation associated with existing oil filled 400/132Kv Super Grid Transformers (SGTs) between 25 and 166m northwest of the site. • Adjacent existing diesel generators one outside the old 132kV control building and one outside the 400Kv GIS building at approximately 20m northwest of the site. • No PCBs in grid and super grid transformers. The oil filled plant was recently installed.
	• The wider substation northwest of the site primarily comprises plant, equipment and machinery. The wider substation also includes welfare facilities, control rooms, battery rooms and one storage building.
	• The storage building is a high voltage partially open bus bar substation which includes old protection and control relay panels, and possibly also storing insulating gas.

3. Site History

3.1 Introduction

The following account of the historical development of the site and its immediate surroundings are based on examination of historical Ordnance Survey (OS) and aerial photography both obtained as part of an Envirocheck Report attached as **Appendix B**, and a review of publicly available web-based mapping services.

AECOM also notes that only indicative map scales are provided. 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 & Aerial Photographs

A review of historical land uses within the site and surrounding areas has been undertaken using OS Bing, Google Earth Pro, and the Envirocheck ordnance surveys/report and is summarised in Table 3.1 below. It should be noted that the search has been limited to 250m, with only notable land uses beyond this distance included.

Table 3.1 Summary of Historical Mapping & Aerial Photography

Date/s	Features within on-site development area	Features within 250m of development area
1873-1874 (1:10,560)	• The site is undeveloped with mainly agricultural/rough pastureland within the northeast and central areas of the site. • Two un-named drains that converge at a confluence with the site boundary are shown.	• Surrounding area is undeveloped land, with Auchteraw Burn located to the southwest of the site.
1876 (1:2,500)	• No significant changes	• No significant changes
1900	• Rough land pasture only shown below the County Boundary (Geographical), overall less land pasture	• No significant changes
1904 (1:10,560)	• The site is undeveloped with mainly agricultural/rough pastureland within the northeast and central areas of the site.	• No significant changes
1967-1968 (1:2,500)	• The western-most un-named drain is no longer shown.	• Coniferous and non-coniferous trees shown to the southeast, and southwest near Auchteraw Burn • An Electricity Transmission Line 'ETL', and associated pylon tower shown approximately 180m north of the site. A new drain is shown adjacent to the southeast of the site. • Additional areas of rough land pastures to the south of the site, between Auchteraw Burn and the new drain • Electricity Pylon adjacent to the southeast of the site.
1970-1971 (1:10,000)	• Wind Gauge present within the northeast of the site.	• Three additional pylons to the north associated with cable lines, at approximate distances of 180m, and one at approximately 115m. • New buildings at approximate distance of 65m northeast of the site, near the pylon location, potentially associated with the Auchterawe substation. • New buildings/properties, and associated coniferous trees and cisterns within 200m northeast of the site, • A new drain approximately 97m north of the site, near the believed substation. • Sports Ground approximately 280m to the northwest. • Sheepfold at approximately 255m northeast of the site. • Sports Ground at approximately 247m northwest of the site. • Substation at approximately 70m north of the site.

Date/s	Features within on-site development area	Features within 250m of development area
		• New buildings/residential properties at approximately 82m north and 183m northeast of the site.
1995 (1:2,500)	• Agricultural/rough pastureland no longer shown on site	• Areas of coniferous/non-coniferous trees, and rough land pasture are no longer shown. • Heath Habitat at approximately 250m southwest of the site.
2001 (1:10,000)	• Site is mainly unoccupied. • 'Drain' is shown on the site flowing north to south.	• Coniferous trees shown adjacent to the southwest, southeast and west of the site. • Substation approximately 65m north of the site is labelled as 'Electricity Distribution Site' • Sand pit southwest within 500m • New building at approximately 120m northwest of the site. • 'Sports Ground' no longer shown
2005	• No significant changes	• No significant changes
2006 (1:10,000)	• No significant changes	• No significant changes
2021 (Google Earth)	• SUDS pond to the southwest of the site	• Pond shown approximately 31m south of the site
2023 (1:10,000)	• Rough pastureland within the west of the site • A new Pylon tower to the centre • Car park to the northeast of the site • Car park to the southeast, south of the pylon tower • New building of approximately 500m^2 in the centre of the site.	• Expansion of the Auchterawe substation. • Four new buildings to the northwest between 34m-187m. • Coniferous trees to the west, southwest, and east of the site, replace with rough pastureland. • A new track 92m northwest of the site. • New transmission line 250m northwest of the site

4. Existing Information Review

4.1 Introduction

Numerous reports have been provided to AECOM related to the subject site and / or the wider substation area from previous proposed developments, planning applications and specific design surveys for the proposed development. Where these reports relate to the proposed developments geological or land quality status, they have been subject to a review and summary as part of this report.

Where the submitted reports are not relevant to land quality or geology, they are not included for further review in as part of this study.

4.2 Third Party Information Review

4.2.1 Fugro, Report on Ground Investigation (2018)

The Client SSEN commissioned Fugro Geoservices Limited (FGSL) to undertake a ground investigation at the wider Fort Augustus Substation. FGSL carried out the ground investigation within the area adjacent to the current proposed development. The objective of the works was to characterise the ground and groundwater conditions within the wider substation area and the proposed development, and to provide SSEN with information to assist the geotechnical approval report. The site work was carried between 12 June and 27 June 2018. The report on ground investigation without the geotechnical evaluation comprised exploratory hole and field-testing records, laboratory results, photographs and a site plan[1].

The ground investigation works included five cable percussion boreholes to 4.20m below ground level (bgl), eleven machine excavated trial pits up to 4.00m bgl, two trial pits included soak away tests and eleven included in-situ California Bearing Ratio (CBR) tests at 0.50m bgl. Two thermal resistivity tests were completed at 1.50m bgl. The ground investigation was carried out in accordance with BS 5930:2015, BS EN ISO 14688-1:2002 + A1:2013 and BS EN ISO 14689-1:2003 and BS 10175:2011 + A1:2013.

The report identified the following key findings:

- The site investigated (i.e wider substation area) was described as located approximately 2.5km to the west of Fort Augustus and to the east of the Auchterawe community, amongst woodland. The site is centred at National Grid reference NH 35627 08347, The site was adjacent to dense woodland, private properties and dwellings.
- The site was described as underlain by superficial deposits of Devensian Glaciofluvial sheet deposits comprising sands, gravels and boulders. The bedrock geology is made up of West Highland Granite Gneiss Intrusion to the south of the development and Tarvie Psammite Formation to the north of the development.
- A summary of the geological strata encountered during the ground investigation is presented below:
  - Topsoil of dark brown slightly gravelly clayey fine to coarse sand, or fine to coarse gravel encountered to a maximum of 0.35m bgl.
  - Underlying superficial deposits comprised brown or brownish grey gravelly fine to coarse sand or fine to fine to coarse gravel, encountered to a maximum thickness of 4.20m bgl[2].
  - Bedrock was not encountered.
- The geotechnical laboratory testing was undertaken by DETS (reference 18-19148 and 18-20755) and included the following: moisture content, particle size distribution by sieving, sedimentation by pipette, 4.5kg compaction, California Bearing Ratio (CBR), BRE SD1 suite, sulphate, chloride and pH testing.
- Chemical contamination testing was analysed for a range of contaminants including metals, total cyanide, free cyanide, total phenols, total sulphate, sulphur, sulphide, pH, Total Organic Carbon (TOC), Extractable Petroleum Hydrocarbons (EPH), Polycyclic Aromatic Hydrocarbons (PAHs), Asbestos, Waste Acceptance Criteria (WAC) analysis. Fugro did not comment on whether or not visual / olfactory evidence of contamination was identified.

[1] FUGRO-Report on Ground Investigation Without Geotechnical Evaluation Fort Augustus Substation Redevelopment, 25 September 2018
[2] Maximum thickness taken from BH4 exploratory hole log.

- Asbestos was not identified within any of the soil samples analysed. Chemical results were generally close to or below the method detection limit, except for generally higher chromium, zinc, lead, nickel and copper content. Whilst AECOM have not undertaken formal quantitative risk assessment on these results, they do indicate the presence of likely contamination impacts.
- Groundwater was not encountered in any of the boreholes during boring or excavation.
- An Unexploded Ordnance (UXO) risk mitigation survey was undertaken and UXOs were not encountered.

4.2.2 SSEN, Scope Particular Requirements

The report is for site selection, EIA Screening and Environmental Impact Assessment Report (EIAR) to support the Town and Country Planning Application to upgrade the existing Beauty Denny 275Kv circuit to 400Kv at Fort Augustus, i.e the proposed development[3].

The report identifies the proposed development as an expansion of the existing electricity substation in two phases. The report covers both the proposed development and the wider substation area. For the purpose of AECOM reporting, this is referred as the 'wider substation area' in the below text, and as described in **Section 1.2**.

The report identified the following[4]:

- The wider substation area development does not lie within a designated landscape. It falls within the Great Glen south of Fort Augustus, within which the historic and still active Caledonian Canal passes to the south (>1km).
- Groundwater is anticipated to migrate through the proposed development and the wider substation area because of the permeable nature of the topsoil (peat and sandy gravels). The applicant has produced a Surface Water Management Plan which has influenced the proposed layout. A permanent site drainage plan has been developed to cope with 1 in 200 (0.5% likelihood) year event, + 30% climate change with temporary drainage designed to accommodate a 1:100 year event.
- Although no signs of protected mammal species were identified during the course of surveys both on site and on the wider substation area there appears to be suitable habitat for badger, with woodland edges, scrub and extensive areas of grassland suitable for shelter and foraging. Conifer plantations provided suitable habitat for Red squirrel and Pine marten. There was limited suitable habitat for Otter or Water vole within the proposed development and the wider substation area.

4.2.3 SLR Consulting, Peat Response (2018)

SLR Consulting produced a letter report detailing the findings of a peat survey undertaken for the proposed development and the surrounding area[5].

- The letter was prepared for Susan Haslam in response to SEPA's objection to the planning application (18/007760/FUL), seeking information to demonstrate the proposed development will not disturb areas of peat.

The peat survey identified the following:

- A total of 145 peat probes were undertaken, on the 13th of June 2018.
- Soil thickness varied up to 40cm, but generally between10-30cm. One deeper area around a water course (adjacent to the south of the site), encountered soils to 60cm, however, this was alluvial deposits rather than peat.
- If organic soils have been found in the past investigations, their presence is localised, there is no evidence to suggest that there are significant peat deposits on the proposed development and wider substation area.
- There is stated to be "*no risk*" of future planned development compromising any significant peat deposits.

[3] SSSEN LT0000519 Fort Augustus 400Kv upgrade (1085-05-18, Scope Particular Requirements).

[4] Note: only items considered to be relevant to land quality have been summarised.

[5] SLR Consulting *RE: Fort Augustus – Peat Management'*, dated 19 June 2018 (Ref. 428.00660.00052).

4.2.4 Raeburn, Report on Ground Investigation (2023)

The Client SSEN commissioned Raeburn Drilling & Geotechnical Limited (RDG) to undertake a ground investigation at the proposed development (Phase 2). The site works were carried out under the instruction of the investigation supervisor Jacobs. A factual report was only requested. The objective of the works was to provide information on the ground conditions for design and construction of the proposed development and in relation to determine any geochemical contamination of the site. The site work was carried between 14 August and 25 August 2023, in accordance with EN1997-2:2007[6], BS5930[7], BS10175[8] and in house - procedures. Prior to commencing the works, an Ecological Clerk of Works (ECoW) carried out a survey to ensure no ecological or environmental constraints were present.

The report on ground investigation comprised borehole and trial pits records, testing records, laboratory results, photographs and a site plan[9].

The ground investigation works included twelve boreholes drilled by resonance sonic drilling up to 16.50 mbgl, twenty one trial pits excavated by mechanical means up to 3.60 mbgl. Soak away tests were undertaken in three of the trial pits. Dynamic Cone Penetrometer (DCP) tests were undertaken in five of the trial pits. Twelve in situ thermal resistivity tests were undertaken in six of the trial pits.

Perforated standpipes were installed in seven boreholes between 4.00m bgl and 10.00m bgl to monitor ground gas concentrations for methane, carbon monoxide, hydrogen sulphide, and oxygen. No water was encountered in any of the seven boreholes.

The report identified the following key findings:

- The site investigated is situated in a forestry area with some residential dwellings nearby.
- The positions and depths of the boreholes and trial pits were determined by SSEN and were set out on site by Raeburn Drilling & Geotechnical Ltd, in conjunction with Jacobs.
- Raeburn Drilling & Geotechnical Ltd prepared the test schedules and site works were completed by Jacobs.
- FATP08 and FATP08B were undertaken simultaneously and were separated into pit A and B due to the presence of potentially contaminated material.
- The laboratory geotechnical testing was carried out by Terra Tek Limited (Trading as Igne) and included the following: Moisture content, Liquid and plastic limit tests, Particle Size Distribution Tests, Moisture Content/Dry Density Relations, Maximum & Minimum Dry Densities for Granular Soils, Shear Strength by Direct Shear, Thermal Resistivity, BRE Suite C.
- Chemical contamination testing was carried by Terra Tek Ltd for a range of contaminants including: Metals, Inorganic Suite, Total Petroleum Hydrocarbon Criteria Working Group / Volatile Petroleum Hydrocarbon Criteria Working Group (TPHCWG / VPHCWG) , PAH, PCBs 7 Congeners, Volatile Organic Compounds (VOCs), Benzene, Toluene, Ethylbenzene, Xylene (BTEX) , Asbestos, WAC analysis.
- Chemical results were generally close to or below the method detection limit, except for generally higher total chromium, zinc, lead, nickel, copper, organic matter, total organic carbon, TPH (C10-C40) and PCBs content. Whilst AECOM have not undertaken a formal quantitative risk assessment of the data provided for review, the concentrations do not appear to indicate contamination impacts.
- No asbestos was identified within any of the soil samples analysed.
- The WAC testing did not show any exceedances of inert landfill, stable non-reactive hazardous landfill and hazardous landfill acceptance criteria.
- Groundwater strikes were encountered in five of the trial pits (FATP03, FATP08, FATP08A, FATP08B and FATP08C) between depths of 0.30-2.50m bgl within topsoil, made ground and superficial deposits.
- A summary of the geological strata encountered during the ground investigation is presented below:

[6] BS EN 1997-2. Eurocode 7: Geotechnical design-Part 2: Design assisted by laboratory testing, 2007.
[7] BS5930:2015+A1:2020: Code of Practice for Ground Investigations, British Standards Institution, 2020.
[8] BS10175: Code of Practice for the investigation of Potentially Contaminated Sites, British Standards Institution, 2011 + A1:2013.
[9] RAEBURN-Report on Ground Investigation, LT519 Fort Augustus 400KV Substation Upgrade, 20 November 2023

- Made Ground of dark brown and brown silty fine and medium sand and fine to coarse subangular to rounded gravel of various lithologies including granite, psammite and gneiss with low and medium cobble and low boulder content with frequent rootlets, up to 3.60mbgl[10].
- Superficial deposits of very dense brown silty coarse sand and fine to coarse subangular and subrounded gravel of granite and psammite with cobbles to 16.50mbgl[11].
- No bedrock was encountered.

- Three rounds of ground gas monitoring data were undertaken at atmospheric pressure ranging between 973mbar and 1019mbar. The following ground gas results were recorded:
  - Methane (CH4) at 0%v/v;
  - Carbon dioxide (C02) between 0.10%v/v and 0.20%v/v;
  - Oxygen (O2) between 19.50%v/v and 20.40%v/v;
  - Hydrogen sulphide (H2S) between 0ppm and 1ppm; and,
  - Carbon monoxide (CO) at 0 ppm

- The ECoW Report included as Appendix E of the Raeburn Report identified the following:
  - No immediate ecological or environmental concerns. Most positions were microsited to avoid potential issues with watercourses, vegetation, or from an engineering perspective to avoid placing positions on man-made bunds.
  - One Toad (Bufo bufo) was recorded along with a variety of common woodland and scrubland bird species. No sign of nesting was recorded.
  - Two scats (likely to be Fox (Vulpes vulpes) and Pine Marten (Martes martes) were recorded on the trac of the water extraction point.
  - It is recommended weekly ECoW visits are made to ensure compliance with all relevant legislation, including use of drip-mats, correct storage of chemicals, separated waste, no litter, and appropriate levels of reinstatement where earthworks are necessary for access.

4.3 Regulatory Consultation

4.3.1 SEPA, Freedom of Information Request

AECOM has requested information from SEPA to assess any information relating to potentially contaminated land within the site within a radius of no greater than 1km from the site. The following information has been issued to AECOM on 6 December 2023 (Ref-Response to F0196245), and attached as **Appendix C**:

- Historically, the main land use has been forestry. It has been owned and maintained by the Forestry Commission since 1919.
- The site is not identified as Contaminated Land Under Part IIA of the Environmental protection Act 1990.
- No relevant pollution incidents have been recorded since 2021.
- Areas both within the site and in the immediate surrounding are not listed as sites of special interest, protection or conservation.
- Most of the site area and the immediate surrounding areas are vulnerable to pollutants not readily adsorbed or transformed.
- SEPA holds records of 18 private sewage registration along the U1663 Auchteraw Road. Additionally, SEPA holds records of 4 pipeline/cable crossings, 1 bridging culvert, and 4-point sources for both new and existing sewage treatment systems. The Allt na Fearna Hydro Scheme located at 1km northeast of the site has a licence for abstraction (CAR/L/1140297), impoundment hydropower, and abstraction return, while the current Fort Augustus substation (CAR/R/5002941) has a licence for impoundment for flood defence and for realignment of the watercourse.

4.3.2 Highland Council, Freedom Of Information Request

AECOM has requested information from The Highland Council (HC) to assess any information relating to potentially contaminated land within the site within a radius of no greater than 1km from the site. The following information has been issued to AECOM on 9 November (Ref 23/16), and attached as **Appendix C**:

[10] Based on FATP17 trial pit log
[11] Based on FAB03 borehole log

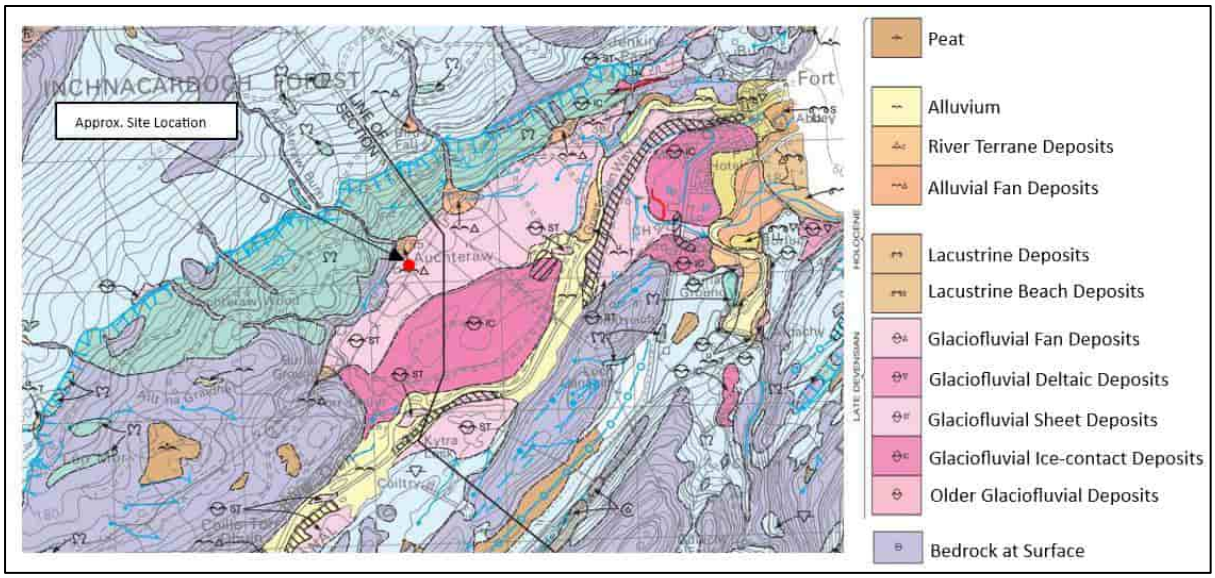
- HC does not hold details of any recorded current or historical environmental problems at the site and adjacent areas with regards to ground contamination or solid waste arisings.
- No details of any historical landfills are recorded within 500m of the site boundary.
- There are no records of any ecologically sensitive areas in the nearby vicinity of the site.
- Areas both within the site and in the nearby vicinity are not listed as sites of special interest, protection, or conservation.
- Residential and commercial properties are considered as potentially sensitive receptors. A total of nine residential properties and one self-catered accommodation site were identified within 250m of the site. However, records do not include any areas of potentially contaminated land to affect these properties.
- Surface water bodies such as the Allt Na Fearna are considered as a sensitive environmental receptor.
- HC holds records of four private water supplies located between 148m and 380m northwest of the site.

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 Sheet 73W Invermoriston (dated 2012), and the Envirocheck Report (**Appendix B**).

An extract of from the geological map indicated above is presented below as **Figure 1**.



C16/02-CSL British Geological Survey © UKRI. All rights reserved.

Figure 1 Published Geology

The following sections summarise the geological setting of the proposed development and surrounding area,

5.1.1 Artificial Ground

There are no BGS designated areas of made ground or artificial ground recorded on the site or within 250m of the proposed development boundary.

5.1.2 Natural Superficial Deposits

The drift geology across the site is shown to comprise superficial deposits of Glaciofluvial Sheet Deposits, comprising sand, gravel, and boulder. Small areas of Hummocky (moundy) Glacial Deposits Alluvium and Alluvial Fan Deposits are also shown off-site to the north and northeast respectively.

5.1.3 Solid Geology

Published mapping shows that Tarvie Psammite Formation – Psammite is present beneath the site, with the West Highland Granite Gneiss Intrusion – Granite located adjacent to the south of the site area. Given the ambiguity in geological mapping and the interpretation of the geologists undertaking the original survey, the possibility of the West Highland Granite Gneiss Intrusion being present beneath the proposed development area should be considered.

5.2 Historical Borehole Records

Exploratory hole logs available on the BGS Geoindex have been reviewed to provide an indication of the ground conditions on site. There were three available hole records for boreholes within 250m of the site boundary (BGS Geoindex reference NH30NE35-no FT01-A-2, NH30NE34-no FT01-A-1, NH30NE33-no BF132), located at approximately 45m to the west and 270m northwest of the site.

Superficial deposits across the wider substation area were encountered between up to 8.50m and 16.00mbgl described as brown gravelly fine to coarse sand locally passing to a fine coarse sand and very sandy subrounded and rounded fine to coarse gravel[12]. In location BF132, cobbles and boulders of schist were recorded.

Groundwater strikes were encountered at depth of 0.70mbgl which was sealed off at 1.50mbgl, and heavy ground water was encountered at depth of 10.50mbgl[13] (reference BF132), recorded in sand superficial deposits. Heavy groundwater was also encountered at a depth of 13.00mbgl in gravel superficial deposits[14]. No visual or olfactory evidence of contamination was recorded. The Borehole records are attached in **Appendix D.**

5.3 Mining and Quarrying

The Coal Authority website[15] has been reviewed on 04 December 2023, to determine whether the proposed development is within a Coal Authority Reporting Area. The review determined that the site is not within the Coal Authority Reporting Area, indicating that risks from coal mining are negligible. The Envirocheck report indicates one non-coal mining area of Great Britain at distance of 245m north of the site, however available aerial images and maps do not show any potential mining areas in this approximate location. Hence, this is not considered to represent a likely risk to the proposed development.

Additionally, there is one recorded BGS Mineral site at a distance of 522m east of the site referred to as 'Muir Pit', comprising an opencast quarry of 'Dormant' status. The geology is Glaciofluvial Ice Contact Deposits, Devensian and the resource removed from the quarry is stated to be sand and gravel.

There is a potentially infilled land (Water) to the southwest of the site, at approximate distance of 535m.

5.4 Hydrology

Review of publicly available Ordnance Survey maps undertaken indicates drainage routes passing through the east of the site boundary, and to the north of the wider substation. The hydrology of the area is summarised in Table 5.1 below.

Table 5.1 Summary of Hydrology

Feature	Distance to proposed development	Flow Direction	Description
Auchteraw Burn and associated tributaries (FA1)	80m South. Flows along the western and southern edge of the proposed development site boundary.	East	The Auchteraw Burn collects water from various small un-named drains and other named burns to the north and west of the site and discharges into a confluence with the River Oich approximately 800m east. Originates from around NH 33148 10208 to the northwest of the development site on steep terrain around 370mAOD in the saddle between hills Carn Mhic Raonuill and Carn Tarsuin.
Allt na Feàrna and associated tributaries (FA2)	100m East. Flows into FA1, on the southern edge of the proposed development site boundary.	Southeast	This watercourse is located to the northeast of the site beyond the artificially altered location of the un-named drain above. This flows in a south-easterly direction to meet the River Oich at a confluence. Originates from around NH 34639 11240 and flows into FA1 at NH 36237 08184
Un-named Surface Water Drain (FA3)	200m North Flows directly through the wider substation area.	East	Situated to the north of Fort Augustus Substation. Appears to have been engineered or manmade channel. Appears to have originated from NH 35430 08612, NH 35490 08667 and NH 35093 08357. The flows over the north of the substation and down into the engineered drainage system at NH 35945 08190.
Engineered Surface Water Drain (FA4)	Flows through the proposed development site boundary.	Southeast	This water features comprises a recently re-engineered channel to add a series of undulating bends in the surface water features and model it to improve flow.

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

[12] Based on NH30NE34
[13] Based on NH30NE33
[14] Based on NH30NE34
[15] Interactive Map Viewer | Coal Authority (bgs.ac.uk)

Selected water bodies in Scotland are classified by SEPA under the Water Framework Directive (WFD) with classifications of High, Good, Moderate, Poor or Bad. The River Oich (SEPA ID: 20253), is in the River Ness Catchment, with an overall classification of "Good" by SEPA in 2020.

Three Private Water Supply abtractions from surface water features are present between 148m and 770m from the site boundary, these are localised abstractions for domestic use associated with individual residential properties.

5.5 Hydrogeology

Information from the Envirocheck Report (**Appendix B**), BGS Onshore Geoindex[16], Aquifer Productivity (Scotland) GIS datasets Version 2 Revised Report[17] and the Scotland's Aquifers and Groundwater bodies (OR/15/028[18]) has been reviewed in relation to the aquifer classifications for superficial deposits and bedrock underlying the site. These conclude that:

- **The Glaciofluvial Sheet Deposits** - classified as intergranular flow, with high productivity (IH) and borehole yields >10 l/s.
- **Tarvie Psammite Formation-Psammite –** classified by SEPA as a low productivity aquifer (Loch Eil Group). The Loch Eil group is an aquifer with small amounts of groundwater in near surface weathered zone and secondary fractures, and low yields (0.1 to 10l/s). Similarly, the Envirocheck report identifies the site area to have a 'Non or weakly permeable bedrock aquifer- with negligible permeability that are generally regarded as containing insignificant quantities of groundwater'.

The groundwater beneath the site falls in the 'Northern Highlands'' (SEPA ID: 150701) of the Scotland River basin district and is classified as having an overall condition of 'good' in 2018. Groundwater flow direction within the aquifer units will be influenced by the local topography. Groundwater direction is assumed to flow south towards the River Oich.

According to the Envirocheck report, there are no recorded groundwater abstractions points at the site or within 1km of the subject property. However, five licensed Private Water Supply boreholes are located between 240m and 635m from the site boundary for localised water abstraction for domestic purposes.

5.6 Flood Risks

The SEPA Flood Maps for planning website[19] was access on 04 December 2023 to assess potential flood risks at the site, which are summarised below:

- **River Flooding** – the entirety of the southern portion of the site is within a Medium Risk to High Risk area for river flooding, defined by SEPA as an area which has a 0.5% to 10% chance of flooding each year respectively.
- **Surface Water Flooding** – small sections of the site predominantly in the east and south are classified as having a Medium Likelihood and High Likelihood of surface water flooding, defined by SEPA as an area which has a 0.5% and 10% chance of flooding each year respectively.

Additionally, SEPA Flood Maps shows at present, a medium to high risk of river flooding. The tool predicts for the future a medium risk defined as '*By the 2080s, each year the area may have a 0.5% chance of flooding*'. Coastal flooding is not indicated to be a potential risk at the site.

According to the Environmental Impact Assessment LT000519 Fort Augustus 400Kv Upgrade report (1085-04-18), the surface water flooding on site is mainly within the medium to high-risk likelihood (0.5% annual probability or 1 in 200 year). This is also confirmed by SEPA Flood Maps.

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 UK Radon website[20] was reviewed on 4th December to determine potential radon risks for the site.

[16] GeoIndex - British Geological Survey (bgs.ac.uk)
[17] BGS publications online
[18] OR15028.pdf (nerc.ac.uk)
[19] https://map.sepa.org.uk/floodmaps/FloodRisk/Search
[20] https://www.ukradon.org/information/ukmaps

According to the website the site is located within an area where the potential for radon to exceed the action levels are 30% or greater.

It is considered likely that for occupied new buildings, full radon protection measures should be implemented as part of the development design and construction. Further risk assessment may be considered via procurement of a site-specific radon report and / or implementation of radon testing as part of building commissioning.

5.8 Environmental Designated Sites and Listed Buildings

The NatureScot Viewer[21] was used on 4th December to identify environmental designated sites. A Geological Conservation Review Site is located approximately 675m northeast of the proposed development, designated as 'Fort Augustus' (PA Code: 9592).

PASTMAP interactive mapping service, which provides access to the databases of Historic Environment Scotland (HES) was consulted regarding sites of potential historical and/or archaeological significance and none were recorded on site or within 1 km of the site.

A review of the Envirocheck Report (Appendix B) indicates that there are no Sites of Special Scientific Interest (SSSIs), Conserved Wetland Sites (Ramsar Sites), Special Areas of Conservation (SAC), Special Protection Areas (SPAs), National Nature Reserves (NNR), Local Nature Reserves (LNR), or Forest Parks within the development boundary or within 250m.

According to both the Highland Council and SEPA Environment Information responses there are no ecologically sensitive areas within the development boundary or in the nearby vicinity of the site.

5.9 Unexploded Ordnance

To assess the potential risks from Unexploded Ordnance (UXO) at the site, the Zetica Unexploded Bomb Risk Map[22] was used on 4th December 2023.

The Zetica Bomb Risk Map for the site and surrounding area indicated that Low risk area, which is defined by Zetica as an '*area indicated as having 15 bombs per 1000 acres or less*'.

A Zetica Pre-Desk Study Assessment (PDSA) has identified WWII military activities on or affecting the site which are 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 in **Appendix E**.

Table 5.2 Summary of WWII Military Activities On or Affecting the Site

Date	On or Affecting the Site
Pre-WWI Military Activity	None identified
WWI Military Activity	None identified
WWI Bombing	None Identified
Interwar Military Activity	None Identified
WWII Military Activity	None identified on the Site. Military training is known to have taken place in the rural areas of Inverness-shire 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	None Identified

[21] SiteLink (nature.scot)
[22] Risk Maps | Zetica UXO

5.10 Soil Classification

The National Soil Map of Scotland[23] was reviewed on 11th December 2023 to determine the soil type on site and within the surrounding area. Podzols (Class 3), brown soils (Class 1z), blanket peats (Class 6) and gleys (Class 5) are identified in the local area. Mineral Podzols form the dominant soil type on site and within the immediate surrounding area of the proposed development. Humus-Iron podzols form the dominant soil subgroup on site and within the immediate surrounding of the proposed development.

Areas of carbon-rich soil, deep peat and peatland habitats are mapped by NatureScot[24]. The top two classes, 1 and 2, taken together identify the nationally-important resource. The classes are defined as follows:

- **Class 1:** Nationally important carbon-rich soils, deep peat and priority peatland habitat, areas likely to be of high conservation value.
- **Class 2:** Nationally important carbon-rich soils, deep peat and priority peatland habitat, areas of potentially high conservation value and restoration potential.

No areas of Class 1 or Class 2 soils are present on-site or in the immediate surrounding area.

The Carbon and Peatland Map 2016 viewer[25] identifies areas of Improved Pasture, Smooth Grass / Rushed mapped and Open Canopy on site and / or within the immediate surrounding area of the proposed development.

5.11 Contaminative Land Uses

This section presents a summary of current and historical land uses included within the Envirocheck Report (**Appendix B**) pertaining to the proposed development area and within 1km which could result in soil and groundwater contamination. 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 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	Onsite	Within 1km
Integrated Pollution Prevention and Controls	None Recorded	None Recorded
Enforcement and Prohibition Notices		None Recorded
Control of Major Accidents Hazards Sites (COMAH)		None Recorded
Notification of Installations Handling Hazardous Substances (NIHHS)		None Recorded
Planning Hazardous Substances		None Recorded
Registered Radioactive Substances		None Recorded
Registered Landfill or BGS Recorded Landfill Sites		None Recorded
Licensed Waste Management Facilities		None Recorded

[23] UK Soil Observatory (bgs.ac.uk)
[24] Map | Scotland's environment web
[25] https://map.environment.gov.scot/Soil_maps/#

Wastewater Discharge Consents	There are four discharge consents within 1km of the site area, between 312m-871m. The discharge consents were granted for sewage septic tank/soakaway effluent.
Contaminated Land	None Recorded
Contemporary Trade Directory Entries for the Site and/or Fuel Station Entries	None Recorded
Fuel Stations	None Recorded
Points of Interest – Manufacturing and Production	There are two sand pits located between 514-550m east of the site. They are both located at PH32, and are classified as “Sand, Gravel, Clay Extraction and Merchants”.

As mentioned in **Section 4.3**, both SEPA and The Highland Council do not hold any information of historical contamination at the site. SEPA states the following “*the is site not to be identified as Contaminated Land under Part IIA of the environmental Protection Act 1990*”.

6. Preliminary Conceptual Site Model

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 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 Land Contamination Risk Management (LCRM) 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 has not yet formally made its 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 conceptual site model (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 potentially unacceptable risk, is also unlikely to exist. Where all three components are present, a 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 Preliminary Conceptual Site Model

The preliminary 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 proposed development area, receptors on or near the proposed development area, and pathways on or near the proposed development area are discussed within the following sub-sections.

The preliminary CSM has been developed with a view to assessing the potential risks/ liabilities and constraints associated with the site in its current condition, prior to any proposed redevelopment. Risks associated with the proposed development have also been assessed based on continual clinical usage as the final option is currently unknown.

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 250m of the site.**

It should be noted that a number of current and historical sources have not been carried forward and discounted as part of this assessment as they are unlikely to have an effect on soil and groundwater contamination within the site boundary.

The discounted off-site sources include:

- **Historical:** Agricultural land use is generally not considered as a source of contamination. Agricultural land is no longer predominant from the 1970s maps, and new buildings, car park areas and pylon towers were built which represent more prevalent sources.

Discounted on-site sources include:

- **Ground gas:** With reference to BS 8576:2013 Guidance on Investigations for Ground Gas the site is considered to represent a Very Low gas generation potential, which is supported by ground gas monitoring undertaken in 2023, which recorded low concentrations of ground gas. As such, risks from ground gas to the proposed development have been discounted.

Table 6.1. Potential Sources of On-site Contamination within the proposed development area

Potential On-site Source	Potential Contaminants	Area of Site Affected	Current/ Historical
Made ground associated with on-site construction, including but not limited to construction of existing pylon towers, electricity cables, car park.	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), asbestos, sulphates, sulphides, cyanides, phenols and asbestos containing materials (ACMs).	Pylon tower within the north of the site, two car parks to the north and centre of the site.	Current and Historical
Road	Coal tars, PAH, TPH	Site wide	Current and historical
Car park	Mineral Oils, PAHs, TPH including BTEX and MTBE,	North, South and Centre of the site	Current

Table 6.2. Potential Sources of Off-site Contamination (within 250m of proposed development area)

Potential Off-site Source	Potential Contaminants	Area of Site Affected	Current/ Historical
Made ground associated with off-site construction, including but not limited to construction and expansion of the existing substation, and associated pylon towers, electricity cables,transformers, welfare facilities, buildings, and control rooms. .	Metals and inorganic compounds, pH, PAHs, TPH BTEX and MTBE, asbestos, sulphates, sulphides and ACMs.	Adjacent to northwest of the site.	Current and Historical
Substation components including existing diesel generators, existing oil filled 400/132kV super grid transformers, equipment, and machinery.	Mineral Oils Polychlorinated biphenyls (PCBs), chlorinated aromatic hydrocarbons.	Northwest of the site	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., substation workers) and visitors; • Future on-site construction and maintenance workers; • Off-site third party land users
The Water Environment	• Auchteraw Burn to the southeast and the Allt na Fearna Burn to the northeast of the site, at approximate distances of 79m and 100m respectively. • Un-named drains leading to named receptors. • SUDS Ponds including aquatic receptors within/to the southwest of the site • Groundwater within the bedrock aquifer within the West Highland Granite Gneiss Intrusion and Tarvie Psammite Formation by leaching and migration of contaminants via shallow made ground. • Groundwater within The Glaciofluvial Sheet Deposits by leaching and migration of contaminants via shallow made ground. • Private Water supply (Type B & A) abstractions
The Built Environment	• In future developments including concrete foundations of any proposed development. • Accumulation of potentially flammable toxic and/ or vapours within confined spaces; and • Potable water supply pipes and other services.

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 proposed development of the site.

Table 6.4. Potential Pathways

Pathway	Description
Human Health	• Current and future on-site workers by direct contact and/or direct ingestion with contaminated soil and / or groundwater, inhalation of vapours/asbestos fibres, windblown dust ingestion and radon ingress. The presence of airborne dust may be exacerbated by demolition of any existing structures. • Third party neighbours by migration of hydrocarbon vapour migration and accumulation in confined spaces (asphyxiation/ explosion).
The Water Environment	• Groundwater within the superficial deposits by leaching and migration of contaminants via shallow Made Ground and natural superficial deposits. • Groundwater within the underlying bedrock by leaching and migration of contaminants via shallow Made Ground and bedrock. • Surface water via surface water run-off, and lateral migration of contaminants via shallow deposits and service runs. • Surface water by migration of contaminants via groundwater. • Drainage systems on site.

Pathway	Description
The Built Environment	• Concrete construction materials by direct contact with contaminated soil and groundwater (e.g hydrocarbons) and aggressive ground conditions (pH and sulphate). • Direct contact of services and supply pipes with contaminated soils.

6.2.4 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)[26], CIRIA C552[27], and the Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66[28]see **Appendix F**.

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 matrix colour coding is presented in **Appendix F**:

[26] Guidelines for Environmental Risk Assessment and Management - Green Leaves III (publishing.service.gov.uk)
[27] CIRIA C552 Contaminated land risk assessment, guide to good practice, 2001 (c552 (ciria.org))
[28] R&D66 VOL 1 Guidance for the Safe Development of Housing on Land Affected by Contamination (nhbc.co.uk)

Table 6.5. Summary of Preliminary CSM and Risk Assessment

Source	Receptor		Exposure Pathway	Probability	Consequence	Risk Category	Justification
On-site Contamination sources including areas of car parking, Made Ground and roadways.	**Human Health – On-site**	Site Workers / Visitors	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of contaminants in soil, soil-derived dust and volatile vapours. Inhalation of asbestos fibres.	Unlikely	Medium	**Low Risk**	Historical investigation has recorded the general absence of Made Ground, and where encountered it appears to comprise re-worked natural deposits. Low concentrations from environmental sample data. However, the use of appropriate PPE, good hygiene practice and adherence to construction health and safety legislation/best practice should mitigate against the potential for exposure to construction workers. A site construction management plan will be produced prior to development. Radon ingress into structures is considered to be the most likely risk to impact human health and confined spaces. The purchase of a site specific radon report may reduce risks, or may confirm the requirement for protection measures.
			Radon ingress into site structures	Likely	Medium	**Moderate**	
		Construction / Maintenance Workers	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of contaminants in soil-derived dust and volatile vapours. Inhalation of asbestos fibres.	Unlikely	Medium	**Low Risk**	
			Radon ingress into site structures	Likely	Medium	**Moderate**	
	Human Health – Off-site	Third Party Neighbours	Inhalation of contaminants in soil, soil-derived dust and volatile vapours. Inhalation of asbestos fibres.	Unlikely	Medium	**Low Risk**	
	Water Environment	Superficial and Bedrock Aquifers	Leaching of contaminants in the unsaturated zone to groundwater in underlying aquifers.	Unlikely	Medium	**Low Risk**	Historical BGS borehole records suggest groundwater strikes are inconsistent in shallow deposits, indicating discontinuous groundwater presence in the shallow aquifer. More consistent groundwater encountered at depth of 10.50mbgl (reference BF132), recorded in sand superficial deposits. Hydraulic continuity between shallow and deep groundwater is unknown, but should be assumed. The general absence of Made Ground indicates generally low risks, with migration via preferential pathways being the highest risk.
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Low likelihood	Medium	**Moderate / Low**	
		Surface Water Features inc. Auchteraw Burn, Allt na Fearna Burn and SUDS pond	Lateral migration of contaminated groundwater with discharge to surface watercourses as base flow.	Unlikely	Mild	**Very Low Risk**	Due to the proximity of the Auchteraw Burn (80m) and Allt na Fearna (100m) which both flow hydraulically down gradient in River Oich the risk to surface water features via shallow deposits and/or surface run-off cannot be discounted entirely, but the low contaminant concentrations in historical ground investigation and re-worked natural deposits indicate low risks.
			Discharge of contaminants entrained in surface water run-off followed by overland flow and discharge.	Low likelihood	Mild	**Low Risk**	
	The Built Environment		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 relatively

Source	Receptor		Exposure Pathway	Probability	Consequence	Risk Category	Justification
		Existing and future structures and water supply pipes	Migration and accumulation of radon along strata and preferential pathways such as service routes or differentially permeable strata.	Unlikely	Mild	**Very Low Risk**	inexpensive engineered mitigation measures for a small site of this nature.
Off-site contamination sources including off-site made ground and the neighbouring.	**Human Health – On-site**	Site Workers / Visitors	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of , contaminants in soil-derived dust and volatile vapours. Inhalation of asbestos fibres.	Low likelihood	Medium	**Moderate / Low**	Off-site contamination from neighbouring sources is a possibility, though the limited occupation of the site to routine maintenance visits reduces risks. Risks to construction workers will be managed via adherence to health and safety legislation and regulations.
		Construction / Maintenance Workers		Unlikely	Medium	**Moderate / Low**	
	The Built Environment	Existing and future structures and water supply pipes	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 relatively inexpensive engineered mitigation measures for a small site of this nature.
			Migration and accumulation of radon along strata and preferential pathways such as service routes or differentially permeable strata.	Unlikely	Mild	**Very Low Risk**	

7. Conclusions & Recommendations

7.1 Conclusions

Potential sources of contamination have been identified within the site boundary relating to the use of the site as a car park and construction compound for recent construction of Phase 1 of the proposed development which is located adjacent to the subject site. However, whilst sources have been identified the likely extent and contamination potential of these sources is considered to be low.

Recent ground investigation has encountered Made Ground in isolated locations, however, this Made Ground appears to comprise re-worked natural materials and is considered unlikely to represent a source of widespread contamination, though some low concentrations of diffuse and localised contamination cannot be entirely discounted. These isolated contamination areas (if present) could pose potential risks to human health and the water environment should contamination (not encountered previously) be present. There is some potential for contaminants to migrate on to site from the surrounding current and past use of surrounding areas as part of the wider Fort Augustus substation, whilst this is considered unlikely it cannot be discounted entirely.

The main potential risk identified at the site is the radon generation potential of the underlying geology, with the site located in an area where >30% of homes are above the action level for radon. Risks may be revised via purchase of a site specific radon report, but this is considered unlikely. In any case, fitting of radon protection measures to the few proposed on-site routinely occupied structures as part of the proposed development is unlikely to represent a significant development constraint.

Based on the available desk study information and the proposed residential development, the site is classified overall as having a Low risk with respect to contaminated land.

7.2 Recommendations

The Geo-environmental Desk Study identified unacceptable risks in accordance with Land Contamination Risk Management guidance from the generation of radon beneath the site. It is recommended that the following further work / assessment is undertaken to constrain potential risks:

- Procurement of a site specific radon assessment from the BGS;
- Should the site specific radon assessment indicate risks are as indicated, it is recommended that the following approach is adopted:
  - Review of development design to determine the type of enclosed building spaces proposed and the level of intrinsic ventilation present to understand whether risks can be appropriately discounted (i.e. well ventilated substation housings for example).
  - Should the above review indicate risks are still apparent, then it is recommended that the design and implementation of full radon protection in accordance with BRE211 document titled: '*Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment (2023)*'.

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 historically developed site there may be localised differences in Made Ground thicknesses, the presence of obstructions and physical or chemical composition. 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.

Appendix A Figures and Drawings

35 36

09 09

08 08

Scottish & Southern Electricity Networks

TRANSMISSION

Scale @ A3: 1:5,000

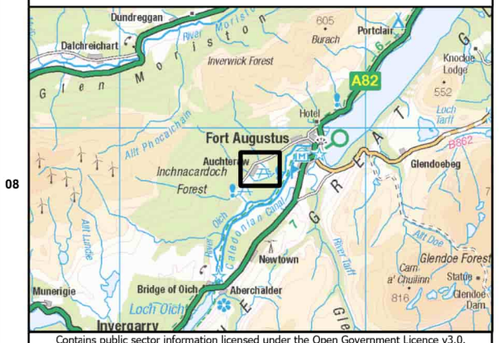
0 50 100 200 300 400 500 m

Legend

- Substation Area Boundary
- Proposed Development Site (Phase 2)

Substation Elements

- GIS Substation
- Coire Glas Transmission Project (New Tower covered under Section 37 Application)
- Blackstart Reactors
- Super Grid Transformers
- Existing SuDS Pond
- SuDS Pond to be removed
- New Tower
- Tower to be removed
- Existing Access Tracks
- Proposed Access Tracks
- New OHL
- OHL to be removed



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Project No: LT000519

Project: Fort Augustus Substation 400kV Upgrade

Title:
Fort Augustus Site Boundary Plan

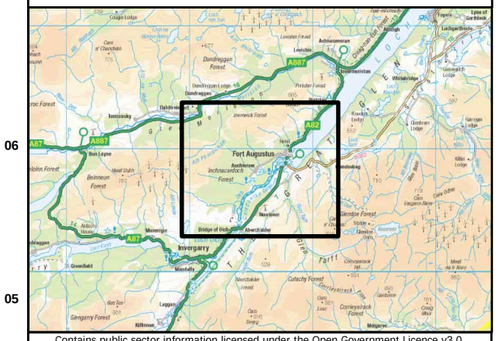
Drawn by: JBARR Date: 06/02/2024

Drawing: Figure 11.1

Scottish & Southern Electricity Networks
TRANSMISSION

Legend

Substation Area Boundary



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Project No: LT000519

Project: Fort Augustus Substation 400kV Upgrade

Title:
Fort Augustus Site Location Plan

Drawn by: JBARR Date: 06/02/2024

Drawing: Figure 11.2

Appendix B Envirocheck Report

Appendix C Local Authority Consultation

The Highland Council
Comhairle na Gàidhealtachd

Christine Johnson
Principal Geologist
AECOM
177 Bothwell Street
GLASGOW
G2 7ER

Please ask for: Scott Barclay
Email: scott.barclay@highland.gov.uk
Our Ref: 23/16
Date: 9 November 2023

Dear Christine

FORT AUGUSTUS SUBSTATION
NATIONAL GRID REFERENCE: 235695: 808320

Thank you for your Environmental Information Request for the above site received by this service on 2 November 2023. Having examined the following Ordnance Survey, Pre-War County Series maps and service records, I am now able to provide the following information in answer to your specific questions:

- **Any recorded current or historical environmental problems at the site and adjacent areas with regards to ground contamination or solid waste arisings;**

Having consulted our records, we hold no details of any recorded current or historical environmental problems at the site and adjacent areas with regards to ground contamination or solid waste arisings. The study site is recorded on our database of potentially contaminative sources as 'Auchterawe Electrical Substation' – Our Ref: 17-ELC-2001 centred at National Grid Reference: 235624: 808301. The substation appears on our historical maps from 1967 (E5a Scale 1: 2500) which extends in area and is displayed as 'Electricity Distribution Site' on our Current OS Mastermap.

- **The presence and location of any historical landfills within 500m of the site boundary;**

Having consulted our records, we hold no details of any historical landfills within 500m of the site boundary.

- **Any particular areas of sensitivity in the vicinity of the site or nearby areas for which the council may have particular concern;**

With regards to this question, I have broken down environmentally sensitive receptors into the following categories: Ecological, residential/ commercial properties and the water environment.

Having reviewed our records, we hold no details of any ecologically sensitive areas in the nearby vicinity of the site. Our GIS records do not indicate there to be any

Special Areas of Conservation, Special Protection Areas, SSSIs nor of any RAMSAR sites within the nearby study site boundary.

Our Corporate Address Gazetteer does include the following residential properties within 250m of the site:
• Hawkes View, Auchterawe, Fort Augustus, PH32 4BT
• Caravan, 7B Auchterawe, Fort Augustus, PH32 4BT
• Forest Lodge, Auchterawe, Fort Augustus, PH32 4BT
• Whinhill House, Auchterawe, Fort Augustus, PH32 4BT
• Meadowside, Auchterawe, Fort Augustus, PH32 4BT
• 6 Auchterawe, Fort Augustus, PH32 4BT
• 7 Auchterawe, Fort Augustus, PH32 4BT
• 8 Auchterawe, Fort Augustus, PH32 4BT
• Old Farmhouse, Auchterawe, Fort Augustus, PH32 4BT

We also hold record of Self Catering Accommodation at:
• Pinetops, Auchterawe, Fort Augustus, PH32 4BT

We would consider a residential/ commercial property to be a potentially sensitive receptor due to any adverse environmental impacts such as from noise, air pollution and contaminated land. Our records do not include any areas of potentially contaminated land to affect any of these properties.

In terms of the water environment, our GIS map indicates two small streams with one named ‘Allt na Fearna’ to intersect the study site. Surface waterbodies such as rivers, streams and lochs are considered to be sensitive environmental receptors.

In the absence of any environmental reporting we hold for this site, we are unable to confirm any areas of concern regarding any environmentally sensitive receptors in the nearby site vicinity.

- **Any other relevant environmental information you may hold about the site.**

Having consulted our Environmental Health database, we hold records of two complaints in relation to the SSE substation site.

In 2019, we received a complaint about generator noise and light pollution from the substation. There was also a complaint about dirt/ debris being left by works for installing an underground cable. The issue was resolved with the generators being removed from the site and all lighting being powered by mains. The lights have been put on a timer and are directional so should not shine on to nearby residential properties. The lights should only be switched on when required. SSE also tidied up the area disturbed by an underground cable. There were also no current plans to install street lighting on the tarmac access road between the main road and the

substation. The mobile lighting columns installed on the haul road were to allow safe access to the site and have been put on timers and are directional. The complaint in relation to light pollution was not considered as a statutory light nuisance under the Environmental Protection Act 1990.

We also received a noise complaint against the substation in 2021. It was reported that there was a low level humming noise for several months however it was not associated with recent night time construction noise. SSE were contacted and did not consider the noise coming from the substation.

In relation to private water supplies, we hold details of the following records within 250m of the study site boundary:

• PWS 7b Achnacloich – Unique ID: 41587
Address: 7b Auchterawe, Fort Augustus, PH32 4BT
Type B Domestic Supply
Source Type: Stream
National Grid Reference: 235290: 808127

• PWS 8 Auchterawe – Unique ID: 28938
Address: Old farmhouse, Auchterawe, Fort Augustus, PH32 4BT
Type B Domestic Supply
Source Type: Borehole
National Grid Reference: 235095: 808326

• PWS Pine Tops – Unique ID: 40299
Address: Pine Tops, Auchterawe, Fort Augustus, PH32 4BT
Type A Regulated Supply (Type A Reason: Holiday Let)
Source Type: Borehole
National Grid Reference: 235206: 808083

• PWS Whinhill – Unique ID: 30121
Address: Auchterawe, Fort Augustus, PH32 4BT
Type B Domestic Supply
National Grid Reference: 235125: 807970

Please be aware that there may be other Private Water Supplies within the local area which we are yet to be made aware of.

We also keep our Private Water Supply Spatial Dataset on our Open Data (maps) Portal - link: https://map-highland.opendata.arcgis.com/

Please do not hesitate to let me know should you wish to obtain a copy of our Private Water Supply Register.

Information Requests are charged at an hourly rate of £81 plus VAT (£97.20). In this instance, one (1) hour was taken to prepare this Information Request therefore an invoice for £81 plus VAT shall be raised by colleagues in Business Support.

The Council cannot be held liable for any error or omission contained within this report, nor does the information represent or replace the requirement of a site investigation. I hope the information presented is of interest.

Should you have any queries, please do not hesitate to contact me on tel: 01463 644599.

Yours sincerely



Scott Barclay
Information Technician (Contaminated Land)

Environmental Health welcomes your feedback. Please help us improve our service by taking our short customer survey by clicking on this link https://www.surveymonkey.com/s/highlandeh

Appendix D BGS Borehole Records

British Geological Survey

BGS ID: 18953502 : BGS Reference: NH30NE33
British National Grid (27700) : 235508,808321

RAEBURN DRILLING AND GEOTECHNICAL LTD

Site: BEAULY - DENNY 400KV OVERHEAD LINE PROJECT

Contract No: 22408

Borehole No: BF132

Client: Balfour Beatty Utility Solutions Ltd

Engineer: Balfour Beatty Utility Solutions Ltd

Location: E 235508.8 N 808321.3

Orientation: Vertical

Equipment: Marooka MST2000 Mounted Boart Longyear Deltabase 520; T2101; Air Flush

Inspection Pit to 1.20
Rotary Open Hole to 12.00

Progress	Sample Depth	Samples and Tests Type	Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
13/3/2012	0.00	RO-S			40.68		Brown gravelly fine to coarse SAND				
					40.08	0.60					
	1.20 1.20	SPT>50 6,12/18,17,19,19 T		1.20			Very dense grey silty fine to coarse SAND and angular and rounded fine to coarse GRAVEL with occasional cobbles. Gravel of schist, pelite, psammite, quartz and granite				
	2.40 2.40	SPT>50 8,13/12,18,20,20 T		2.40							
	4.00	SPT>50 34/		4.00							
					35.98	4.70					
	5.50	SPT>50 50/		5.50			COBBLES and BOULDERS of schist recovered as a sandy subrounded to angular fine and medium gravel				
12/2	7.00	SPT>50 50/		7.00							
					32.48	8.20					
	9.00 9.00	SPT>50 7,14/16,19,27,23 T		9.00			Very dense brown fine to coarse SAND and subrounded and rounded fine to coarse GRAVEL locally passing to gravelly sand				

Remarks:
An inspection pit was excavated by hand to a depth of 1.20m to clear services.
Ground-water was recorded at a depth of 0.70m which was sealed off at 1.50m. Heavy ground-water was encountered at a depth of 10.50m.
The borehole was terminated at 12.00m due to sand blowing up casing.

Diam	To Depth Boring	To Depth Casing
128	12.00	12.00

Driller	Originator
WH	SJP
Chk & App	Status
WTG	Final

Ground-water Struck	Rose To	Time(mins)	Cut Off
0.70	0.70		1.50

Water Added From	To

Chiselling From	To	Time(hr)

Flush Returns	Type	To Depth
Full	Air	12.00

Fig No: B1
Sheet 1 of 2
Scale 1:50

Style: BOREHOLE File: P:\GINTW\PROJECTS\22408.GPJ+44 (0) 1698 710999 Printed: 18/04/2012 14:36:04 Raeburn Drilling and Geotechnical, Whistleberry Rd, Hamilton ML3 0HP Tel: 01698-711177 E-mail: enquiries@raeburndrilling.com

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 18953502 : BGS Reference: NH30NE33
British National Grid (27700) : 235508,808321

RAEBURN DRILLING AND GEOTECHNICAL LTD

Site: BEAULY - DENNY 400KV OVERHEAD LINE PROJECT

Client: Balfour Beatty Utility Solutions Ltd

Engineer: Balfour Beatty Utility Solutions Ltd

Contract No: 22408

Borehole No: BF132

Location: E 235508.8 N 808321.3

Orientation: Vertical

Equipment: Marooka MST2000 Mounted Boart Longyear Deltabase 520; T2101; Air Flush

Inspection Pit to 1.20
Rotary Open Hole to 12.00

Progress	Sample Depth	Samples and Tests Type	Result	Casing Depth	Level (mOD) 40.68	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
	0.00						.... see previous sheet				
	10.50 10.50	T	SPT>50 5,13/17,14,18,17	10.50					▼		
13/2	12.00	T		12.00	28.68	12.00	Unable to undertake SPT due to sand coming up casing END OF BOREHOLE		10.50		12.00

Remarks:
An inspection pit was excavated by hand to a depth of 1.20m to clear services.
Ground-water was recorded at a depth of 0.70m which was sealed off at 1.50m. Heavy ground-water was encountered at a depth of 10.50m.
The borehole was terminated at 12.00m due to sand blowing up casing.

Diam	To Depth Boring	To Depth Casing
128	12.00	12.00

Driller	Originator
WH	SJP
Chk & App	Status
WTG	Final

Ground-water Struck	Rose To	Time(mins)	Cut Off	Water Added From	To	Chiselling From	To	Time(hr)	Flush Returns	Type	To Depth
10.50									Full	Air	12.00

Fig No: B1
Sheet 2 of 2
Scale 1:50

Style: BOREHOLE File: P:\GINTW\PROJECTS\22408.GPJ+44 (0) 1698 710999 Printed: 18/04/2012 14:36:04 Raeburn Drilling and Geotechnical, Whistleberry Rd, Hamilton ML3 0HP Tel: 01698-711177 E-mail: enquiries@raeburndrilling.com

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 18953503 : BGS Reference: NH30NE34
British National Grid (27700) : 235653,808268

RAEBURN DRILLING AND GEOTECHNICAL LTD

Site: BEAULY - DENNY 400KV OVERHEAD LINE PROJECT

Contract No: 22408

Borehole No: FT01A-1

Client: Balfour Beatty Utility Solutions Ltd

Engineer: Balfour Beatty Utility Solutions Ltd

Inspection Pit to 1.20
Rotary Open Hole to 16.00

Location: E 235653.9
N 808268.7

Orientation: Vertical

Equipment: Marooka MST2000 Mounted Boart Longyear Deltabase 520; Air Flush

Progress	Sample Depth	Samples and Tests Type	Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
8/3 2012	0.00	RO-S			39.71		Medium dense brown gravelly fine to coarse SAND locally passing to a fine to coarse sand and very sandy subrounded and rounded fine to coarse gravel. Gravel consists of shist, semi pelite, psammite, granite and quartz				0.20
	0.30	T									1.00
	1.20 1.20	SPT=26 3,4/6,5,6,9 T		1.20							
					37.21	2.50					
	2.50 2.50	SPT>50 5,12/14,16,15,17 T		2.50			Very dense grey and brown sandy subrounded and rounded fine to coarse GRAVEL locally passing to fine to coarse sand and subrounded and rounded fine to coarse gravel. Gravel of shist, psammite, semi pelite, granite and quartz				6.00
	4.00 4.00	SPT>50 4,12/16,15,25 (225) T		4.00							7.00
	5.50 5.50	SPT>50 6,18/30 (75) T		5.50							
	7.00 7.00	SPT>50 4,10/12,16,15,14 T		7.00							
8/3	8.50 8.50	SPT>50 5,15/16,25 (150) T		8.50							

Remarks:
Description based on Driller's log.
An inspection pit was excavated by hand to a depth of 1.20m to clear services.
Heavy ground-water was encountered at a depth of 13.00m.
No SPTs undertaken below 13.00m; sand blowing up casing.

Diam	To Depth Boring	To Depth Casing
125	16.00	16.00

Driller	Originator	Ground-water Struck	Rose To	Time(mins)	Cut Off	Water Added From	To	Chiselling From	To	Time(hr)	Flush Returns	Type	To Depth
WH											Full	Air	16.00
Chk & App	Status												
WTG	Final												

Fig No: B1
Sheet 1 of 2
Scale 1:50

Style: BOREHOLE File: P:\GINTW\PROJECTS\22408.GPJ+44 (0) 1698 710999 Printed: 27/04/2012 15:45:09 Raeburn Drilling and Geotechnical, Whistleberry Rd, Hamilton ML3 0HP Tel: 01698-711177 E-mail: enquiries@raeburndrilling.com

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 18953503 : BGS Reference: NH30NE34
British National Grid (27700) : 235653,808268

RAEBURN DRILLING AND GEOTECHNICAL LTD

Site: BEAULY - DENNY 400KV OVERHEAD LINE PROJECT

Client: Balfour Beatty Utility Solutions Ltd

Engineer: Balfour Beatty Utility Solutions Ltd

Contract No: 22408

Borehole No: FT01A-1

Inspection Pit to 1.20
Rotary Open Hole to 16.00

Location: E 235653.9 N 808268.7

Orientation: Vertical

Equipment: Marooka MST2000 Mounted Boart Longyear Deltabase 520; Air Flush

Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
	10.00	T	SPT>50 3,8/12,14,15,17	10.00	39.71		.... see previous sheet				
	11.50	T	SPT>50 8,16/17,27 (150)	11.50							
	13.00	W							▼		
	13.00	T									
	14.50	T									
9/3					23.71	16.00					
	16.00	T					END OF BOREHOLE				

Remarks:
Description based on Driller's log.
An inspection pit was excavated by hand to a depth of 1.20m to clear services.
Heavy ground-water was encountered at a depth of 13.00m.
No SPTs undertaken below 13.00m; sand blowing up casing.

Diam	To Depth: Boring	To Depth: Casing
125	16.00	16.00

Driller	Originator
WH	
Chk & App	Status
WTG	Final

Ground-water: Struck	Rose To	Time(mins)	Cut Off	Water Added: From	To	Chiselling: From	To	Time(hr)	Flush: Returns	Type	To Depth
13.00									Full	Air	16.00

RAEMCR2

Fig No: B1
Sheet 2 of 2
Scale 1:50

Style: BOREHOLE File: P:\GINTWPROJECTS\22408.GPJ+44 (0) 1698 710999 Printed: 27/04/2012 15:45:11 Raeburn Drilling and Geotechnical, Whistleberry Rd, Hamilton ML3 0HP Tel: 01698-711177 E-mail: enquiries@raeburndrilling.com

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 18953508 : BGS Reference: NH30NE35
British National Grid (27700) : 235653,808268

RAEBURN DRILLING AND GEOTECHNICAL LTD

Site: BEAULY - DENNY 400KV OVERHEAD LINE PROJECT

Client: Balfour Beatty Utility Solutions Ltd

Engineer: Balfour Beatty Utility Solutions Ltd

Contract No: 22408

Borehole No: FT01A-2

Inspection Pit to 1.20
Rotary Open Hole to 8.50

Location: E 235653.9
N 808268.7

Orientation: Vertical

Equipment: Marooka MST2000 Mounted Boart Longyear Deltabase 520; Air Flush

Progress	Sample Depth	Samples and Tests Type	Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill Symbol	Backfill Depth
13/3/2012	0.00	RO-S			39.71		Medium dense brown gravelly fine to coarse SAND locally passing to a fine to coarse sand and very sandy subrounded and rounded fine to coarse gravel. Gravel consists of shist, semi pelite, psammite, granite and quartz				
	1.20 1.20	SPT=15 2,4/3,3,4,5 T		1.20							
	2.50 2.50	SPT>50 4,10/11,13,14,17 T		2.50	37.21	2.50	Very dense grey and brown sandy subrounded and rounded fine to coarse GRAVEL locally passing to fine to coarse sand and subrounded and rounded fine to coarse gravel. Gravel of shist, psammite, semi pelite, granite and quartz				
	4.00 4.00	SPT>50 6,12/17,15,16,17 T		4.00							
	5.50 5.50	SPT>50 6,14/18,24 (150) T		5.50							
	7.00 7.00	SPT>50 8,19/18,19 (150) T		7.00							
13/3					31.21	8.50			DRY		8.50
	8.50 8.50	SPT>50 7,15/20,18,27 (225) T		8.50			END OF BOREHOLE				

Remarks:
Description based on Driller's log.
An inspection pit was excavated by hand to a depth of 1.20m to clear services.
Ground-water was not encountered.

Diam	To Depth Boring	To Depth Casing
125	8.50	8.50

Driller	Originator	Chk & App	Status
WH		WTG	Final

Ground-water Struck	Rose To	Time(mins)	Cut Off	Water Added From	To	Chiselling From	To	Time(hr)	Flush Returns	Type	To Depth
									Full	Air	8.50

Fig No: B2
Sheet 1 of 1
Scale 1:50

Style: BOREHOLE File: P:\GINTWP\PROJECTS\22408.GPJ +44 (0) 1698 710999 Printed: 27/04/2012 15:45:16 Raeburn Drilling and Geotechnical, Whistleberry Rd, Hamilton ML3 0HP Tel: 01698-711177 E-mail: enquiries@raeburndrilling.com

Contact BGS: ngdc@bgs.ac.uk

Appendix E UXO Pre-Desk Study Assessment

Pre-Desk Study Assessment

Site:	Fort Augustus Substation, Auchteraw Road, Scotland
Client:	AECOM
Contact:	Oceane Mbaguta
Date:	30th January 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 the rural areas of Inverness-shire 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. ■ Military camps and training areas.
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 F Approach to Risk Assessment

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 National House Building Council/Environment Agency/Chartered Institute of Environmental Health publication R&D 66 (NHBC/EA/CIEH, 2008), 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).

The severity of the risk is classified according to the criteria in the table below.

Description of Severity of Risk

Term	Description
Severe	– Highly elevated concentrations likely to result in significant harm to human health. – Catastrophic damage to crops, buildings or property (e.g. by explosion). – Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects of water quality. – Major damage to aquatic or other ecosystems.
Medium	– Elevated concentrations which could result in significant harm to human health. – Significant damage to crops, buildings or property (e.g. damage to building rendering it unsafe). – Equivalent to EA Category 2 pollution incident including significant effect on water quality. – Significant damage to aquatic or other ecosystems.
Mild	– Exposure to human health unlikely to lead to significant harm. – Minor damage to crops, buildings or property (e.g. surface spalling to concrete). – Equivalent to EA Category 3 pollution incident including minimal or short-lived effect on water quality. – Minor or short-lived damage to aquatic or other ecosystems.
Minor	– No measurable effect on humans. – Repairable effects of damage to buildings, structures and services. – Equivalent to insubstantial pollution incident with no observed effect on water quality of ecosystems.

The probability of the risk occurring is classified according to the criteria in the table below.

Likelihood of Risk Occurrence

Likelihood	Explanation
High	Contaminant linkage may be present that appears very likely in the short-term and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Likely	Contaminant linkage may be present, and it is probable that the risk will occur over the long term.
Low	Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Contaminant linkage may be present but the circumstances under which harm would occur even in the long-term are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown below.

Risk based on Comparison of Likelihood and Severity

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

Appendix G Report on Ground Investigation – RAEBURN Drilling & Geotechnical LTD