# Burnside to Greens 400kV Connection

## Environmental Appraisal Appendix D: Geology, Soils and Contaminated Land

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# Document Notes

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# 1 Introduction

## 1.1 Introduction

This Environmental Appraisal considers constraints relating to geology (including hydrogeology), soils and contaminated land with respect to up to four 400 kilovolt (kV) underground cable circuits, connecting Caledonia Offshore Wind Farm Burnside Onshore Substations to the Scottish and Southern Electricity Networks Transmission (SSEN-T) Greens Substation, together with associated works (hereafter referred to as the 'Proposed Development') by way of identification of baseline conditions and subsequent identification of potential impacts. Where potential impacts are identified mitigation is proposed.

## 1.2 Study Area

The red line boundary for the site is shown in Figure 1-1 below. The site covers approximately 157 hectares and is approximately 3.2 km in length. At its widest point, the site is around 1 km wide, and at its narrowest section measures approximately 170 meters. The site is situated in a landscape that is predominantly agricultural land used for pasture and arable farming. To the northwest lies a patch of commercial forestry, while scattered farmsteads and isolated dwellings are dispersed throughout the vicinity.

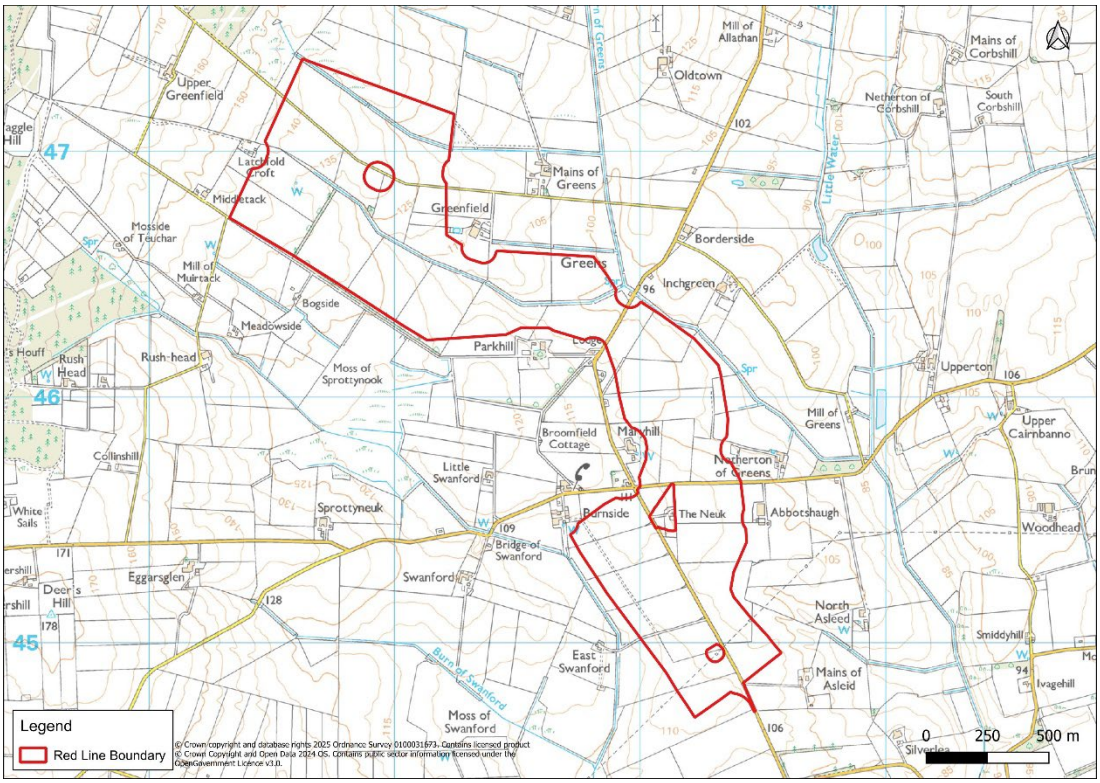


**Figure 1-1 Red Line Boundary**

The Proposed Development includes the following elements:

- A working cable corridor up to 100 metres wide, accommodating all temporary works areas required for installation;
- Up to four 400 kV cable circuits installed in trenches;

- Up to two temporary haul roads;
- Haul road access points;
- Up to four Joint Bays for each cable circuit;
- Up to two Satellite construction compounds; and
- Temporary crossing infrastructure for haul road(s), road, watercourse and utilities

The parameters set out are presented to enable consideration and determination of PPP.

## 1.3 Baseline Environment

Section 2 presents the baseline geology, hydrogeology, soils and contaminated land of relevance to the Proposed Development. Surface water hydrology is summarised (to inform any risks associated with contaminated land), however the water environment (along with flooding) is addressed separately in Appendix H Flood Risk and the Water Environment to the Environmental Appraisal.

Mapping will be confirmed by way of a site visit at the detailed (Matters Specified by Condition (MSC)) stage.

# 2 Baseline Environment

## 2.1 Geology

### 2.1.1 Superficial Geology

The majority of the site is underlain by Till deposits, which are characterised as unsorted and unstratified drift, deposited directed by and underneath a glacier[1]. Some areas of the site have no mapped superficial deposits present, and there are localised areas of mapped Alluvium corresponding to where small watercourses are present[1]. Alluvium is characterised as the unconsolidated detrital material deposited by a river, stream or other body of running water, and may comprise any mixture of clay, silt, sand and gravel[1].

The wider surrounds are peppered with pockets of peat, although there are no areas of peat mapped within the red line boundary for the site[1].

Mapping of the superficial deposits is shown in Figure 2-1 below.

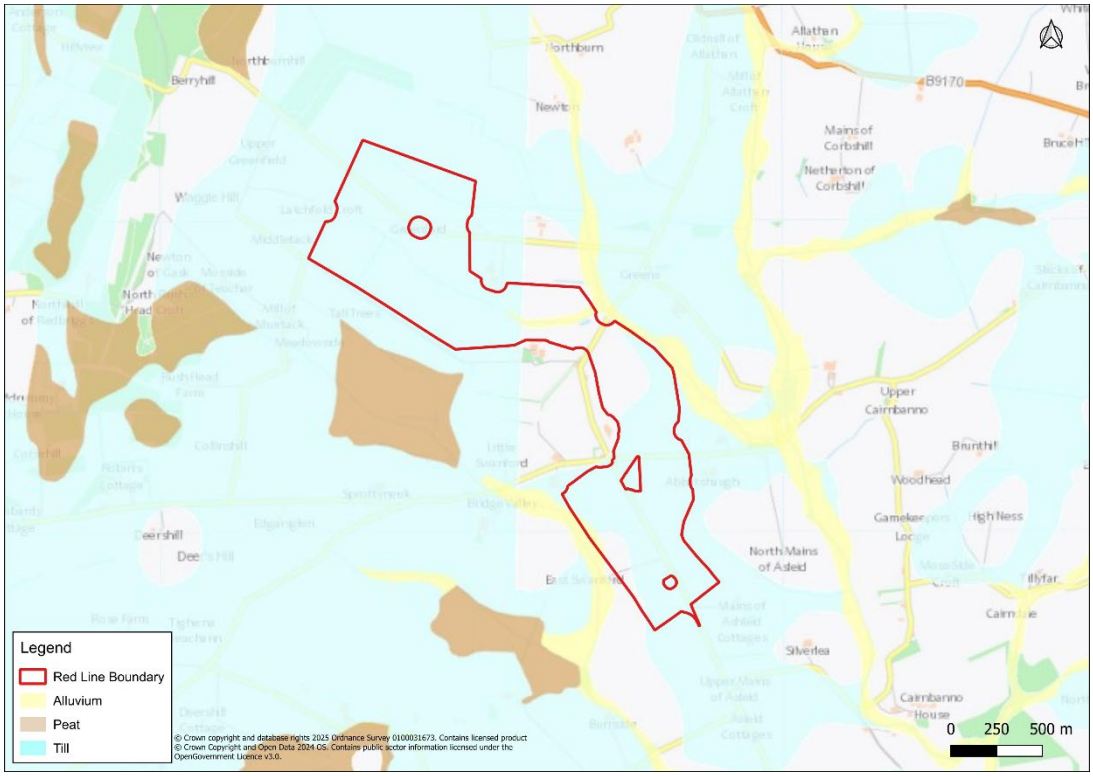


**Figure 2-1 Superficial Geology**

[1] British Geological Survey (BGS) GeoIndex, mapping for geology, hydrogeology, historical boreholes, mines and quarries; https://mapapps2.bgs.ac.uk/geoindex/home.html. Accessed 22nd October 2025.

### 2.1.2 Bedrock Geology

The site is underlain by the Macduff Formation, which is characterised as interbedded psammite and semipelite with subsidiary pelite, and contains major units of pebbly psammite[1].

### 2.1.3 Historical Boreholes

There are no historical boreholes present on the site itself, however there are three historical boreholes located between 700m and 900m east of the southern-most boundary of the site[1].

Borehole 1, ref. NJ84SW14381/1, is located 700m east of the site, and the log has recorded topsoil over a 0.50m thickness of Peat. Underlying the Peat were interbedded horizons of granular soils comprising a 1.40m thickness of sand and gravel overlying a 0.6m thick band of cobbles and boulders. Another thin horizon (0.2m) of sand and gravel was observed before encountering bedrock comprising schist at 3.30m bgl[1]. The adjacent borehole 2, ref. NJ84SW14381/2, recorded a very similar stratigraphical succession. The third borehole, ref. NJ84SW1, recorded a 0.50m thickness of topsoil directly overlying bedrock comprising sandstone[1].

### 2.1.4 Agricultural Soils

Land Capability for Agriculture maps show that the soils fall within classes 3.1, 3.2 and 4.1[2]. Class 4.1 is defined as *"land capable of producing a narrow range of crops, primarily grassland with short arable breaks of forage crops and cereal[2]."* Class 3.2 is defined as *"land capable of average production though high yields of barley, oats and grass can be obtained. Grass leys are common[2]."* Classes 1 to 3.1 are considered to be prime agricultural land. Class 3.1 soils are mapped in the central portion of the site and in the southernmost portion of the site[2]. The mapping with respect to land capability for agriculture is shown in Figure 2-2 below[2].

[2] Scottish Soils, mapping for agricultural soils; https://map.environment.gov.scot/Soil_maps/?layer=10#. Accessed 22nd October 2025.

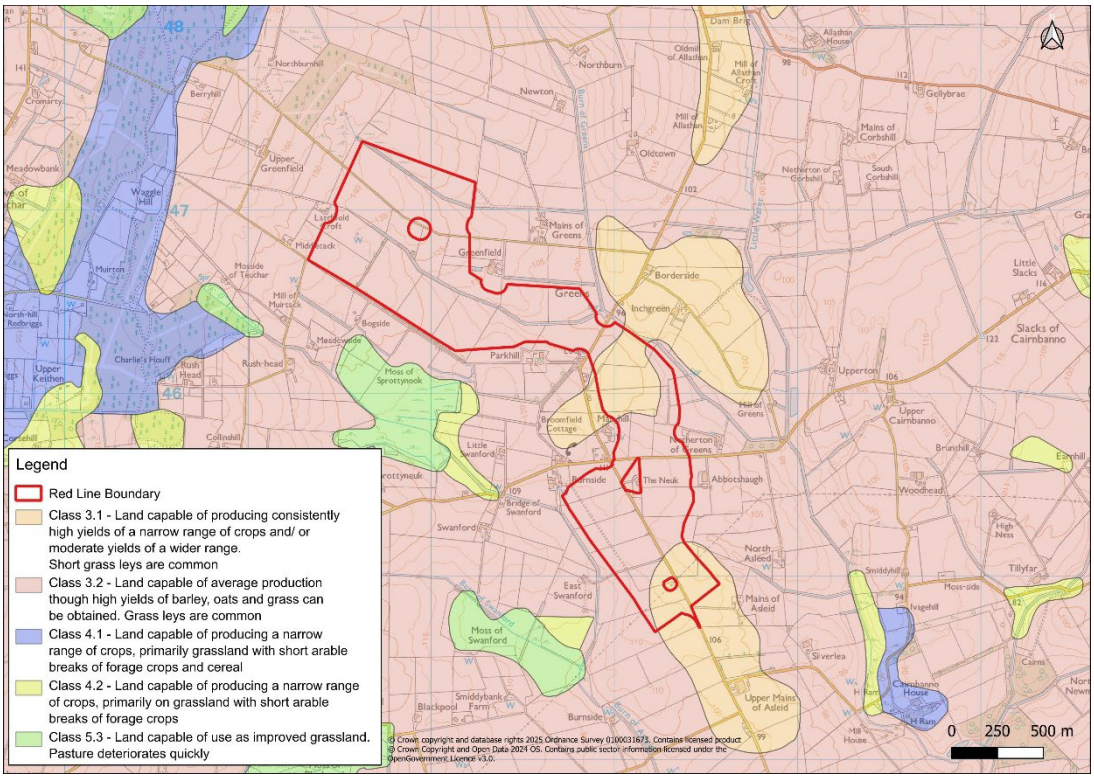


**Figure 2-2 Land Capability for Agriculture**

The protection of soils is addressed in National Planning Framework 4, Policy 5. This states the following,

*"Development proposals on prime agricultural land, or land of lesser quality that is culturally or locally important for primary use, as identified by the Local Development Plan (LDP), will only be supported where it is for; i. Essential infrastructure and there is a specific locational need and no other suitable site; iv. The generation of energy from renewable sources or the extraction of minerals and there is secure provision for restoration……and that the layout and design of the proposal minimises the amount of protected land that is required".* The site will be restored once the proposed cabling has been installed. As the proposed development is designated as a "National " development in NPF4, this can also be classed as "essential infrastructure" ensuring compliance with this aspect of policy.

This is further supported in the Aberdeenshire Local Development Plan 2023 (LDP) which states (Policy PR1.5 Prime Agricultural Land) that *"time-limited proposals for renewable energy generation or mineral extraction may be acceptable on prime agricultural land providing the site will be restored and returned to its original status.".* Given the proposed development involves the laying of an underground cable, with associated above ground restoration – this policy provision can be met. Based on the above, there is not considered to be any constraint on development with regard to agricultural soils.

### 2.1.5 Peatland Soils

No peat is mapped within the red line boundary of the site, as shown in Figure 2-3[3].

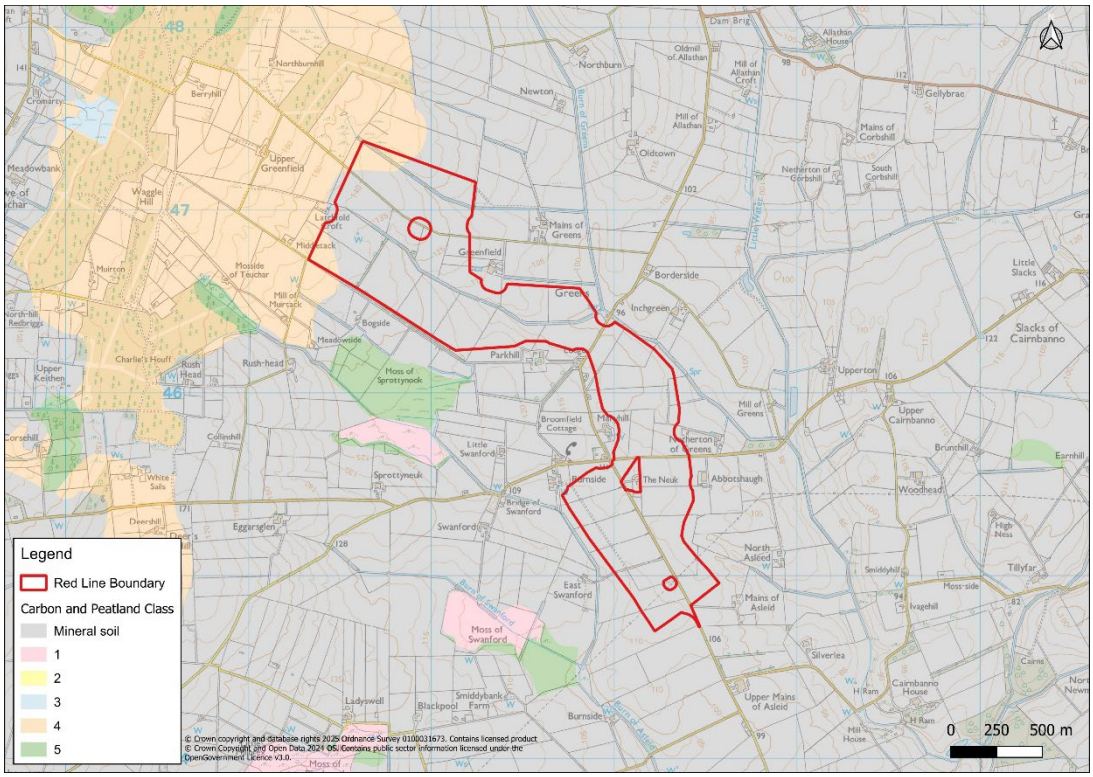


**Figure 2-3 Peat Mapping**

The majority of the study area is underlain by Class 0 soils, which are mineral soils where peatland habitats are not typically found, and there is no peatland vegetation present[3]. Two small parcels of land in the north-west of the site are designated as Class 4 soils, which are characterised as predominantly mineral soils with some peat soil present[3]. Class 4 soils are unlikely to be associated with peatland habitats. Based on this, peat is not expected to be a constraint to the Proposed Development.

### 2.1.6 Geologically Designated Sites

There are no geologically designated sites within the study area[4].

### 2.1.7 Mineral Resources

The site is not located in a coal mining area[5].

Section 12 of the LDP relates to protecting resources, and policy PR1.9 is specific to mineral protection, stating, *"We identify important mineral safeguarding sites where other types of development should not be generally allowed, and wider areas of search where mineral resources should not be sterilised by inappropriate development. Major non-mineral developments will be permitted in the areas of search if an opportunity is given for the extraction of mineral resources before the development commences. On*

[3] Scottish Soils, mapping for peat; https://map.environment.gov.scot/Soil_maps/?layer=10. Accessed 22nd October 2025.

[4] Nature Scot, mapping for geological conservation review sites; https://sitelink.nature.scot/map. Accessed 22nd October 2025.

[5] Mining Remediation Authority Map Viewer; https://datamine-cauk.hub.arcgis.com/. Accessed 24th October 2025.

*safeguarded sites non-mineral developments will be refused unless they are small-scale and ancillary to existing uses, or of a temporary nature."*

Safeguarding maps are presented in Appendix 14 of the LDP, and this shows that there are no safeguarded sites within the red line boundary. As such, mineral resources are not expected to represent a constraint to the development.

## 2.2 Water Environment

### 2.2.1 Hydrogeology

No superficial aquifer is mapped underlying the site[6]. The bedrock geology underlying the site belongs to the Southern Highland Group, and this unit is classified as a low productivity aquifer, where small amounts of groundwater are present in the near surface weathered zone and secondary fractures[1].

The Southern Highland Group aquifer belongs to the wider Ellon groundwater body (I.D: 150676), which has an overall quality status of "Poor"[6].

### 2.2.2 Hydrology

The Burn of Greens is a small unclassified watercourse that is a tributary of Little Water/Black Burn and is present in the northern half of the site[6]. There are two minor side channels associated with the Burn of Greens, and one of these crosses onto the site in the approximate centre, where a road is bisecting the site in a southwest-to-northeast direction, and the other side channel enters the site from the east in the north-westernmost portion of the site. While the Burn of Greens and its unnamed side channels don't have a quality designation, Little Water/Black Burn has a designated quality of "Moderate Ecological Potential"[6]. For more detail on Water Framework Directive (WFD) in regard to the existing watercourses, please refer to Figure 3-1 contained within Appendix H Flood Risk and the Water Environment of the Environmental Appraisal.

### 2.2.3 Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

It is understood from the UKHab survey undertaken as part of this appraisal (Appendix C Terrestrial Ecology of Environmental Appraisal) that no potential GWDTEs have been identified at this stage.

### 2.2.4 Private Water Supplies

An enquiry was sent to Aberdeenshire Council on 16 October 2025 (and followed up on 22 October 2025) pertaining to the presence and location of private water supplies (PWS) in the vicinity of the site, and a response is currently awaited.

Figure 2-4 below shows the registered addresses held by Aberdeenshire Council for private water supplies dated 2022, as provided to the Applicant, and as such this information may no longer be accurate.

It should be noted that the locations indicated on the map show the addresses that the private water supplies serve, and not the point of water abstraction, therefore while none of the PWS addresses intrude into the red line boundary of the site, this may not be the case for the abstraction points themselves. The awaited response from

[6] SEPA Water Classification Hub, data relating quality of surface water and groundwater bodies; https://informatics.sepa.org.uk/WaterClassificationHub/. Accessed 24th October 2025.

Aberdeenshire Council will confirm any updates to the registered addresses for private water supplies dated 2022.

A 100m buffer has been applied to the red line boundary in the figure below which has been considered appropriate between private water supplies and the Proposed Development at PPP stage prior to identification of the final cable route. The PWS Risk Assessment, to be undertaken at MSC stage when the final cable route is known, will include a buffer in accordance with Guidance on Assessing the Impacts of Development on Groundwater Abstractions, SEPA, August 2024.

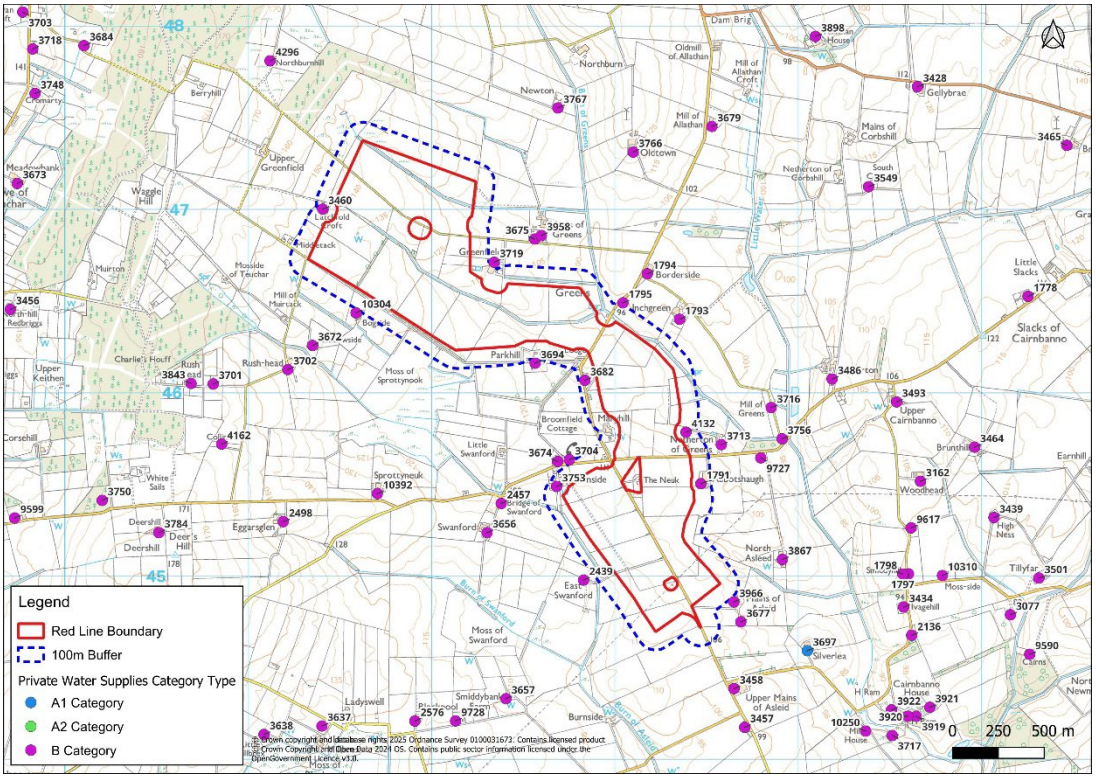


**Figure 2-4 Private Water Supplies (dated 2022)**

In terms of the aforementioned SEPA guidance, a full PWS assessment and identification of any mitigation is a 3 stage process, and relies upon a detailed design being available prior to completion. Despite still awaiting a response from Aberdeenshire Council work is already underway on the first stage of this which is to identify and engage with landowners potentially impacted by the proposed development within a 250m buffer. Stage 2 involves undertaking a Qualitative impact assessment of potential impacts to any groundwater abstractions identified in Stage 1. Stage 3 is the undertaking of a Detailed Quantitative risk assessment to determine the potential effects on the groundwater abstractions. The results of this 3-stage process will determine the mitigation actions required at MSC stage.

### 2.2.5 Public Water Supplies

According to the Scotland River Basin District maps, the site is not located in a drinking water protected area in relation to surface waters, although a protected area is located approximately 500m west[7].

The site is located in a drinking water protected area with respect to groundwater[7].

## 2.3 Contaminated Land

There is no artificial ground mapped within the red line boundary[1].

1840's – 1880's mapping shows the red line boundary to be largely the same as it is in the present day[8]. The site is divided into fields, and there are infrequent residential homes present that likely belong to the farmers, although these properties are excluded from the redline boundary. Numerous wells are labelled on the maps.

1902 – 1923 – Land uses are largely as 1840's-1880's, smithy present in the centre of the site[8].

A land use survey map dated 1931 - 1938 shows that the red line boundary is predominantly arable land, with some areas of heathland, moorland and rough pasture and new housing areas noted where homes are present[8].

1937 – 1961 – As above.

Historical mapping after 1961 is not publicly available. Current google imagery from 2024 shows that the red line boundary is predominantly occupied by agricultural fields and isolated housing, with a road bisecting the site through the centre. The properties are excluded from the red line boundary.

Contaminated land enquiries were sent to Aberdeenshire Council and SEPA on 17th October 2025, and responses are currently awaited. Notwithstanding, at this stage no adverse issues are anticipated.

[7] Drinking Water Protected Areas – Scotland River Basin District: Maps; https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/. Accessed 24th October 2025.

[8] National Library of Scotland Series Maps 1795 – 1961; https://maps.nls.uk/series/. Accessed 24th October 2025.

# 3 Conclusion

## 3.1 Summary

A desk-based review of the baseline environment has indicated that the primary constraint for the Proposed Development relates to the potential presence of PWS abstractions on site. Up-to-date data relating to the location of PWS and their abstraction points is being collected by the Applicant, and this will enable further assessment of risks (by way of a 3 stage process as described in Section 2.2.4) arising from the Proposed Development.

The presence of limited Class 3.1 soils is not considered to represent a constraint to development providing the site will be restored and returned to its original status.

From a Geology, Soils and Contaminated Land perspective therefore, there are not considered to be any policy conflicts at this stage which would prevent the granting of Planning Permission in Principle, with suitable mitigation to be designed and agreed through MSC.

## 3.2 Mitigation Measures

PWS mitigation may be required following completion of the full 3 stage PWS assessment.

A Soil Management Plan may be required to inform agricultural soil restoration where topsoil and sub-soil will be treated and stored appropriately to minimise risk of erosion and/or soil degradation indirectly affecting soil quality.

# 4 References

There are no sources in the current document.

**National and Local Frameworks**

Aberdeenshire Local Development Plan 2023 (Aberdeenshire Council), Policy PR1 'Protecting Important Resources'.

Aberdeenshire Local Development Plan 2023 (Aberdeenshire Council), Appenix 14 'Areas Safeguarded or Identified as Area of Search for Minerals'.

National Planning Framework 4 (Scottish Government), Policy 5 'Soils'.

National Planning Framework 4 (Scottish Government), Policy 33 'Minerals'.

**Mapping Resources**

British Geological Survey (BGS) GeoIndex, mapping for geology, hydrogeology, historical boreholes, mines and quarries: https://mapapps2.bgs.ac.uk/geoindex/home.html

Scottish Soils, mapping for peat: https://map.environment.gov.scot/Soil_maps/?layer=10

Scottish Soils, mapping for agricultural soils: https://map.environment.gov.scot/Soil_maps/?layer=10#

Nature Scot, mapping for geological conservation review sites: https://sitelink.nature.scot/map

SEPA Water Classification Hub, data relating quality of surface water and groundwater bodies: https://informatics.sepa.org.uk/WaterClassificationHub/

National Library of Scotland Series Maps 1795 – 1961: Series maps, 1795-1961 - National Library of Scotland

**Guidance**

SEPA (2024) Guidance on Assessing the Impacts of Development on Groundwater Abstractions