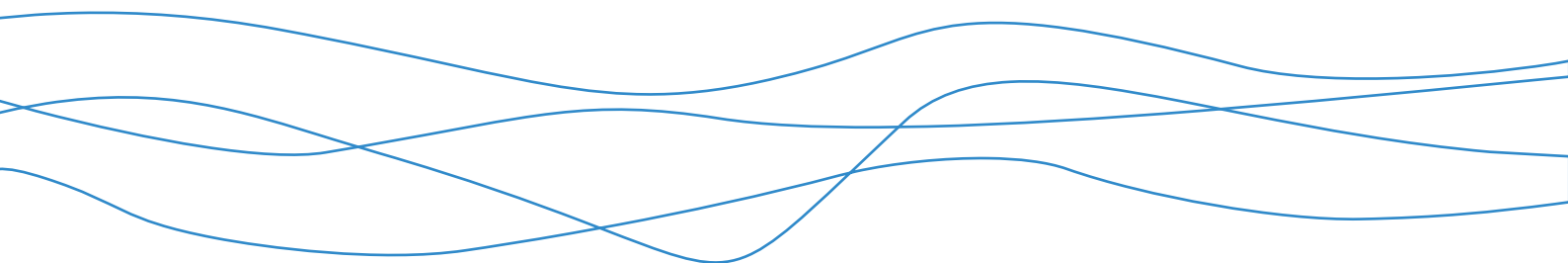




Bowdun Offshore Wind Farm, Onshore EIA Report

Volume 1, Chapter 10: Geology and Ground
Conditions

TWP-BOW-JCB-ONE-RPT-00021 | November 2025



Contents

| | | |
|-----------|---|-----------|
| 10 | Geology and Ground Conditions | 1 |
| 10.1 | Introduction | 1 |
| 10.2 | Geology and Ground Conditions Study Area..... | 1 |
| 10.3 | Legislative and Policy Context..... | 1 |
| 10.4 | Consultation | 6 |
| 10.5 | Data Sources | 9 |
| 10.6 | Methodology for Assessment of Effects..... | 10 |
| 10.7 | Key Parameters for Assessment..... | 15 |
| 10.8 | Baseline Environment | 18 |
| 10.9 | Embedded Mitigation | 26 |
| 10.11 | Assessment of Significance | 28 |
| 10.12 | Inter-Related Effects..... | 35 |
| 10.13 | Cumulative Effects Assessment | 36 |
| 10.14 | Summary of Impacts, Mitigation, Likely Significant Environmental Effects and Monitoring..... | 40 |
| | References | 43 |
| | Annex – Figures | 45 |

List of Tables

| | |
|---|----|
| Table 10.1: Summary of Legislation Relevant to Geology and Ground Conditions | 2 |
| Table 10.2: Summary of Policy Provisions Relevant to Geology and Ground Conditions | 4 |
| Table 10.3: Summary of Key Guidance and Standards Relevant to Geology and Ground Conditions | 5 |
| Table 10.4: Summary of key consultation issues raised during consultation activities undertaken for the Proposed Development relevant to Geology and Ground Conditions | 7 |
| Table 10.5: Summary of Key Data Sources | 9 |
| Table 10.6: Definition of Terms relating to Magnitude of Impact..... | 10 |
| Table 10.7: Definition of Terms Relating to the Sensitivity of the Receptor | 12 |
| Table 10.8: Matrix Used for the Assessment of the Significance of the Effect | 14 |
| Table 10.9: Definition of Significance | 15 |
| Table 10.10: Maximum Design Scenario Considered for Each Potential Impact as Part of the Assessment of Likely Significant Environmental Effects on Geology and Ground Conditions | 16 |
| Table 10.11: Impact Scoped Out of the Assessment for Geology and Ground Conditions | 18 |
| Table 10.12: Groundwater Waterbody Characteristics..... | 22 |
| Table 10.13: Embedded Measures Adopted as Part of the Proposed Development | 26 |
| Table 10.14: Screening of Other Projects for Consideration within the CEA for Geology and Ground Conditions | 36 |
| Table 10.15: Maximum Design Scenario Considered for Each Impact as part of the Assessment of Likely Significant Cumulative Effects on Geology and Ground Conditions | 38 |

List of Figures

| | |
|---|-----------------|
| Figure 10.1: Geology and Ground Conditions Study Areas | Annex – Figures |
| Figure 10.2: Geology: Superficial Deposits | Annex – Figures |
| Figure 10.3: Bedrock Geology | Annex – Figures |
| Figure 10.4: Land Capability for Agriculture (LCA) and Private Water Supplies | Annex – Figures |
| Figure 10.5: Groundwater Dependent Terrestrial Ecosystems (GWDTE) and Carbon and Peatland Classification | Annex – Figures |

10 Geology and Ground Conditions

10.1 Introduction

10.1.1 This chapter of the Onshore Environmental Impact Assessment (EIA) Report assesses the likely significant effects of the onshore infrastructure of the Bowdun Offshore Wind Farm (hereafter referred to as ‘the Project’) on the local soils, geology and hydrogeology. The onshore infrastructure of the Project, is the works landward of Mean Low Water Springs (MLWS), including the intertidal area, and is referred to as ‘the Proposed Development’.

10.1.2 The assessment has been undertaken in accordance with Design Manual for Roads and Bridges (DMRB) LA 104, DMRB LA 109, DMRB LA 113, and professional judgment where necessary. Although the Proposed Development is not a road/bridge, the DMRB sets out a standard framework for the assessment of soils and geology in EIA that is appropriate for linear projects. In the absence of other more applicable guidance, the DMRB methodology has been used as a basis for this EIA approach. The assessment presented is also informed by Volume 1, Chapter 11: Water Quality and Flood Risk.

10.1.3 The assessment is supported by the following technical appendix:

- Volume 2, Appendix 10.1: Hydrogeological Characteristics of Superficial and Bedrock Geological Units.

10.2 Geology and Ground Conditions Study Area

10.2.1 The Study Areas for the Geology and Ground Conditions assessment are defined below and are shown on Figure 10.1 (Annex – Figures).

10.2.2 A 250 m buffer PPP Application Boundary has been chosen for the assessment of soil and land contamination based on best practice (National House Building Council and Environment Agency, 2008); this is considered appropriate in the context of the Proposed Development considering the distance over which contamination may migrate and the location and type of off-site receptors. For sensitive groundwater receptors, including licensed abstractions, private water supplies (PWS) and Groundwater Dependent Terrestrial Ecosystems (GWDTE), a wider Study Area of 1 km from the PPP Application Boundary has been applied.

10.3 Legislative and Policy Context

10.3.1 The overarching policy and legislation applicable to the Proposed Development is presented in Volume 1, Chapter 1: Introduction. A summary of the legislative provisions relevant to Geology and Ground Conditions chapter is provided in Table 10.1 below, relevant policy provisions in Table 10.2 and relevant guidance in Table 10.3.

Table 10.1: Summary of Legislation Relevant to Geology and Ground Conditions

| Legislation | Summary and where considered in this Chapter |
|---|---|
| <p>The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017</p> | <p>The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations are a key part of Scotland’s planning legislation to ensure environmental considerations are fully integrated into the planning process. They require a systematic assessment of the likely significant environmental effects of the Proposed Development. Regulation 4(2) and 4(3)(c) require significant effects on land and soil to be considered within the EIA process.</p> <p>This Chapter presents the assessment of the likely significant environmental effects of the Proposed Development within the EIA process.</p> |
| <p>Nature Conservation (Scotland) Act 2004</p> | <p>The Nature Conservation (Scotland) Act establishes a legal framework for the conservation of biodiversity and natural heritage in Scotland. The Act requires identification and conservation of areas considered to have high quality in terms of their flora, fauna, or geological or geomorphological features. Sites of Special Scientific Interest (SSSI) is a statutory designation made by NatureScot under the Nature Conservation (Scotland) Act 2004.</p> <p>Consideration of the Act is presented in Section 10.8 which identifies areas considered to have high quality in terms of geological or geomorphological features. Section 10.9 presents embedded mitigation to conserve the feature, with the assessment of the significance being presented in Section 10.10.</p> |
| <p>Environmental Protection Act 1990: Part IIA (Contaminated Land) and Contaminated Land (Scotland) Regulations 2005</p> | <p>The Environmental Protection Act 1990: Part IIA (Contaminated Land) was introduced to establish a statutory framework for identifying and remediating land that poses unacceptable risks due to contamination. The Act establishes a risk-based framework for identifying and remediating land where historical contamination poses significant harm (or a significant possibility of significant harm) to human health or the environment, including pollution of the water environment. The 2005 Regulations amend the original 2000 Scottish regulations to refine the contaminated land regime in Scotland. They require a phased approach to identifying and remediating potential contamination sources prior to construction of the Proposed Development to make land “suitable for use”.</p> <p>Consideration of the presence of land affected by potential contamination and it’s ‘suitability for use’ is included in the assessment presented in Section 10.10.</p> |
| <p>EU Water Framework Directive (2000/60/EC)</p> <p>Water Environment and Water Services (Scotland) Act 2003</p> | <p>The Water Framework Directive (WFD) establishes a framework for water protection and management across the European Union (EU).</p> <p>The Water Environment and Water Services (Scotland) Act 2003 (WEWS Act) provide a comprehensive legal framework for protection and sustainable management</p> |

| Legislation | Summary and where considered in this Chapter |
|--|---|
| <p>European Commission Groundwater Directive 2006/118/EC</p> | <p>of Scotland’s water environment. It was enacted to implement the EU Water Framework Directive (2000/60/EC) and came into force on 15 December 2003.</p> <p>The European Commission Groundwater Directive 2006/118/EC came into force on 17 January 2007, serving as a “daughter directive” to the Water Framework Directive (2000/60/EC) and is aimed at protecting groundwater from pollution and deterioration.</p> <p>This legislation aims to protect and improve the status of aquatic ecosystems, groundwater and surface waters which are discussed within the context of land contamination throughout this chapter. Section 10.10 presents the assessment of the likely significant environmental effects of the Proposed Development on the water environment with mitigation measures set out in Section 10.9 with the aim of protecting it from pollution and deterioration.</p> |
| <p>Groundwater Policy Protection for Scotland</p> | <p>The Groundwater Protection Policy for Scotland is a framework developed by the Scottish Environment Protection Agency (SEPA) to safeguard Scotland’s groundwater resources including protection against pollution.</p> <p>Consideration of this Policy is given in Section 10.9 which presents measures to safeguard Scotland’s groundwater resources including protection against pollution.</p> |
| <p>The Water Environment (Controlled Activity) (Scotland) Regulations 2011 (as amended)</p> | <p>These regulations, administered by SEPA, are designed to control activities that could adversely affect water bodies, including rivers, lochs, estuaries, coastal waters, and groundwater, including construction and operation of the Proposed Development.</p> <p>This legislation was superseded on the 1st November 2025 by the Environmental Authorisation (Scotland) Regulations 2018, see below.</p> |
| <p>Environmental Authorisation (Scotland) Regulations 2018</p> | <p>These regulations cover all water, waste management and industrial activities. These replace previous separate regulations. All new activities with the potential to interact with the water environment will require authorisation.</p> |
| <p>Construction (Design & Management) Regulations (CDM) 2015</p> | <p>The CDM regulations are the principal legal framework in the UK for managing health, safety, and welfare throughout construction of the Proposed Development.</p> <p>The employer, designer and Principal Contractor will adhere to the legal framework relating to the CDM regulations.</p> |

Table 10.2: Summary of Policy Provisions Relevant to Geology and Ground Conditions

| Policy | Summary and where considered in this Chapter |
|--|---|
| <p>National Planning Framework 4 (NPF4)</p> | <p>NPF4 is part of the statutory development plan in Scotland. It integrates spatial strategy and national planning policy, meaning its policies will influence planning decisions for the Proposed Development.</p> <p>The following policy requirements are relevant for the assessment presented in the Geology and Ground Conditions Chapter:</p> <ul style="list-style-type: none"> • Policy 5: Protection of carbon-rich soils, restoration of peatlands and minimisation of soil disturbance. • Policy 9: Covers the use of brownfield land and states that where land is known or suspected to be unstable or contaminated, development proposals will demonstrate that the land is, or can be made, safe and suitable for the proposed new use. • Policy 9: Protection of geodiversity and geological features. • Policy 10: Development should avoid soil sealing and degradation and support sustainable soil management and reuse of excavated materials. • Policy 12: Seeks to reduce, reuse, or recycle materials in line with the waste hierarchy, which in this context is in relation to soils. <p>A Geology and Ground Conditions impact assessment has been undertaken and presented within this Chapter. An assessment of effects has been undertaken within Section 10.10 and mitigation measures to be adopted as part of the Proposed Development are presented in Sections 10.9.</p> |
| <p>The Scottish Soil Framework</p> | <p>The framework aims to promote the sustainable management and protection of soils consistent with the economic, social and environmental needs of Scotland.</p> <p>Section 10.10 presents an assessment of soils, with mitigation for protection included in Section 10.9.</p> |
| <p>Aberdeenshire Local Development Plan 2023 (ALDP)</p> | <p>At the local level, the ALDP contains policies of relevance to soils and contaminated land. These include:</p> <ul style="list-style-type: none"> • Policy PR1: Protecting Important Resources. Prevents developments that have a negative effect on important environmental resources, including prime agricultural land, peat and other carbon rich soils, and the water environment). • Policy C3: Carbon Sinks and Stores. Safeguarding and protecting carbon sinks and stores from disturbance or destruction, such as woodland and high-carbon peat rich soils. • Policy P4: Hazardous and Potentially Polluting Developments and Contaminated Land. The policy states that refusal of development would occur if there were a significant pollution risk, and/or an unacceptable danger to the public or environment after completion of appropriate site investigations and/or remediation. <p>The identification of important land and soil resources are presented in Section 10.8. Mitigation measures to minimise significant and non-significant effects to be adopted as part of the Proposed Development are presented in Sections 10.9.</p> |

Table 10.3: Summary of Key Guidance and Standards Relevant to Geology and Ground Conditions

| Key Guidance and Standards | Summary of Key Guidance and Standards |
|---|--|
| Design Manual for Roads and Bridges (DMRB) LA 109: Geology and Soils | This document sets out a standard framework for the assessment of soils and geology in EIA. In the absence of other more applicable guidance, the DMRB methodology has been used as a basis for this EIA approach. |
| DMRB LA 113: Road Drainage and the Water Environment | This document sets out the requirements for assessing and reporting effects on the water environment, which includes groundwaters and surface waters. |
| Institute of Environmental Management and Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment | This document recommends an approach to assessing soil function and the ecosystem services and natural capital provided by soils, rather than just a quantification based on agricultural land classification (ALC). |
| C552: Contaminated Land Risk Assessment: A guide to good practice (CIRIA, 2001) | This document sets out an approach to assessing the risks from land contamination on relevant receptors, which includes human health, groundwaters, and surface waters. |
| Land contamination: risk management (LCRM) | This document presents best-practice guidance for the assessment of land contamination and is applicable in Scotland. |
| Planning Advice Note (PAN) 33: Development of Contaminated Land | This note presents the implications of the contaminated land regime (including Part IIA of the Environmental Protection Act) on the Scottish Planning system. |
| Land Capability Classification for Agriculture (Bibby, et al., 1991) | This report is the framework in Scotland for the classification of agricultural soils according to their potential productivity and the flexibility of crops that can be grown. |
| SEPA's Regulatory guidance – Promoting the sustainable reuse of greenfield soils in construction | This guidance encourages the reuse of greenfield soils to reduce waste and sets conditions for the offsite reuse of soils without a management licence. |
| BS 5930:2015 – Code of Practice for Ground Investigations | Sets out best practice for planning, executing, and reporting ground investigations for geotechnical and geoenvironmental purposes. |
| BS 10175:2011+A2:2017 – Investigation of Potentially Contaminated Sites | Sets out a systematic approach for the investigation of potential land contamination risks. |
| SEPA's Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems | This guidance sets out the expectations for the assessment of impact on Groundwater Dependent Terrestrial Ecosystems. |

10.4 Consultation

- 10.4.1 The approach to consultation for the Proposed Development is set out in Volume 1, Chapter 4: Stakeholder Engagement and Consultation. A summary of the issues raised during consultation activities undertaken to date specific to the Geology and Ground Conditions chapter is presented in Table 10.4, together with how these issues have been considered in this assessment.
- 10.4.2 Consultation was undertaken with SEPA and Aberdeenshire Council to identify private water supplies (PWS) and groundwater abstractions in the Study Area. Consultation with a number of landowners was also undertaken. This information is considered appropriate for Planning Permission in Principle. Further consultation with private water supply owners is planned for future stages of assessment, when further design details are available.

Table 10.4: Summary of key consultation issues raised during consultation activities undertaken for the Proposed Development relevant to Geology and Ground Conditions

| Date | Consultee and Type of Consultation | Summary of Issue(s) Raised | Response to Issue Raised and/or Where Considered in this Chapter |
|-----------------|---|--|---|
| 24 October 2024 | Aberdeenshire Council, Bowdun Scoping Opinion | The Scoping Opinion summarises consultee responses which are listed separately below. | Responses to each of the issues raised are listed below. |
| | Aberdeenshire Council (Environmental Health), Bowdun Scoping Opinion | The proposals within the Scoping Report with respect to contaminated land were considered to be satisfactory. | Consideration of the presence of land affected by potential contamination is included in the assessment presented in Section 10.10. |
| | Aberdeenshire Council (Natural Environmental), Bowdun Scoping Opinion | The Scoping Opinion states the Burn of Benholm Site of Special Scientific Interest (SSSI) should be scoped in, unless it can be determined that this is excluded from the search area and won't be affected by the proposals. | The Burn of Benholm SSSI and Geological Conservation Review site encroaches the Study Area along the Onshore Export Cable Corridor (but is beyond the PPP Application Boundary). The route will be designed to avoid designated areas including SSSIs and these were therefore scoped out in the Scoping Report. The proximity of the final cable route to the SSSI will be reassessed once the final design details are known. |
| | NatureScot, Bowdun Scoping Opinion | The Scoping Opinion states The Burn of Benholm SSSI should be scoped in if it can not be determined that the SSSI is excluded from the search area and won't be affected by the proposals. | |
| | SEPA, Bowdun Scoping Opinion | The Scoping Opinion states that potential interruption of private water supplies (PWS) should be scoped into the EIA. Numerous PWS appear to be within the proposed cable route corridor and many are of an unknown source. We emphasise the source of any PWS will need to be identified. | PWS and sources have been scoped into the assessment presented in Section 10.10 where data are available to date and taking into account the design details available at this PPP stage. |
| | SEPA, Bowdun Scoping Opinion | The EIA submission is required to contain scale drawings of sensitivities, for example peat depth, peat condition. | Review of peat mapping is included in Figure 10.5 (Annex – Figures); site specific peat surveys were not proposed within the Onshore Export Cable Corridor due to the avoidance of mapped peat areas during design of the Proposed Development. Peat |

| Date | Consultee and Type of Consultation | Summary of Issue(s) Raised | Response to Issue Raised and/or Where Considered in this Chapter |
|-----------------------|---|---|---|
| | | | <p>was recorded in a limited number of exploratory holes near the Substation Search Area during recent ground investigation with thicknesses of less than 0.5 m. This information has informed the assessment in Section 10.10 of this chapter.</p> |
| | Scottish Water, Bowdun Scoping Opinion | The response confirms there are no Scottish Water drinking water catchments or water abstraction sources designated as Drinking Water Protected Areas (DWPA) under the Water Framework Directive in the area that may be affected by the proposed activity. | Consideration of this information is included in the assessment presented in Section 10.10. |
| December 2024 | Smiddy Cottage/ Clachanshiels, Rickarton, Stonehaven, Aberdeenshire, AB39 3TH. Private Water Supply information | Details of private water supply associated with this property provided by the landowner. | The information provided has been taken into account in the assessment presented in Section 10.10. |
| January 2025 | Whitehill, Rickarton, Stonehaven, Aberdeenshire, AB39 3TH. Private Water Supply information | Details of private water supply associated with this property provided by the landowner. | The information provided has been taken into account in the assessment presented in Section 10.10 of this chapter. . |
| September 2025 | Aberdeenshire Council Private Water Supply Data | Details of unlicensed private water supplies within the 1 km Study Area. | The locations of reported water supplies have been taken into account in the assessment presented in Section 10.10 of this chapter. |
| October 2025 | Aberdeenshire and Moray Council Private Water Supply Data | Details of unlicensed private water supplies within the vicinity of the Proposed Development. | The locations of reported water supplies have been taken into account in the assessment presented in Section 10.10 of this chapter. |

10.5 Data Sources

10.5.1 Topic specific information has been reviewed and analysed to inform the Geology and Ground Conditions baseline. No site-specific surveys were undertaken to inform the assessment as the majority of the potential effects are associated with temporary land-take along the Onshore Export Cable Corridor. Permanent land-take is limited to an area within the Substation Search Area only and this is over land which is not classified as prime agricultural land.

Desktop Study

10.5.2 Information on the geology, soils, and potential contamination within the Study Area was collected through a detailed desktop review of publicly available information which is summarised in Table 10.5.

Table 10.5: Summary of Key Data Sources

| Title | Source | Extent | Year | Author |
|---|---|--|------|---|
| GeoIndex (Onshore) | https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ | Covers the Study Area | 2025 | British Geological Survey (BGS) |
| NatureScot SNHi Data Services | https://sitelink.nature.scot/map | Covers Scotland | 2025 | NatureScot |
| Recycling and Waste Facilities – Scotland | https://data.spatialhub.scot/dataset/recycling_and_waste_facilities-is | Aberdeenshire | 2025 | Aberdeenshire Council |
| Scotland's environment map | https://map.environment.gov.scot/sewebmap/ | Covers the Study Area | 2025 | Scottish Government |
| Side by Side Map images | https://maps.nls.uk/geo/explore/side-by-side/ | Covers much of the Study Area (some maps are not present for the northern section of the Study Area) | 2025 | National Library of Scotland (NLS) |
| Soil maps | https://map.environment.gov.scot/Soil_maps/?layer=1 | Covers the Study Area | 2025 | Scottish Government |
| Water Classification Hub | https://informatics.sepa.org.uk/WaterClassificationHub/ | Covers Scotland | 2023 | Scottish Environment Protection Agency (SEPA) |
| Water Environment Hub | https://informatics.sepa.org.uk/RBMP3/ | Covers Scotland | 2020 | Scottish Environment Protection Agency (SEPA) |
| Scotland's aquifers and groundwater bodies | https://nora.nerc.ac.uk/id/eprint/511413/ | Covers Scotland | 2015 | BGS and SEPA |

10.6 Methodology for Assessment of Effects

Overview

10.6.1 The Geology and Ground Conditions assessment of likely significant effects has followed the methodology set out in Volume 1, Chapter 3: EIA Methodology. Specific to the Geology and Ground Conditions assessment, the following guidance documents have also been considered:

- IEMA Guide: A New Perspective on Land and Soil in Environmental Impact Assessment (IEMA, 2022).
- DMRB LA 109: Geology and Soils (Highways England, 2019).
- DMRB LA 113: Road drainage and the water environment (Highways England, 2020).

Criteria for Assessment

10.6.2 When determining the significance of effects, a process is used which involves defining the magnitude of the potential impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume 1, Chapter 3: EIA Methodology.

10.6.3 The criteria for defining magnitude in this chapter are outlined in Table 10.6. Each assessment considers the spatial extent, duration, frequency and reversibility of impact when determining magnitude which are outlined within the magnitude section of each impact assessment (e.g. a duration of hours or days would be considered for most receptors to be of short-term duration, which is likely to result in a low magnitude of impact). The criteria for defining sensitivity in this chapter are outlined in Table 10.7.

Table 10.6: Definition of Terms relating to Magnitude of Impact

| Magnitude of Impact | Definition |
|---------------------|--|
| Major | <p><u>Soils</u> Permanent, irreversible sealing or loss of one or more soil functions (including downgrading of LCA) over an area of more than 20 ha. Permanent improvements in one or more soil functions (including upgrading of LCA) over an area of more than 20 ha.</p> <p><u>Land contamination</u> Soil contamination considered to pose a high risk to potential receptors with one or more pollutant linkages certain to be present. Removal of all pollutant linkages that pose a risk to identified receptors.</p> <p><u>Groundwater</u> Major or irreversible change to groundwater aquifer(s) flow, water level, quality or available yield which endangers the resources currently available. Groundwater resource use/abstraction is irreparably impacted upon, with a major or total loss of an existing supply or supplies. Changes to water table level or quality would result in a major or total change in, or loss of, a GWDTE, where the value of a site would be severely affected. Changes to groundwater aquifer(s) flow, water level and quality would result in major changes to groundwater baseflow contributions to surface water and/or</p> |

| Magnitude of Impact | Definition |
|---------------------|---|
| | <p>alterations in surface water quality, resulting in a major shift away from baseline conditions such as change to WFD status. Dewatering effects create significant differential settlement effects on existing infrastructure and buildings leading to extensive repairs required. Short-term (acute) damage to human health.</p> |
| Moderate | <p><u>Soils</u> Permanent, irreversible sealing or loss of one or more soils functions (including downgrading of LCA) over an area between 5 ha and 20 ha. Permanent improvement of one or more soil functions over an area of between 5 ha to 20 ha.</p> <p><u>Land contamination</u> Soil contamination considered to pose a moderate risk to potential receptors with one or more pollutant linkages likely present. Removal of the majority of identified pollutant linkages so that risks to receptors are reduced.</p> <p><u>Groundwater</u> Moderate long-term or temporary significant changes to groundwater aquifer(s) flow, water level, quality or available yield which results in moderate long term or temporarily significant decrease in resource availability. Groundwater resource use/abstraction is impacted slightly, but existing supplies remain sustainable. Changes to water table level or groundwater quality would result in partial change in or loss of a GWDTE, where the value of the site would be affected, but not to a major degree. Changes to groundwater aquifer(s) flow, water level and quality would result in moderate changes to groundwater baseflow contributions to surface water and/or alterations in surface water quality, resulting in a moderate shift from baseline conditions upon which the WFD status rests. Dewatering effects create moderate differential settlement effects on existing infrastructure and buildings leading to consideration of undertaking minor repairs. Long-term (chronic) damage to human health.</p> |
| Minor | <p><u>Soils</u> Permanent, irreversible sealing or loss of one or more soil functions (including downgrading of LCA) over an area of less than 5 ha, or a temporary, reversible loss of one or more soil functions. Permanent improvement of one or more soil functions over areas of less than 5 ha.</p> <p><u>Land contamination</u> Soil contamination considered to pose a low risk to potential receptors with one or more pollutant linkages likely present. Possible removal of pollutant linkages so that risks to receptors are reduced.</p> <p><u>Groundwater</u> Minor changes to groundwater aquifer(s) flow, water level, quality or available yield leading to a noticeable change, confined largely to the Proposed Development area. Changes to water table level, groundwater quality and yield result in little discernible change to existing resource use. Changes to water table level or groundwater quality would result in minor change to GWDTEs, but where the value of the site would not be affected. Changes to groundwater aquifer(s) flow, water level and quality would result in minor changes to groundwater baseflow contributions to surface water and/or alterations in surface water quality, resulting in a minor shift from baseline conditions (equivalent to minor but measurable change within WFD status). Dewatering effects create minor differential settlement effects on existing infrastructure and buildings which may need to be monitored but where repairs may be avoidable. No significant impact or harm to human health based on the potential effects on the critical human health receptor.</p> |

| Magnitude of Impact | Definition |
|---------------------|--|
| Negligible | <p><u>Soils</u> No discernible loss, reduction or improvement of soil functions that restrict or decrease restrictions to current or proposed land use.</p> <p><u>Land contamination</u> Soil contamination not considered to pose any risk to potential receptors, with no pollutant linkages present.</p> <p><u>Groundwater</u> Very slight change from groundwater baseline conditions, approximating to a 'no change' situation. Dewatering effects create no or no noticeable differential settlement effects on existing infrastructure and buildings. Non-permanent health effects to human health.</p> |
| No change | <p><u>Soils</u> No loss/reduction of soil functions that restrict current or proposed land use.</p> <p><u>Land contamination</u> Soil contamination not considered to pose any risk to potential receptors, with no pollutant linkages present.</p> <p><u>Groundwater</u> No significant change to existing groundwater conditions.</p> |

Table 10.7: Definition of Terms Relating to the Sensitivity of the Receptor

| Sensitivity | Definition |
|------------------|--|
| Very High | <p><u>Soils</u> Biomass production: Soils supporting agricultural land of grades 1 and 2. Biodiversity: Soils supporting a European designated site (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA)).</p> <p><u>Land contamination</u> Human receptors, e.g. construction workers, future site users, and adjacent land users. Very high value groundwater body as defined below. Very high value surface water feature as defined in Volume 1, Chapter 11: Water Quality and Flood Risk. Internationally designated ecological sites.</p> <p><u>Groundwater</u> Groundwater aquifer(s) with very high productivity. Exploitation of groundwater resource is extensive for public, private domestic and/or agricultural use (i.e. feeding ten or more properties) and/or industrial supply. Groundwater feeding GWDTE with a high or moderate groundwater dependence within areas of international or national environmental importance such as Ramsar, SACs, SPAs and Sites of Special Scientific Interest (SSSIs).</p> |
| High | <p><u>Soils</u> Biomass production: Soils supporting agricultural land of class 3.1. Biodiversity: Soils supporting UK designated sites (e.g. SSSI, National Nature Reserve and ancient woodland). NatureScot priority peatland Class 1 (nationally important carbon-rich and peaty soils, deep peat and priority peatland habitat likely to be of high conservation value) and Class 2 (nationally important carbon-rich and peaty soils, deep peat and priority peatland habitat likely to be of potentially high conservation value and restoration potential).</p> <p><u>Land contamination</u> High value groundwater body as defined below.</p> |

| Sensitivity | Definition |
|-------------------|---|
| | <p>High value surface water feature as defined in Volume 1, Chapter 11: Water Quality and Flood Risk.</p> <p><u>Groundwater</u> Groundwater aquifer with moderate/ high productivity. Exploitation of groundwater resource is not extensive (i.e., private domestic and/ or agricultural supply feeding less than ten properties). Localised community. Groundwater feeding GWDTEs with a low groundwater dependence within areas of international or national environmental importance such as Ramsar, SACs, SPAs and SSSIs or groundwater feeding GWDTEs with a high or moderate groundwater dependence within a regional or local environmental importance such as Wildlife Sites and Sites of Interest for Nature Conservation.</p> |
| Medium | <p><u>Soils</u> Biomass production: Soils supporting agricultural land of grade 3.2. Biodiversity: Soils supporting non-statutory designated sites (e.g. Local Nature Reserve, Local Geological Site). NatureScot priority peatland Class 3 (dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich and peaty soils, with some areas of deep peat).</p> <p><u>Land contamination</u> Medium value groundwater body as defined below. Medium value surface water feature as defined in Volume 1, Chapter 11: Water Quality and Flood Risk. Structural elements of the built environment associated with the project and adjacent land uses – buried concrete, utility services etc. Other property i.e., crops and livestock.</p> <p><u>Groundwater</u> Groundwater aquifer with low productivity. No current known exploitation of groundwater as a resource and aquifer(s) properties make potential exploitation appear unlikely. Individual dwelling. Groundwater feeding GWDTEs with a low groundwater dependence within a regional or local designation such as a Wildlife Sites or Sites of Interest for Nature Conservation or groundwater feeding GWDTEs with a high or moderate groundwater dependence within areas of no environmental designation.</p> |
| Low | <p><u>Soils</u> Biomass production: Soils supporting agricultural land of grades 4.1 to 7 or urban soil. Biodiversity: Soils supporting non-designated notable or priority habitats. NatureScot priority peatland Class 5 (soil information takes precedence over vegetation data and there is no peatland habitat recorded, but all soils are carbon-rich and peaty soil and deep peat).</p> <p><u>Land contamination</u> Low value groundwater body as defined below. Low value surface water feature as defined in Volume 1, Chapter 11: Water Quality and Flood Risk.</p> <p><u>Groundwater</u> Groundwater aquifer with no significant productivity. No known past or present exploitation of groundwater aquifer(s) as a resource. Infrequently used area. Groundwater feeding GWDTEs with a low groundwater dependence within areas of local environmental importance.</p> |
| Negligible | <p><u>Soils</u> Biomass production: Soils in non-agricultural or urban areas. Biodiversity: Soils outside any of the habitats identified above.</p> |

| Sensitivity | Definition |
|-------------|---|
| | NatureScot priority peatland Class 4 (areas unlikely to be associated with peatland habitats or wet and acidic type, and unlikely to include carbon-rich or peat soils), Class 0 (mineral soils where peatland habitats are not typically found), Class -1 (unknown soil types) and Class -2 (non-soil (i.e. loch, built up area, rock and scree)). |

10.6.4 The magnitude of the impact and the sensitivity of the receptor are combined when determining the significance of the effect upon Geology and Ground Conditions. The particular method employed for this assessment is presented in Table 10.8 and Table 10.9.

10.6.5 Where a range is suggested for the significance of effect, for example, minor to moderate, it is possible that this may span the significance threshold. The technical specialist’s professional judgement will be applied to determine which outcome defines the most likely effect, which takes in to account the sensitivity of the receptor and the magnitude of impact. Where professional judgement is applied to quantify final significance from a range, the assessment will set out the factors that result in the final assessment of significance. These factors may include the likelihood that an effect will occur, data certainty and relevant information about the wider environmental context.

10.6.6 The EIA Regulations require the identification and reporting of significant environmental effects. For the purposes of this assessment:

- a level of moderate or more will be considered a ‘significant’ effect in terms of the EIA Regulations; and
- a level of minor or less will be considered ‘not significant’ in terms of the EIA Regulations.

Table 10.8: Matrix Used for the Assessment of the Significance of the Effect

| Sensitivity of Receptor | Magnitude of Impact | | | |
|-------------------------|---------------------|---------------------|---------------------|-------------------|
| | Negligible | Minor | Moderate | Major |
| Negligible | Negligible | Negligible or Minor | Negligible or Minor | Minor |
| Low | Negligible or Minor | Negligible or Minor | Minor | Minor or Moderate |
| Medium | Negligible or Minor | Minor | Moderate | Moderate or Major |
| High | Minor | Minor or Moderate | Moderate or Major | Major |
| Very High | Minor | Moderate or Major | Major | Major |

Table 10.9: Definition of Significance

| Impact | Justification |
|-------------------|---|
| Negligible | No effects or those that are beneath levels of perception, within normal bounds of variation, or within the margin of forecasting error. |
| Minor | These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Proposed Development. |
| Moderate | These beneficial or adverse effects have the potential to be important and may influence the decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor. |
| Major | These beneficial or adverse effects are very important and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national, or regional importance. However, a major change in a site or feature of local importance may also enter this category. |

10.7 Key Parameters for Assessment

Maximum Design Scenario

- 10.7.1 The Maximum Design Scenario (MDS) identified in Table 10.10 lists those parameters expected to have the potential to result in the greatest effect on an identified receptor or receptor group. Any other development scenario within the Project Design Envelope (PDE) will result in the same, or less, level of environmental effect. The scenario has been selected from the details provided in Volume 1, Chapter 2: The Proposed Development.

Table 10.10: Maximum Design Scenario Considered for Each Potential Impact as Part of the Assessment of Likely Significant Environmental Effects on Geology and Ground Conditions

| Potential Impact | Phase* | | | Maximum Design Scenario |
|--|--------|-----|---|--|
| | C | O&M | D | |
| Physical removal or sealing of prime agricultural land and/or peaty soils | ✓ | x | ✓ | The Substation Search Area extends over an area of 24 hectares (ha) within which the Substation will be located. However, The permanent footprint of the Substation Site – the total area for construction of the Substation Switchyard covering approximately 19 ha – is considered to be the maximum potential area which could be affected by permanent soil removal. |
| Degradation during stripping, handling and storage through mechanisms such as compaction and smearing | ✓ | x | x | During construction there is a potential that where trenches are constructed for the emplacement of the Onshore Export Cables, that degradation of soil may occur. The Maximum Design Scenario for the Onshore Export Cables will be up to three circuits buried in up to two cable trenches, with trenches currently estimated to be a maximum of 4.2 m wide at the top. Over a length of 22 km, this could potentially impact 9.2 ha of soil. This is the greatest extent of soils that could be impacted by degradation along the Onshore Export Cable Route. |
| Soil quality may be degraded by mobilising contaminants or from contaminated surface water run-off | ✓ | x | ✓ | Historical and current land use review indicates that potentially contaminative land uses have been identified, including former and current railway land and quarries. The contamination potential is considered likely to be low given that only sporadic historical land uses have been identified which have the potential to be contaminative, alongside agricultural use. |
| Disturbance of land contamination may result in risks to human health | ✓ | x | ✓ | The Study Area contains residential properties predominantly in and around Drumlithie and Arbuthnott, and there are also scattered properties and farmhouses across the Study Area. There may be acute risks from exposure to contaminated soils, waters, and from fugitive dusts during construction and decommissioning that will require standard construction management. |
| Disturbance of land contamination may result in risks to groundwaters | ✓ | x | ✓ | There is the potential for pollution from contaminated soils on the underlying groundwaters during construction and decommissioning. |
| Disturbance of land contamination may result in risks to surface waters | ✓ | x | ✓ | There is the potential for pollution of nearby surface waters via leaching and run-off of contaminants and movement in contaminated waters during construction and decommissioning. |

| Potential Impact | Phase* | | | Maximum Design Scenario |
|---|--------|-----|---|---|
| | C | O&M | D | |
| Dewatering of Private Water Supplies (PWS) | ✓ | × | × | Private water supplies are identified in the Study Area. Dewatering during construction may affect PWS. Predicted groundwater dewatering effects are of limited extent. |
| Dewatering of potential GWDE | ✓ | × | ✓ | GWDEs may be impacted by horizontal directional drilling (HDDs) and associated dewatering. |
| Impacts on baseflow to surface water from groundwater dewatering | ✓ | × | ✓ | Predicted groundwater dewatering effects are of limited extent so that there is limited potential for reduction of baseflow impacting surface water bodies. |
| Pollution of groundwater from fuels, oils and lubricants | ✓ | ✓ | ✓ | Moderate risk of pollution may occur from vehicles on site due to any leakage. |

* Project Phase refers to Construction (C), Operation and Maintenance (O&M) and Decommissioning (D)

Impacts Scoped Out of the Assessment

10.7.2 On the basis of the baseline environment and the description of the Proposed Development outlined in Volume 1, Chapter 2: The Proposed Development, a number of potential impacts were scoped out of the assessment for Geology and Ground Conditions. These were proposed and confirmed to be scoped out in the Scoping Report (TWP, 2024) with no concerns raised by key consultees in the subsequent Scoping Opinion.

10.7.3 The potential impacts which are scoped out are outlined in Table 10.11.

Table 10.11: Impact Scoped Out of the Assessment for Geology and Ground Conditions

| Potential Impact | Phase* | | | Justification |
|--------------------------------------|--------|-----|---|--|
| | C | O&M | D | |
| Geologically Designated Sites | ✓ | ✓ | ✓ | The Burn of Benholm SSSI and Geological Conservation Review site encroaches the Study Area, but is beyond the PPP Application Boundary; the cable route will be designed to avoid designated areas including SSSIs and designated sites were therefore scoped out in the Scoping Report. |
| Mineral Resources | ✓ | ✓ | ✓ | There are no mineral search areas or mineral safeguarded sites recorded within the Geology and Ground Conditions Study Area. |

* Project Phase refers to Construction (C), Operation and Maintenance (O&M) and Decommissioning (D)

10.8 Baseline Environment

Overview of Baseline Environment

10.8.1 Information on the baseline environment relevant to geology, soils, and potential contamination was collected through a desktop review of the publicly available information summarised in Table 10.5. The following section provides a summary of the baseline environment.

10.8.2 Baseline conditions cover the following aspects of ground conditions:

- Bedrock and superficial geology.
- Soil resources.
- Groundwater environment including baseflow to surface water features, Private Water Supplies (PWS) and Groundwater Dependent Terrestrial Ecosystems (GWDTE).
- Land contamination.

Geology

10.8.3 Whilst geologically designated sites are scoped out of assessment, geological baseline conditions are relevant to both soils (as parent material) and land contamination with respect to contaminant fate and transport. Information for Geology is taken from the BGS GeoIndex Onshore viewer (British Geological Survey, 2025).

10.8.4 Superficial deposits underlying much of the Study Area are recorded by the BGS as Till (Devensian Diamicton) as shown in Figure 10.2 (Annex – Figures). Narrow bands of alluvial deposits (Alluvium - clay, silt, sand and gravel) are mapped

aligned to surface water courses and Raised Marine Deposits (clay, silt, sand, and gravel) are mapped beneath the Onshore Export Cable Corridor in the southeast of the Study Area. Other superficial deposits include Drumlithe Glacial and Glaciofluvial deposits (gravel, sand and silt) and small pockets of Peat. There are areas where no superficial deposits are mapped indicating likely shallow bedrock deposits.

- 10.8.5 Superficial deposits are largely absent beneath the Substation Search Area with localised areas of Peat, Till and Glacial Deposits recorded.
- 10.8.6 Artificial ground is mapped in two areas within the Study Area. These are associated with the railway line that intersects the centre of the Study Area to the north of the A90 and isolated areas along the A90 highway. It isn't expected that large quantities of artificial ground will be found across the Study Area given its rural nature; however, Made Ground is likely to be present where roads and other development have been constructed.
- 10.8.7 Bedrock geology is highly variable across the Study Area as shown in Figure 10.3 (Annex – Figures). The main bedrock bodies, from southeast to northwest comprise the following:
- Dunnottar-Crawton Group (interbedded conglomerate and sandstone).
 - Arbuthnott-Garvock Group (sandstone with subordinate conglomerate, siltstone and mudstone).
 - Unnamed extrusive rocks (lava and solidified volcanic ash).
 - Strathmore Group (sandstone with subordinate conglomerate, siltstone and mudstone).
 - Stonehaven Group (sandstone with subordinate conglomerate and siltstone).
 - Highland Border Complex (Serpentinite, metabasalt, metalimestone)
 - Southern Highland Group (metamorphosed mudstone).
 - Southern Highland Group (metamorphosed mudstone and sandstone).
 - Unnamed igneous intrusion.
- 10.8.8 The Southern Highland Group (metamorphosed mudstone and sandstone) underly the Substation Search Area.
- 10.8.9 The BGS data indicates that several faults cross the Study Area.
- 10.8.10 A ground investigation was completed by Raeburn Drilling & Geotechnical Limited (Igne) between 28 October 2024 and 18 December 2024 (Igne, 2004) along the approximate route of the Proposed Development. Igne produced a Factual Report which states the scope of works comprised drilling of 30 boreholes and excavation of 51 trial pits. An interpretation of the ground investigation data and laboratory test data was not provided within the Igne report; however, evidence of Made Ground or soil contamination was not recorded by the Igne site engineer on the geological logs. Peat was identified at 15 locations in the Substation Search Area with a maximum thickness of 0.5 m.

Soils

- 10.8.11 The National soil map of Scotland (Scottish Government, 2025a) indicates that much of the south and centre of the Study Area is underlain by brown earths (most with humus-iron podzols), with the north underlain by humus-iron podzols and peaty gleyed podzols. Small areas of noncalcareous gleys are found in the south and an area of alluvial soils is recorded in the centre.
- 10.8.12 The economic resource value of soil is primarily measured by its ability to support agricultural uses. This is quantified by its Land Capability for Agriculture (LCA) classification with seven grades defined (Bibby, et al., 1991) as follows:
- Class 1 (land capable of producing a very wide range of crops).
 - Class 2 (land capable of producing a wide range of crops).
 - Class 3 (land capable of producing a moderate range of crops).
 - Class 4 (land capable of producing a narrow range of crops).
 - Class 5 (land capable of use as improved grassland).
 - Class 6 (land capable only of use as rough grazing).
 - Class 7 (land of very limited agricultural value).
- 10.8.13 It is noted that “Class 3 and 4 have two divisions based on increasing restrictions to arable cropping” and “Class 5 land has three divisions based on potential for successful reclamation and Class 6 three based upon the value of the existing vegetation for grazing purposes” (Bibby, et al., 1991).
- 10.8.14 Class 1, 2, and 3.1 agricultural land are classified as prime agricultural land meaning that the land is the most flexible land in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining yield.
- 10.8.15 The LCA soil classifications across the Study Area are shown in Figure 10.4 (Annex – Figures). Soils across most of the Study Area in the south consist of LCA classes 3.1 and 3.2 with areas of class 4.1, 4.2, 5.1, 5.2 and 6.2 in the north. Class 5.1 soils underlie the Substation Search Area.
- 10.8.16 The carbon and peat 2016 mapping (Scottish Government, 2025a) classifies soils according to the following classes (Scottish Natural Heritage, 2017):
- Class 1 (areas of peat soil and peatland habitats).
 - Class 2 (areas dominated by peat soil and peatland habitats).
 - Class 3 (dominant vegetation cover is not a priority peatland habitat but is associated with wet and acidic types. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat).
 - Class 4 (area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils).
 - Class 5 (areas of high-carbon and deep soil but no peatland habitat recorded).
 - Class 0 (area of mineral soil, i.e., no peat).
 - Class -2 (non-soil e.g., loch, built up area, rock, and scree).
 - Class -1 (unknown soil type)

10.8.17 The mapping indicates that the Study Area is predominantly underlain by class 0 (mineral) soils as shown in Figure 10.5 (Annex – Figures). A small area to the north of Drumlithie and the most northerly extents of the Study Area are underlain by Class 4 soils. Localised areas of Class 3 and Class 5 soils are present to the north of the Substation Search Area. The soils in the Substation Search Area consist of Class 4 soils which are “*unlikely to be associated with peatland or to include carbon-rich soils*”.

Surface Water and Groundwater

10.8.18 Surface water features are expected to have a groundwater baseflow component, and groundwater may be a contributor to flooding mechanisms.

10.8.19 The WFD recognised watercourses within the 1 km Study Area include Bervie Water, Forthie Water (tributary to Bervie Water), and Carron Water. Other smaller surface watercourses and water features are present and include burns, agricultural drainage, and ponds. More information on watercourses can be found in Volume 1, Chapter 11: Water Quality and Flood Risk.

10.8.20 The Water Environment Hub (SEPA, 2020) includes information on the current quality of rivers in Scotland and the following is noted for the Study Area:

- Bervie Water – Lower Catchment crosses the southeast of the Study Area. In 2023, it had an overall poor ecological potential. Water quality is noted as moderate, and its physical condition is rated as bad status for hydromorphology.
- Bervie Water – Upper Catchment crosses the Study Area. It had a moderate ecological status in 2023. The overall ecology and hydromorphology are both poor, and the water quality is noted as moderate.
- Cowie Water-Fetteresso Forest – passes through the north of the Study Area. In 2023 it had an overall high ecological potential and high water quality.
- Forthie Water – crosses the centre of the Study Area, near Drumlithie. In 2020, it had an overall moderate ecological potential. Water quality is noted as moderate, and its physical condition is noted as bad status for hydromorphology.
- Carron Water – crosses the north of the Study Area. In 2020, it had an overall moderate ecological potential. Water quality is noted as moderate, and its physical condition is noted as bad status for hydromorphology.

10.8.21 Superficial deposits present in the Study Area are identified and discussed in Volume 2, Appendix 12.1: Hydrogeological Characteristics of Superficial and Bedrock Geological Units. This Appendix also provides the hydrogeological characteristics of the geological units, discusses the potential for groundwater connectivity between these units using information adapted from the BGS Scotland 1:625,000 aquifer classification data (Scottish Government, 2025b) and assigns a value/importance based on the criteria presented in Table 10.7 Value/Importance Criteria.

10.8.22 Groundwater within superficial deposits underlying the Study Area is likely to be predominantly present within the Raised Marine Deposits of Holocene Age,

Alluvium, the Drumlithie Sand and Gravel Member, the Lochton Sand and Gravel Member, the Devensian Raised Marine Deposits and the River Terrace Deposits. There is likely to be a high degree of connectivity between these deposits where contact exists.

- 10.8.23 Two SEPA identified WFD surface water sub basin districts are located within the Study Area: the North East Scotland Sub Basin District (UK01SU01) and the Tay Sub Basin District (UK01SU02).
- 10.8.24 Four SEPA identified bedrock aquifers are located within the Study Area: the St Cyrus aquifer, the Drumlithie aquifer, the Stonehaven aquifer, and the Portlethen aquifer. There is a potential for there to be a connection between the bedrock aquifers and the water bearing superficial deposits. However, the presence of Glacial Till and cohesive layers, such as silt and clay, within the superficial deposits may act as barriers or aquitards between the bedrock aquifers and water bearing superficial deposits where present.
- 10.8.25 Table 10.12 provides further detail on the characteristics of each identified water body, summarising information from SEPA Water Environment Hub (SEPA, 2025).

Table 10.12: Groundwater Waterbody Characteristics

| Groundwater Aquifer (SEPA identification) | Hydrogeological Characteristics | Corresponding Geological Units |
|---|---|--|
| St Cyrus aquifer (150524) | The aquifer has moderate to very high productivity. The overall status of the aquifer is classified as good in 2023. The overall status has remained good since 2017. | Crawton Volcanic Formation, Whitehouse Conglomerate Formation, Catterline Conglomerate Formation, Three Wells Sandstone |
| Drumlithie aquifer (150585) | The aquifer has moderate to very high productivity. The overall status of the aquifer is classified as good in 2023. The overall status has remained good since 2017. | Catterline Conglomerate Formation, Three Wells Sandstone formation, Deep Conglomerate Formation, Cromlix Mudstone Formation, Arbuthnott-Garvock Group, Montrose Volcanic Formation, Dunottar-Crawton Group |
| Stonehaven aquifer (150550) | The aquifer has moderate to very high productivity. The overall status of the aquifer is classified as good in 2023. The overall status has remained good since 2017. | Dunottar-Crawton Group, Carron Sandstone Formation, Cowie Sandstone Formation |
| Portlethen aquifer (150625) | This aquifer has very low to low productivity. The overall status of the aquifer is classified as good in 2023. The overall status has remained good since at least 2012. | Glen Lethnot Grit Formation, North Britain Siluro-Devonian Calc-Alkaline Dyke Suite, Glen Effock Schist Formation, Water of Dye Granite |

- 10.8.26 Habitat survey results have identified one area of wet woodland in the Study Area interacting with the Drumlithie groundwater body. One area of wet woodland, one area of other wetland and one area of grassland have been identified within the Stonehaven groundwater body. These have been identified as potential groundwater dependant terrestrial ecosystems (GWDTE) which

could be impacted by dewatering or contamination during construction. The location of known potential GWDTEs at this stage are shown on Figure 10.5 (Annex – Figures).

- 10.8.27 Further study will be required to determine whether these potential GWDTE will be affected by the Proposed Development. This this will be undertaken at future stages of assessment, when detailed design information is available to confirm the cable route and design. Further investigation will be undertaken to confirm the status and groundwater connection of potential GWDTE confirmed as potentially impacted. It is anticipated that potential impacts could be mitigated by embedded mitigation (e.g. as detailed in a CEMP) or additional mitigation or design measures as required.
- 10.8.28 Five other potential GWDTE have been identified within the St Cyrus, Drumlithie and Stonehaven groundwater bodies, comprising wet woodland, grassland and other wetland areas. However, due to their distance from the Proposed Development these are not expected to be impacted.
- 10.8.29 There are no Surface Drinking Water Protected Areas within the Study Area. The entire Study Area is a Groundwater Drinking Water Protected Area.
- 10.8.30 Water abstractions of greater than or equal to 10m³/day require either a registration or abstraction licence from SEPA. These are collectively referred to as licensed abstractions in this report. Water abstractions of less than 10m³/day do not require an abstraction licence or registration, these are referred to as unlicensed abstractions in this report (the local authority has the duty to maintain records of unlicensed abstractions).
- 10.8.31 No public or private licensed groundwater or surface water abstractions are recorded within the Study Area or are within any potential dewatering zones. Sixty-seven unlicensed private water supplies (PWS) have been identified, as shown on Figure 10.4 (Annex – Figures).
- 10.8.32 The Groundwater Vulnerability map (BGS, 2011) indicates that the majority of the Study Area has a vulnerability rating of 4a, with small areas having a rating of 3 and 5. A vulnerability rating of 4a means that the area is vulnerable to pollutants that are not readily absorbed or transformed, and may have a low soil permeability but less likely to have clay present in superficial deposits. A vulnerability rating of 3 means that the area is vulnerable to some pollutants, but many others are attenuated. A vulnerability rating of 5 means that the area is vulnerable to most pollutants, with rapid impacts in many scenarios.
- 10.8.33 Scotland's 1:625,000 aquifer classification data (Scottish Government, 2025b) indicates that the sedimentary bedrock geology within the Study Area are classified as moderately productive aquifers, while the igneous and metamorphic geology are classified as low productivity aquifers. No publicly available information is available for the classification of superficial aquifers across the Study Area.

Human Receptors

- 10.8.34 The term human receptors within this chapter refers to people who may be affected by the Proposed Development. Given their sensitive nature, human receptors are designated as having a Very High Sensitivity.
- 10.8.35 The current land use across the 250 m Study Area is predominantly arable fields with residential properties at Drumlithie and Arbuthnott and sporadic farmhouses in other areas. No human receptors are noted within 250 m of the Substation Search Area.

Mining, Quarrying, and Mineral Resources

- 10.8.36 Historical mapping indicates the presence of sporadic historical quarries, gravel pits and a sand pit within the Study Area (National Library of Scotland, 2025).

Landfills and Waste Sites

- 10.8.37 No historical landfills or refuse heaps are recorded in the Study Area on available historical mapping (between 1868 and 1955) (National Library of Scotland, 2025).
- 10.8.38 Local authority information on recycling and waste facilities (including transfer centres and current/historical landfill sites) indicates that there are no such facilities within the 250 m Study Area (Aberdeenshire, 2025).

Potential Sources of Contamination

- 10.8.39 A review of current and historical land use has been completed based on publicly available (between 1868 and 1955) historical land use maps (National Library of Scotland, 2025) and recent aerial imagery (Google, 2025) to highlight potential sources of contamination in the 250 m Study Area.
- 10.8.40 The pre-application consultee response from Aberdeen Council refers to the presence of potentially contaminated land, including former railway land inland of the landfall, the existing railway and two landfill sites.
- 10.8.41 The current land use within the Study Area is primarily agricultural with sporadic farmhouses and the villages of Drumlithie and Arbuthnott in the centre. Numerous roads exist across the Study Area (including the A90 and A92), and the existing railway line. Forestry covers the northern most section of the Study Area, and the southern most end of the Study Area is along the coast and extends out into the sea.
- 10.8.42 Available historical maps show the Study Area has predominantly been in agricultural use since the mid-19th century, with minor roads, a former and the current railway line present since the time of the earliest mapping in 1868. The following potential sources of contamination have been identified as part of this desk-based assessment:
- Made ground/infilled materials associated with the construction of roads, particularly the A92 in the south and the A90 in the centre.
 - Made ground where the current railway line is located.
 - An historical railway line was situated in the south and there remains the potential for made ground in this area.

- Potentially infilled ponds, surface water courses, quarries, gravel and sand pits.
- Localised made ground where historical mills and smithies were located.

10.8.43 No historical land uses are recorded on or within 250 m of the Substation Search Area; it has remained as forestry and/or undeveloped land since the earliest available mapping in 1868.

Future Baseline Scenario

10.8.44 The EIA Regulations require that “*a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge*” is included within the EIA Report.

10.8.45 If the Proposed Development does not come forward, an assessment of the ‘without development’ future baseline conditions has been carried out and is described within this section.

10.8.46 Without the Proposed Development, it is likely the majority of the existing land use would continue to be agricultural and commercial forestry and therefore it is considered unlikely that the baseline conditions would change significantly. Future developments would be subject to planning restrictions to prevent significant impacts and to address historical contamination.

10.8.47 The recorded baseline scenario has the potential to change as a result of climate change scenarios, such as increases in intense rainfall events that have the potential to increase land erosion and to affect groundwater levels and surface water flooding events.

Data Limitations and Assumptions

10.8.48 Historical mapping information has been sourced from publicly available data and only four maps are freely available for the Study Area, dated between years 1868 and 1955 (National Library of Scotland, 2025). It is possible that potentially contaminative land uses have occurred within the intermediate years that are not mapped and have therefore not been identified as part of this study.

10.8.49 Where information used in the baseline has been sourced from publicly available data from third party data sources, it is assumed to be complete and accurate.

10.8.50 Peat was identified at a limited number of exploratory holes during the recent Igne ground investigation in the Substation Search Area only, and with thicknesses of less than 0.5 m. Site-specific peat probing has not been undertaken due to absence of significant mapped peat deposits. Further assessment of peat may be required prior to any development taking place.

10.8.51 The assessment of private water supplies is based on the desk-based assessment data collected at this stage. Further surveys will be required for supplies that are confirmed to be within 250 m of the final excavations associated with the Proposed Development.

- 10.8.52 It is assumed that the Substation Site – which is located within the wider Substation Search Area – will consist of permanent land take while the Onshore Export Cable Corridor will be temporary land take during construction only, which could be up to 45 months in duration (inclusive of pre-construction and restoration activities). The Substation Site covers an area of approximately 19 ha is the total area required for construction of the Substation Switchyard.
- 10.8.53 It is assumed that during decommissioning, the foundations for the Substation will be broken up and the land reinstated to its original peat, soil classes and land use.
- 10.8.54 It is assumed the trenches required during construction for laying the cables in the Onshore Export Cable Corridor will be approximately 4.2 m wide and 1.65 m deep for the majority of the route, with HDD crossing locations up to a burial depth of 6 m. It is expected the cables will be removed via the Transition Joint Bays (TJBs) to minimise environmental disturbance during decommissioning. The TJBs and link boxes will also be removed if this method of decommissioning is feasible with minimal environmental disturbance.

10.9 Embedded Mitigation

- 10.9.1 As part of the Proposed Development design process, a number of embedded mitigation measures are proposed to reduce potential impacts on Geology and Ground Conditions. These embedded measures are presented in Table 10.13. There is a commitment to implementing these measures at every stage of the Proposed Development through design and best practice and therefore these embedded measures have been considered in the assessment presented in Section 10.10 (i.e. the determination of magnitude and significance assumes implementation of these embedded mitigation measures).

Table 10.13: Embedded Measures Adopted as Part of the Proposed Development

| Ref. | Embedded Measures Adopted as Part of the Proposed Development | Justification |
|------|--|--|
| GEN1 | The Proposed Development is sited over poorer quality land avoiding areas of peat | This reduces the impact on prime agricultural land, peaty soils, and/or carbon-rich soils. This follows Policy 5 of the NPF4 (Scottish Government, 2024). |
| | The Proposed Development area will be refined to reduce area of impact as much as practicable | This reduces the impact on soils which could include soils supporting prime agricultural land, peaty soils, and/or carbon-rich soils. This follows Policy 5 of the NPF4 (Scottish Government, 2024). |
| | Siting the Onshore Export Cable Corridor away from potential sources of contamination where possible | This reduces the likelihood of contamination being disturbed and/or mobilised thus reducing the risk to receptors such as human health and controlled waters. |
| GEN2 | A Construction Environmental Management Plan (CEMP) will be prepared and implemented during the construction and decommissioning phases of the Project. An Outline | Measures will be adopted to ensure the potential for release of pollutants during construction is reduced as far as reasonably practicable through the management procedures outlined in the CEMP, which will include a Surface Water Quality Management |

| Ref. | Embedded Measures Adopted as Part of the Proposed Development | Justification |
|-------------|--|---|
| | CEMP has been included in Volume 2, Appendix 2.2. | Plan (SWQMP), Waste Management Plan and a Stockpile / Soil Management Plan. There will also be controls in place in accordance with the CEMP to control dust emissions and nuisances as well as requirements for designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations, double skinning of pipes and tanks containing hazardous substances, and storage of these substances in impenetrable bunds with adequate capacity to contain potential leakages. |
| | Soil should be stripped prior to construction of the Proposed Development and reused sustainably | <p>Soil stripping reduces the impact on soils because degradation during stripping, handling and storage would either be avoided or would be temporary (short-term) in nature.</p> <p>Reuse of materials adheres to Policy 12 of the NPF4 (Scottish Government, 2024) which seeks to “reduce, reuse, or recycle materials in line with the waste hierarchy” reducing the need for new virgin materials or wasting the materials that are suitable for re-use in the Proposed Development.</p> |
| GEN3 | Private Water Supply Monitoring Plan | The Developer and/or Contractor will engage with Aberdeenshire Council and local residents to inform a Private Water Supply Monitoring Plan to understand the potential impact of construction on Private Water Supplies once detailed design information becomes available. |
| GEO1 | Following Land Contamination Risk Management (LCRM) - | LCRM requires the assessment and management of risks from land contamination and its implementation would result in the land being made safe and suitable for the proposed use of the Proposed Development. This also aligns with Policy 9 of the NPF4 (Scottish Government, 2024). |

10.10 Assessment of Significance

10.10.1 Table 10.10 summarises the potential effects arising from the construction, O&M and decommissioning phases of the Proposed Development, as well as the MDS against which each impact has been assessed. An assessment of the likely significance of the effects of the Proposed Development on the Geology and Ground Conditions receptors caused by each identified impact is given below.

Construction Phase

Soil

Magnitude of Impact

- 10.10.2 Permanent loss of soil function will be associated with construction of the Substation. The exact location of the Substation within the Substation Search Area will be confirmed during detailed design, however an indicative layout has informed this assessment. The maximum design scenario considered is the permanent footprint of the Substation Site, which is the total area required to construct the Substation Switchyard and will be approximately 19 ha. The threshold for a moderate magnitude of impact for permanent, irreversible sealing or loss of one or more soils functions is 5ha to 20 ha, as set out in Table 10.6. As such, a moderate magnitude of impact could occur due to the permanent loss of approximately 19 ha of soil at the Substation Site which would downgrade the LCA. While soil stripping and sustainable reuse would occur as part of the embedded mitigation measures (meaning the magnitude of impact on the soil itself would be negligible) the downgrading of LCA would not be avoidable and therefore this effect would still occur.
- 10.10.3 The permanent sealing or wastage of soil would be avoided as far as practicable along the Onshore Export Cable Corridor via stripping and sustainable reuse, as per the embedded mitigation measures. In addition, by following good practice soil management measures (e.g. by following DEFRA's Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA, 2018) and/or SEPA's regulatory guidance for promoting the sustainable reuse of greenfield soils in construction (SEPA, 2010)), degradation during stripping, handling and storage would either be avoided or would only be temporary (short-term) in nature and would not restrict future use. Therefore, a negligible magnitude of impact is predicted for soils along the Onshore Export Cable Corridor.
- 10.10.4 There is a limited potential for peat to be degraded during construction through disturbance or handling and/or loss via soil sealing. Significant thicknesses of peat are not anticipated based on recent ground investigation data. The design of the Substation and Onshore Export Cable Corridor will avoid areas of peat where practicable. Where peat is unavoidable it is anticipated it will be present at thicknesses of less than 0.5 m. Therefore, the magnitude of impact is deemed to be minor.
- 10.10.5 Given the limited Class 3 peaty soils recorded underlying the Study Area a minor magnitude of impact is considered appropriate.

Sensitivity of the Receptor

- 10.10.6 Below the Substation Site, all land consists of LCA class 5.1 which has a low sensitivity.
- 10.10.7 The Onshore Export Cable Corridor's agricultural land classes indicate that much of the agricultural soils vary from high (LAC class 3.1) to medium (LAC grade 3.2) sensitivity, with the smaller areas of other grades having low sensitivity.
- 10.10.8 Below the Substation Site, peaty soils consist of Class 4 and mineral soils, which have a negligible sensitivity.
- 10.10.9 The most sensitive peaty soils across the Study Area are small areas of Class 3 soils to the north of the Substation Site. This class of soil is indicated to have a medium sensitivity.

Significance of the Effect

- 10.10.10 The magnitude of impact for potential downgrading of the LCA in the Substation Site is deemed to be moderate and the sensitivity of the receptor is considered to be low. This results in a minor adverse significance, which is not significant in EIA terms.
- 10.10.11 The magnitude of the impact of the temporary degradation of agricultural soils along the Onshore Export Cable Corridor is deemed to be negligible and the sensitivity of the receptor is considered to be medium to high. The effect will therefore be of negligible to minor adverse significance, which is not significant in EIA terms.
- 10.10.12 The magnitude of the impact on peat as a result of soils sealing of 19 ha at the Substation Site is deemed to be moderate and the sensitivity of the receptor is considered to be negligible. The effect will therefore be of negligible or minor significance, which is not significant in EIA terms.
- 10.10.13 Overall, the magnitude of the impact for peaty soil degradation within the Study Area is deemed to be minor and the highest sensitivity of the receptor is considered to be medium. The effect will therefore be of minor adverse significance, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

- 10.10.14 Soil mitigation in addition to embedded measures is not considered to be necessary as the assessment has shown the likely effect will not be significant in EIA terms.

Land Contamination

Magnitude of Impact

- 10.10.15 In accordance with LCRM, land contamination issues will be addressed prior to construction of the Proposed Development and land will be made suitable for use and therefore risks to future site users and adjacent land users will not occur. The requirements of the CDM Regulations would provide appropriate protection to construction workers from contamination during construction

works. The magnitude of impact on receptors is therefore deemed to be negligible.

Sensitivity of the Receptor

- 10.10.16 During the construction phase there is the potential that construction workers will encounter potentially contaminated material in previously developed land. Therefore, the sensitivity of the receptor is very high.
- 10.10.17 During the construction phase, disturbance of contaminated soils that have resulted from historical and/or current land use may mobilise contamination or create new pollutant pathways which may impact groundwaters. Given the presence of very high productivity aquifers within the Study Area, the sensitivity of this receptor is very high.
- 10.10.18 During the construction phase, disturbance of contaminated soils that have resulted from historical and/or current land use may mobilise contamination or create new pollutant pathways which may impact surface water courses. As in Volume 1, Chapter 11: Water Quality and Flood Risk, surface water sensitivities vary from medium to high according to their WFD classification and ecological importance.

Significance of the Effect

- 10.10.19 For both human health and groundwater, the sensitivity of the receptors is very high. Given the magnitude of impact for land contamination is negligible, the effect will be of minor adverse significance, which is not significant in EIA terms.
- 10.10.20 For surface waters, the sensitivity of the surface waters varies from medium to high. Given the magnitude of impact for land contamination is negligible, the effect will vary from negligible to minor adverse significance, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

- 10.10.21 No land contamination mitigation is considered necessary if LCRM is followed and the land made suitable for use, as the likely effect in the absence of additional mitigation is not significant in EIA terms.

Groundwater

Magnitude of Impact

- 10.10.22 There is no permanent dewatering planned within the Proposed Development. Any temporary, non-permanent, dewatering will have a localised effect on groundwater bodies, therefore the magnitude of impact is deemed to be negligible.
- 10.10.23 Below ground construction of the Substation will create a localised disturbance of groundwater flows with a potential negligible magnitude of impact on bedrock aquifers.
- 10.10.24 The pre-FEED design does not include retaining walls or sheet piles that might affect groundwater levels or flows. However, this will continue to be reviewed as future design iterations are developed.

10.10.25 During construction, in the event of accidental spillage, potential contamination may migrate from the ground surface through the unsaturated zone reaching the shallow superficial or bedrock aquifers, impairing groundwater quality, unless appropriate measures for control of discharge and drainage are taken. However, with embedded mitigation (i.e. the CEMP) the magnitude of potential impacts is negligible.

10.10.26 Fourteen Private Water Supplies are within close proximity (250 m) of the PPP Application Boundary and where there is a possibility that any dewatering would affect these PWSs. Considering the limited degree of proposed dewatering and distance of the PWS from the Proposed Development, the potential magnitude of impacts for PWS would be minor adverse. The potentially affected PWS are shown on Figure 10.4 (Annex – Figures) and comprise:

| | | |
|-------|--------|--------|
| PWS-1 | PWS-6 | PWS-11 |
| PWS-2 | PWS-7 | PWS-12 |
| PWS-3 | PWS-8 | PWS-13 |
| PWS-4 | PWS-9 | PWS-14 |
| PWS-5 | PWS-10 | |

10.10.27 Five potential GWDTEs are present in close proximity (250 m) of the PPP Application Boundary, resulting in a potential minor to moderate adverse magnitude of impact due to dewatering. These are shown on Figure 10.5 (Annex – Figures) and comprise:

- An area of wet woodland west of Knox Hill, at the southern end of the PPP Application Boundary.
- An area of wet woodland at Buckie’s Mill, at the northern end of the PPP Application Boundary.
- An area of other wetland at Tannachie, at the northern end of the PPP Application Boundary.
- An area of grassland at Waters, at the northern end of the PPP Application Boundary.
- An area of grassland at Cuttiesouter, at the northern end of the PPP Application Boundary.

Sensitivity of the Receptor

10.10.28 The aquifers within the Study Area are very low to very high productivity therefore the sensitivity is designated between medium and very high sensitivity.

10.10.29 Private water supplies are designated with a high sensitivity due to their use as potable water supplies for human consumption.

10.10.30 GWDTEs are not located within environmentally designated areas and so are considered to be of medium sensitivity.

Significance of the Effect

10.10.31 The magnitude of impact on the aquifers are all predicted to be negligible. This combined with a very high sensitivity of some aquifers indicates a minor adverse significance overall, which is not significant in EIA terms.

- 10.10.32 Private water supplies are designated as high sensitivity, and the magnitude of impact is predicted to be minor. Therefore, the significance of the effect is predicted to be minor or moderate adverse. This would be significant in EIA terms and would require further investigation and, potentially, additional mitigation measures.
- 10.10.33 GWDTEs are designated with a medium sensitivity, and the magnitude of impact is predicted to be minor to moderate. Therefore, the significance of the effect is predicted to range from minor adverse to moderate adverse. This would be significant in EIA terms and would require further investigation and, potentially, additional mitigation measures.

Additional Mitigation, Proposed Monitoring and Residual Effect

- 10.10.34 Further investigation will be required to confirm the status and degree of groundwater connection of the five potential GWDTEs (GEO3). Further assessment of potential dewatering impacts may be required.
- 10.10.35 Available information on PWS is currently limited. Further details will be sought and incorporated into future stages of assessment which will also have additional design details for the Proposed Development. At PPP stage, properties with a 1 km search area have been included in an initial screening.
- 10.10.36 PWS within 250 m of excavations required for the final design will be identified in consultation with Aberdeenshire Council and a detailed risk assessment undertaken seeking to avoid impacts on supplies in line with SEPA guidance. Measures seeking to avoid impacts on supplies in line with SEPA guidance will be added to the CEMP. Should a significant impact on a PWS be confirmed, an alternative source of water will be provided.
- 10.10.37 The Contractor will also be required to prepare a supply-specific monitoring plan and mitigation strategy in communication with affected landowners. However, given the application of LCRM as embedded mitigation, monitoring of groundwater and surface water quality and ground gas monitoring may be performed during the process of site characterisation prior to construction.
- 10.10.38 Further investigation will be undertaken to confirm the status and degree of groundwater connection of the potential GWDTEs based on the final cable route design. If required this will consider potential dewatering impacts and additional mitigation to be included in the CEMP.
- 10.10.39 Other than for PWS and GWDTE, no other groundwater mitigation is considered as the potential effects are not significant from an EIA perspective.

Operation and Maintenance Phase

Groundwater

Magnitude of Impact

- 10.10.40 During operation and maintenance, in the event of accidental spillage, potential contamination may migrate from the ground surface through the unsaturated zone reaching the shallow superficial or bedrock aquifers and impairing groundwater quality. However, with good operational and management

practices, in accordance with the Operational Environmental Management Plan, the magnitude of potential impacts is expected to be negligible for all receptors.

Sensitivity of the Receptor

- 10.10.41 Groundwater resources within the Study Area are of very low to very high productivity therefore the sensitivity is designated between medium and very high sensitivity.
- 10.10.42 Private water supplies are designated with a high sensitivity due to their use as potable water supplies for human consumption.
- 10.10.43 GWDTEs are not located within environmentally designated areas and so are considered to be of medium sensitivity.

Significance of the Effect

- 10.10.44 The magnitude of impacts on groundwater resources and related receptors during operation and maintenance is predicted to be negligible. This combined with a very high sensitivity of some aquifers indicates a minor adverse significance overall, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

- 10.10.45 During the operation and maintenance phase there is not expected to be any impacts on groundwater receptors given that no significant disturbance of soil, water or land is expected and operational processes will be controlled through the Operational Environmental Management Plan (GEN4).

Decommissioning Phase

Soil

Magnitude of Impact

- 10.10.46 It is assumed that during decommissioning, foundations for the Substation will be broken up and the land reinstated to its original condition including reinstatement of 19 ha of land resulting in a moderate beneficial magnitude of impact.
- 10.10.47 It is assumed that during and following decommissioning all Onshore Export Cables will be removed via the Transition Joint Bays (TJBs). Therefore no excavation or impact on degradation of soils is expected. The magnitude of the impact to agricultural and peaty soils is therefore no change.

Sensitivity of the Receptor

- 10.10.48 Decommissioning of the Substation would result in the reinstatement of LCA class 5.1 soils which have a low sensitivity.
- 10.10.49 Decommissioning of the Substation would result in the reinstatement of carbon and peatland Class 4 and mineral soil which have a negligible sensitivity.
- 10.10.50 The agricultural land classes along the Onshore Export Cable Corridor vary from high (LAC class 3.1) to medium (LAC grade 3.2) sensitivity, with the smaller areas of other grades having low sensitivity.

Significance of the Effect

- 10.10.51 The magnitude of the impact of the reinstatement of agricultural soils beneath the Substation is deemed to be moderate and the sensitivity of the receptor is considered to be low. This results in a minor beneficial significance, which is not significant in EIA terms.
- 10.10.52 The magnitude of the impact for the reinstatement of soils beneath the Substation back to prior peatland quality is deemed to be moderate and the sensitivity of the receptor is considered to be negligible. The effect will therefore be of negligible or minor beneficial significance, which is not significant in EIA terms.
- 10.10.53 The magnitude of the impact of the degradation of soils along the Onshore Export Cable Corridor (including agricultural and peaty soils) is deemed to be no change. The sensitivity of the receptors is considered to be medium to high. There is no effect during decommissioning, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

- 10.10.54 No soil mitigation is considered necessary as there are no adverse significant effects on soils during the decommissioning phase.

Land Contamination

Magnitude of impact

- 10.10.55 As decommissioning is assumed to return the land to its original condition (or made suitable for alternative use), the magnitude of the impact will be no change.

Sensitivity of the Receptor

- 10.10.56 Human health, surface waters, and ground waters have a medium to very high sensitivity.

Significance of the Effect

- 10.10.57 During the decommissioning phase, no impact from land contamination is expected as land contamination issues would have been dealt with during the construction phase under LCRM. Appropriate environmental management will also have been followed during operation to prevent new contamination sources and/or pollution. New contamination pathways will therefore not be created during the Operation and Maintenance Phase that would result in potential mobilisation of contamination during decommissioning.
- 10.10.58 Overall, the magnitude of the impact for land contamination is deemed to be no change, and the sensitivity of the receptors are considered to be medium to very high, resulting in no effect during decommissioning, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

- 10.10.59 No land contamination mitigation is considered necessary as no significant effects have been noted.

Groundwater

Magnitude of Impact

- 10.10.60 It is assumed that during decommissioning the Substation will be removed and the land reinstated to its original condition. With the removal of below ground construction there will be no remaining impact on groundwater levels or flows resulting in a negligible beneficial impact.
- 10.10.61 During decommissioning, in the event of accidental spillage potential contamination may migrate from the ground surface through the unsaturated zone reaching the underlying aquifers and impairing groundwater quality, unless appropriate control measures are taken. However, with embedded mitigation (i.e. a CEMP and operational environmental management plans) the magnitude of potential impacts are negligible.
- 10.10.62 It is assumed that during the decommissioning phase all Onshore Export Cables will be removed via the TJBs. Therefore, there will be no change in relation to magnitude of impact.

Sensitivity of the Receptor

- 10.10.63 Groundwater resources have very low to very high productivity and therefore a medium to very high sensitivity across the Study Area.

Significance of the Effect

- 10.10.64 The magnitude of impacts on the aquifers during decommissioning of the Substation is predicted to be negligible. This combined with a very high sensitivity of some of the underlying aquifers indicates a minor effect, which is not significant in EIA terms.
- 10.10.65 Due to the nature of anticipated decommissioning work required for the Onshore Export Cables (cables will be removed via the TJBs) the magnitude of impact is considered to be no change, resulting in no effect during decommissioning, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

- 10.10.66 No additional hydrogeology mitigation is considered necessary as no significant effects are expected during decommissioning.

10.11 Inter-Related Effects

- 10.11.1 For Geology and Ground Conditions a number of effects have been identified as summarised in Section 10.10. These effects are not expected to combine to become significant across phases of the Proposed Development due to the implementation of the embedded mitigation which will include measures to make land suitable for use in accordance with LCRM and implementation of the CEMP.
- 10.11.2 Potential effects on Geology and Ground Conditions have the potential to have secondary effects on other receptors and these effects (alongside their significance) are considered in the following topic-specific chapters:
- Water Quality (considered in Volume 1, Chapter 11: Water Quality and Flood Risk)

- Land contamination may impact water quality within surface and groundwaters.

10.12 Cumulative Effects Assessment

Methodology

- 10.12.1 The Cumulative Effects Assessment (CEA) assesses the impact associated with the Proposed Development together with other relevant projects and activities. Cumulative effects are defined as the effect of the Proposed Development in combination with the effects from a number of different projects, on the same receptor or resource.
- 10.12.2 The projects selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise of the long list of Cumulative Projects included in Table 3.9 within Volume 1, Chapter 3: EIA Methodology. Full details on CEA methodology are provided in Volume 1, Chapter 3: EIA Methodology where further information is provided in relation to the other projects and how this information is obtained and applied to the assessment. Each project has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.
- 10.12.3 The justification for screening other projects in or out of the CEA are included in Table 10.14 and the cumulative effects assessed within the context of the Geology and Ground conditions are outlined below in Sections 10.12.5 to 10.12.7.

Table 10.14: Screening of Other Projects for Consideration within the CEA for Geology and Ground Conditions

| Project | Overlap with the Proposed Development | Screened into CEA (Yes/No) |
|--|---|----------------------------|
| Hurlie 400 kV Substation APP/2024/1951, ENQ/2024/1176, ENQ/2024/0146 | The estimated construction period (January 2026 to September 2029) precedes the Proposed Development construction period (2031 to 2035). Potential operational phase overlaps will be mitigated by Operational EMP. | Yes |
| Grains Of Fetteresso Indoor Play Area APP/2025/0058 | No overlap anticipated due to the distance from the Proposed Development being greater than the 1 km screening distance for the Geology and Ground Conditions Cumulative Effects Assessment. | No |
| The Waters BESS ENQ/2024/1615, ENQ/2024/1830 | Unknown dates of construction and operation. Potential overlaps will be mitigated by the CEMP and Operational EMP. | Yes |
| Fetteresso 132 kV Substation Upgrade ENQ/2025/1103, ENQ/2025/1000 | The estimated construction period (2027 to 2029) precedes the Proposed Development construction period (2031 to 2035). Potential operational phase overlaps will be mitigated by Operational EMP. | Yes |
| S36 Windfarm, Fetteresso Forest, ECU00001851, APP/2019/1341 | No overlap anticipated due to the distance from the Proposed Development being greater than the 1 km screening distance for the Geology and Ground Conditions Cumulative Effects Assessment. | No |

| Project | Overlap with the Proposed Development | Screened into CEA (Yes/No) |
|---|---|----------------------------|
| Glenskinnan Renewable Energy Park ENQ/2025/0960 | | No |
| Craigneil Wind Farm ENQ/2024/0640 | | No |
| Meetlaw Farm Battery Energy Storage System, APP/2022/2676 | | No |
| East Coast Viners Solar Storage Project APP/2022/1701 | Unknown dates of construction and operation. Potential overlaps will be mitigated by the CEMP and Operational EMP. | Yes |
| Tealing to Kintore 400 kV OHL ENQ/2024/1397, ECU00005225 | The estimated construction period (2026 to 2029) precedes the Proposed Development construction period (2031 to 2035). Potential operational phase overlaps will be mitigated by Operational EMP. | Yes |
| Droop Hill Solar Park ENQ/2025/0368, APP/2025/0560 | No overlap anticipated due to the distance from the Proposed Development being greater than the 1 km screening distance for the Geology and Ground Conditions Cumulative Effects Assessment. | No |
| Glendye Wind Farm 132 kV OHL ENQ/2024/1818, ECU0005197 | Unknown dates of construction and operation. Potential overlaps will be mitigated by the CEMP and Operational EMP. | Yes |
| Bridgend Farm BESS ENQ/2024/0747, APP/2025/0089 | | Yes |
| Quithel 50 MW BESS ENQ/2023/1713 | | Yes |
| Northeast Of Drumlithie BESS ENQ/2023/0093 | | Yes |

Maximum Design Scenario

- 10.12.4 The MDS identified in Table 10.15 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the details provided in Volume 1, Chapter 2: The Proposed Development as well as the information available on other projects, to inform a ‘maximum design scenario’. Any other development scenario within the Project Design Envelope (PDE), will result in the same, or less, level of environmental effect.

Table 10.15: Maximum Design Scenario Considered for Each Impact as part of the Assessment of Likely Significant Cumulative Effects on Geology and Ground Conditions

| Potential Cumulative Effect | Phase* | | | Tier | Maximum Design Scenario |
|--|--------|-----|---|---------|--|
| | C | O&M | D | | |
| Physical removal or sealing of soils | ✓ | × | ✓ | 2 and 3 | <p>Construction Phase There is the potential for multiple construction projects to cause the physical removal or sealing of soils over a wider combined area of land.</p> <p>Decommissioning Phase No removal or sealing of soils is likely to occur during decommissioning as soils will be reinstated to the previous condition.</p> |
| Degradation during stripping, handling and storage through mechanisms such as compaction and smearing | ✓ | × | ✓ | 2 and 3 | <p>Construction Phase There is the potential for multiple construction projects to result in the degradation of soils over a wider combined area of land.</p> <p>Decommissioning Phase No degradation of soils is likely to occur during decommissioning as soils will be reinstated to the previous condition.</p> |
| Disturbance of land contamination may result in risks to human health | ✓ | × | ✓ | 2 and 3 | <p>Construction Phase There is the potential for the disturbance of land contamination which may impact human health receptors (including nearby residential, construction and/or future site users).</p> <p>Decommissioning Phase Similar to construction phase, with potential for simultaneous activities.</p> |
| Disturbance of land contamination may result in risks to groundwaters | ✓ | × | ✓ | 2 and 3 | <p>Commissioning Phase There is the potential for the disturbance of land contamination and for cumulative impacts on groundwater quality from multiple construction projects.</p> <p>Decommissioning Phase Similar to construction phase, with potential for simultaneous activities.</p> |
| Disturbance of land contamination may result in risks to surface waters | ✓ | × | ✓ | 2 and 3 | <p>Commissioning Phase There is the potential for the disturbance of land contamination and for cumulative impacts on surface water quality from multiple construction projects.</p> <p>Decommissioning Phase There is the potential for the disturbance of land contamination which may impact surface water receptors.</p> |

| Potential Cumulative Effect | Phase* | | | Tier | Maximum Design Scenario |
|--|--------|-----|---|---------|---|
| | C | O&M | D | | |
| Groundwater quality may be degraded by accidental spillage of pollutants | ✓ | ✓ | ✓ | 2 and 3 | <p>Commissioning Phase There is a potential for contamination to enter the groundwater bodies, reducing the groundwater quality across the aquifer.</p> <p>Operation and Maintenance Phase There is a potential for contamination to enter the groundwater bodies, reducing the groundwater quality across the aquifer.</p> <p>Decommissioning Phase There is a potential for contamination to enter the groundwater bodies, reducing the groundwater quality across the aquifer.</p> |

* Project Phase refers to Construction (C), Operation and Maintenance (O&M) and Decommissioning (D)

Cumulative Effects Assessment

- 10.12.5 While the same soil receptors may be affected by the projects outlined in Table 10.15, it is reasonable to assume construction methods would adopt good practice with regards to the management of soils. Application of controls in accordance with the CEMP would result in a negligible magnitude of the impact. The highest sensitivity of soils with ALC of 3.1 and 3.2 is medium to high, leading to potentially negligible to minor adverse combined effects, which is not significant in EIA terms.
- 10.12.6 Similarly, it is assumed that for land contamination the projects outlined in Table 10.15 would follow LCRM prior to and during construction and land will be made suitable for use. It is also assumed these Projects will adopt good practice during construction and decommissioning with regards to environmental management and pollution control. The magnitude of the impact would be negligible. The sensitivity of human health and groundwater receptors is very high, and medium to high for surface waters, leading to potentially negligible to minor adverse combined effects for land contamination, which is not significant in EIA terms.
- 10.12.7 Many of the identified projects are spatially separated, reducing the likelihood of cumulative impacts on the same receptors. Drainage systems would be designed to attenuate runoff and manage water quality, and it is reasonable to assume good practice with regards to groundwater management will be adopted. The magnitude of the impact would be negligible. The highest sensitivity of the aquifers is very high, leading to potentially minor adverse combined effects for groundwater, which is not significant in EIA terms.
- 10.12.8 It is recommended that ongoing consultation with relevant authorities (e.g., SEPA and Aberdeenshire Council) be maintained to ensure there is a coordinated approach across all Projects in the area.

10.13 Summary of Impacts, Mitigation, Likely Significant Environmental Effects and Monitoring

- 10.13.1 The assessment identified a range of potential Geology and Ground Conditions impacts across the construction, operation and maintenance decommissioning phases of the Proposed Development.

Construction

Soil Impacts

- 10.13.2 Permanent loss of approximately 19 ha of LCA class 5.1 agricultural land at the Substation Site is considered to be a moderate magnitude of impact and the sensitivity of the receptor is considered to be low, resulting in a minor adverse effect, which is not significant in EIA terms.
- 10.13.3 Temporary degradation of agricultural soils along the Onshore Export Cable Corridor is considered to be a negligible magnitude of impact due to embedded mitigation such as topsoil stripping and reuse. The sensitivity of the receptor is considered to be medium to high, resulting in a negligible to minor adverse effect, which is not significant in EIA terms.

- 10.13.4 Potential loss of peat as a result of sealing approximately 19 ha of soil at the Substation Site is deemed to be a moderate magnitude of impact and the sensitivity of the receptor negligible, resulting in a negligible to minor adverse effect, which is not significant in EIA terms.
- 10.13.5 The magnitude of potential peaty soil degradation across the Study Area is deemed to be minor and the highest sensitivity of the receptor is considered to be medium. This results in a minor adverse effect, which is not significant in EIA terms.

Land Contamination

- 10.13.6 Potential contamination sources are limited to isolated areas along roads and railway land, quarries and two areas of landfill. Further investigation of potential sources of contamination will be required.
- 10.13.7 On the basis that LCRM will be followed prior to construction, land will be made suitable for use in the Proposed Development and the magnitude of impact for land contamination will be negligible. For both human health and groundwater, the sensitivity of the receptor is very high, resulting in minor adverse effects, which are not significant in EIA terms. The sensitivity of surface water receptors is medium to high, resulting in negligible to minor adverse effects, which is not significant in EIA terms.

Groundwater

- 10.13.8 The potential for limited and temporary dewatering activities to affect aquifers below the Study Area is considered to have a negligible magnitude of impact. Combined with the very high sensitivity of some of the aquifers, this results in minor adverse effects, which is not significant in EIA terms.
- 10.13.9 Private Water Supplies (PWS) are assessed as having a high sensitivity, and the magnitude of impact is predicted to be minor. This results in a minor to moderate adverse effect. This would be significant in EIA terms and would require further investigation and, potentially, additional mitigation measures.
- 10.13.10 GWDTEs are designated with a medium sensitivity, and the magnitude of impact is predicted to be minor to moderate, resulting in a minor to moderate adverse effect. This would be significant in EIA terms and would require further investigation and, potentially, additional mitigation measures.
- 10.13.11 Accidental pollution risks during construction will be mitigated through Embedded Mitigation (e.g. CEMP, SWQMP), resulting in a negligible magnitude of impact. Combined with the very high sensitivity of some aquifers, this results in minor adverse effects, which is not significant in EIA terms.

Operation and Maintenance

- 10.13.12 No significant effects are expected during this phase due to limited ground and soil disturbance and adherence to operational environmental management plans to implement good environmental practices to prevent pollution of land, groundwater and surface waters.
- 10.13.13 The magnitude of impacts on groundwater resources and related receptors during operation and maintenance is considered to be negligible on the basis

of good practice in accordance with site operational environmental management plans. This combined with the very high sensitivity of some aquifers indicates a minor adverse effect, which is not significant in EIA terms.

Decommissioning

- 10.13.14 Reinstatement of 19 ha of soils and peat at the Substation Site is considered to be a beneficial moderate magnitude impact. The sensitivity of the receptor is negligible to low, resulting in a negligible or minor effect, which is not significant in EIA terms.
- 10.13.15 The magnitude of impact of degradation of peat and soils along the Onshore Export Cable Corridor is deemed to be moderate or no change as a result of decommissioning. The highest sensitivity of the soil receptors is medium to high, resulting in negligible to minor effects, or no change, which is not significant in EIA terms.
- 10.13.16 Significant effects due to land contamination are not anticipated because the land will have been made suitable for the Proposed Development prior to construction under LCRM. The magnitude of the impact for land contamination is therefore deemed to be no change, and the sensitivity of the receptors are considered to be medium to very high, resulting in no effect during decommissioning, which is not significant in EIA terms.
- 10.13.17 The magnitude of impacts on the aquifers during decommissioning is predicted to be no change or negligible beneficial. This combined with a very high sensitivity of some of the underlying aquifers indicates a minor effect or no change, which is not significant in EIA terms.
- 10.13.18 During decommissioning, the Onshore Export Cables will be removed via the TJBs, and the magnitude of impact is considered to be no change, resulting in no effect during decommissioning, which is not significant in EIA terms.

Cumulative Effects

- 10.13.19 No significant cumulative effects are predicted when considered alongside other developments, assuming compliance with industry good practice and regulatory compliance.
- 10.13.20 Ongoing consultation with SEPA and Aberdeenshire Council will be maintained to ensure there is a coordinated approach with potentially cumulative projects.

Monitoring

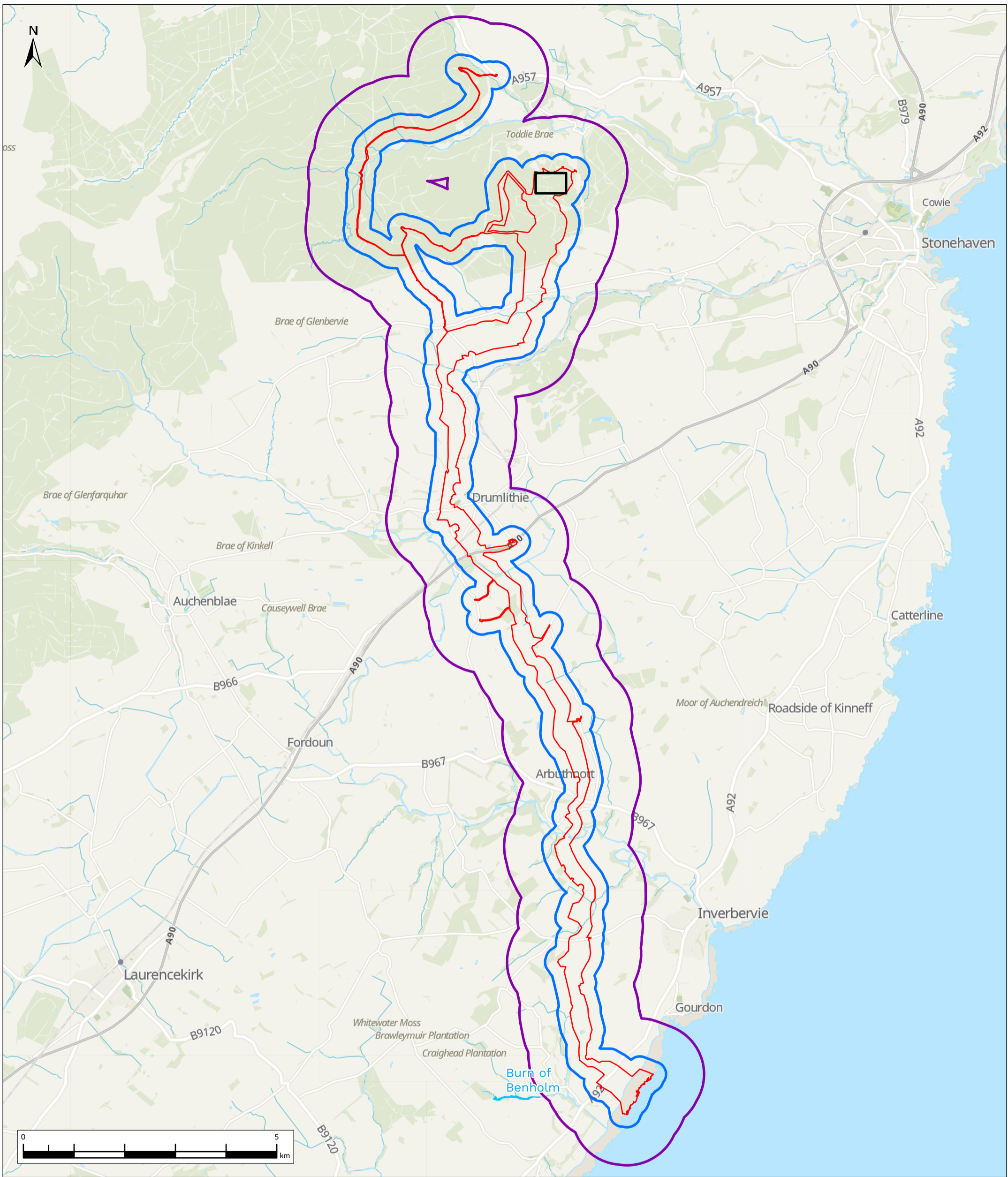
- 10.13.21 Further engagement with Aberdeenshire Council will be completed to prepare a Private Water Supply Monitoring Plan.
- 10.13.22 No other specific monitoring is proposed for Geology and Ground Conditions due to the absence of significant effects. However, groundwater, surface water, and ground gas monitoring will occur as part of LCRM implementation prior to construction.
- 10.13.23 Monitoring of potential GWDTes may be required, pending confirmation of proximity to the final cable routes.

References

- Aberdeenshire Council, 2023. *Aberdeenshire Local Development Plan*, s.l.: s.n.
- Aberdeenshire, 2025. *Recycling And Waste Facilities - Aberdeenshire*. [Online]
Available at: https://data.spatialhub.scot/dataset/recycling_and_waste_facilities-as
[Accessed March 2025].
- Bibby, J. S., Douglas, H. A., Thomasson, A. J. & Robertson, J. S., 1991. *Land Capability Classification for Agriculture*, s.l.: Macaulay Land Use Research Institute.
- British Geological Survey, 2025. *GeoIndex Onshore*. [Online]
Available at:
https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.35921312.1817466901.1754655134-1912582880.1754655133
[Accessed June 2025].
- CIRIA, 2001. *Contaminated land risk assessment. A guide to good practice (C552)*, s.l.: s.n.
- DEFRA, 2018. *Code of practice for the sustainable use of soils on construction sites*. [Online]
Available at: <https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites>
- Environment Agency, 2025. *Land contamination risk management (LCRM)*. [Online]
Available at: <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>
[Accessed January 2025].
- Google, 2025. *Google Earth*. [Online]
Available at: <https://earth.google.com/web/>
[Accessed March 2025].
- Highways England, 2019. *DMRB LA 109 Geology and Soils*, s.l.: s.n.
- Highways England, 2020. *DMRB LA 113 Road drainage and the water environment*, s.l.: s.n.
- HEMA, 2022. *A New Perspective on Land and Soil in Environmental Impact Assessment*, s.l.: s.n.
- National House Building Council and Environment Agency, 2008. *Guidance for the Safe Development of Housing on Land Affected by Contamination*, s.l.: s.n.
- National Library of Scotland, 2025. *Side by Side Map images*. [Online]
Available at: <https://maps.nls.uk/geo/explore/side-by-side/>
[Accessed March 2025].
- RPS, 2024. *Bowdun Offshore Wind Farm Onshore Scoping Report (TWP-BOW-RPS-OSC-RPT-00002)*, s.l.: s.n.
- Scottish Government, 2017. *Planning Advice Note 33: Development of contaminated land*. [Online]
Available at: <https://www.gov.scot/publications/pan-33-development-of-contaminated-land/>
[Accessed August 2025].
- Scottish Government, 2024. *National Planning Framework 4*, s.l.: s.n.
- Scottish Government, 2025a. *Soil maps*. [Online]
Available at: https://map.environment.gov.scot/Soil_maps/?layer=1#
[Accessed March 2025].

- Scottish Government, 2025b. *Scotland's environment*. [Online]
Available at: <https://map.environment.gov.scot/sewebmap/>
[Accessed March 2025].
- Scottish Natural Heritage, 2017. *Peatland Restoration: Information on how to source on-line information on soils and peatland for the purpose of soil / habitats restoration and conservation management*, s.l.: s.n.
- SEPA, 2010. *Regulatory guidance - Promoting the sustainable reuse of greenfield soils in construction*, s.l.: s.n.
- SEPA, 2020. *Water Environment Hub*. [Online]
Available at: <https://informatics.sepa.org.uk/RBMP3/>
[Accessed March 2025].
- O Dochartaigh et al., 2015. Scotland Aquifers and Groundwater Bodies. Available at:
<https://nora.nerc.ac.uk/id/eprint/511413/>.
- Scottish Government, 2014. Drinking Water Protected Areas – Scotland River Basin District: maps. Available at: <https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/>. Accessed November 2025.

Annex – Figures



Legend

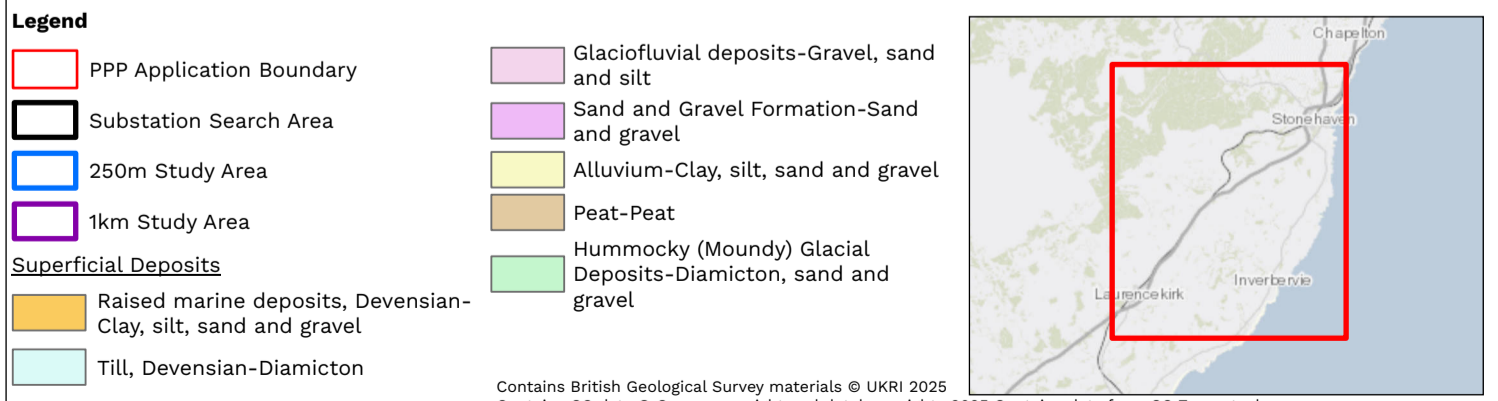
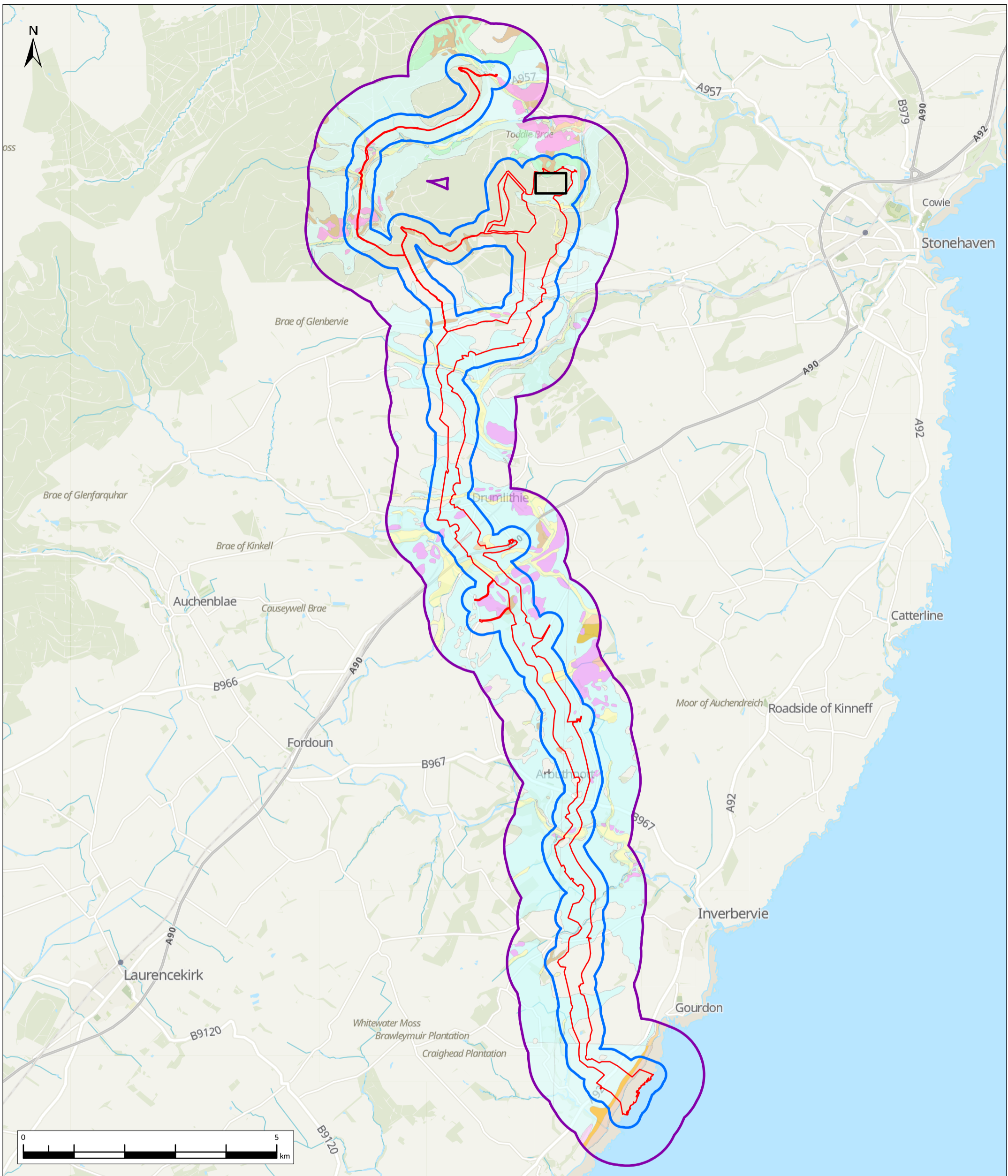
- PPP Application Boundary
- Substation Search Area
- 250m Study Area
- 1km Study Area
- Burn of Benholm Sites of Special Scientific Interest

Contains OS data © Crown copyright and database rights 2025 Contains data from OS Zoomstack

| | | | | | | |
|------------|-----------------|---------------------|--------------|---------|-------|--------|
| 03 | NOV 25 | FINAL | AH | IG | MK | GG |
| Rev. | Date | Purpose of revision | Drawn | Check'd | Rev'd | Appr'd |
| Scale @ A4 | Scale: 1:70,000 | | DO NOT SCALE | | | |
| Jacobs No. | B2487500 | | | | | |

© Copyright 2025 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party.

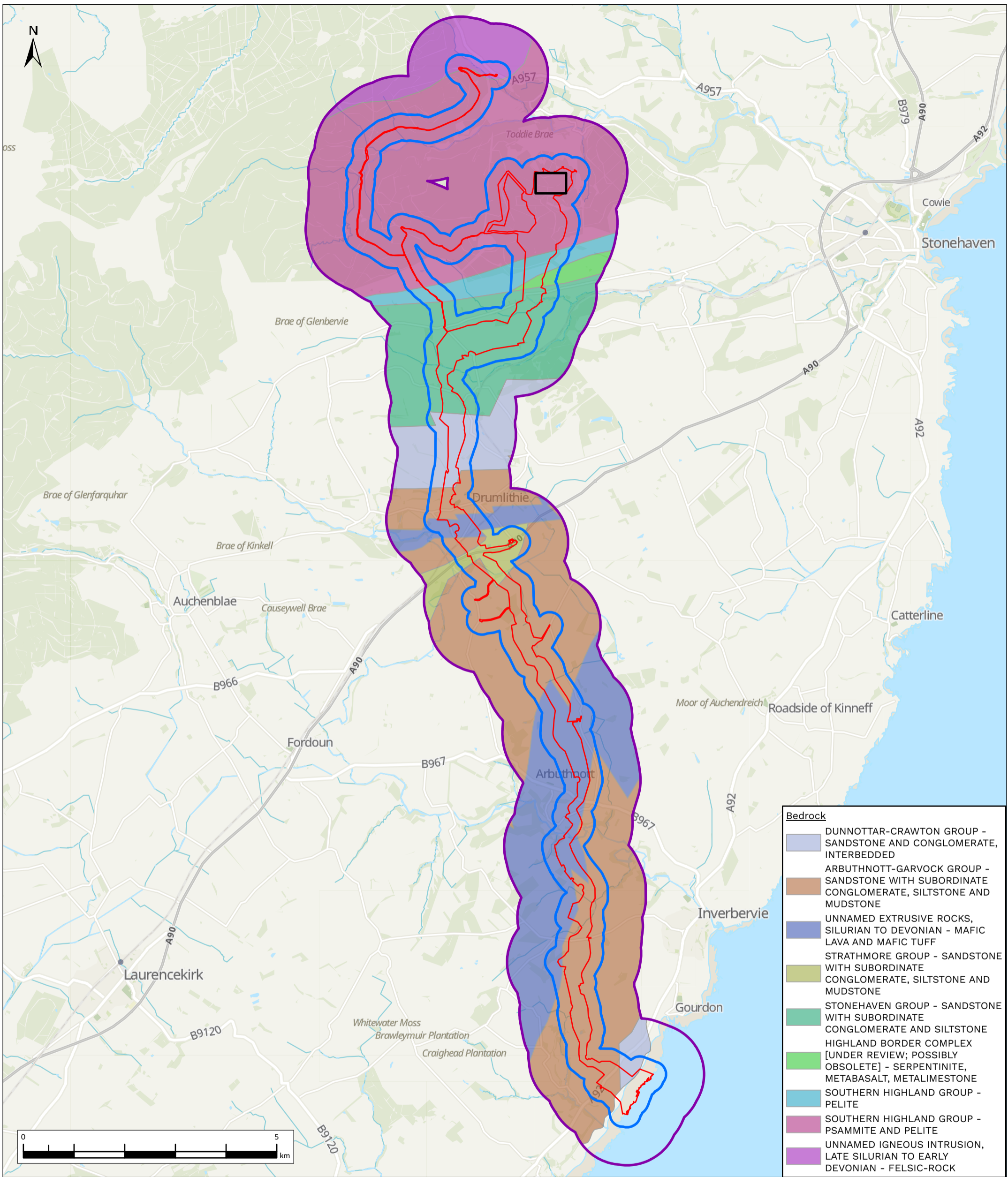
| | | |
|----------------|---|----------------|
| Client | | |
| Project | Bowdun Offshore Wind Farm Onshore EIA Report | |
| Drawing Title | Geology and Ground Conditions Study Areas | |
| Aconnex Number | TWP-BOW-JCB-ONE-DWG-00029 | Drawing Status |
| | | FINAL |
| | Figure 10.1 | Sheet 1 of 1 |



| Legend | |
|--|---|
| | PPP Application Boundary |
| | Substation Search Area |
| | 250m Study Area |
| | 1km Study Area |
| Superficial Deposits | |
| | Raised marine deposits, Devensian-Clay, silt, sand and gravel |
| | Till, Devensian-Diamicton |
| | Glaciofluvial deposits-Gravel, sand and silt |
| | Sand and Gravel Formation-Sand and gravel |
| | Alluvium-Clay, silt, sand and gravel |
| | Peat-Peat |
| | Hummocky (Moundy) Glacial Deposits-Diamicton, sand and gravel |

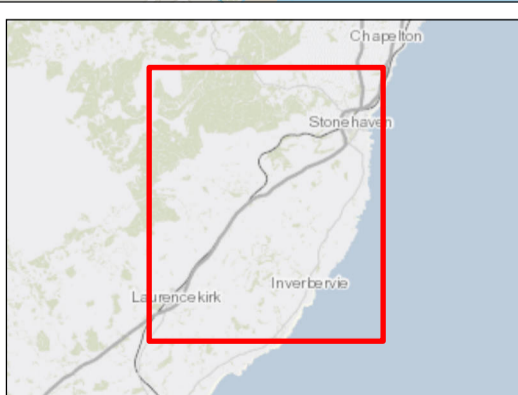
| | | | | | | | | | |
|------------|------|---------------------|--|--------------|---------|-------------------------|--------|---|--|
| 02 NOV 25 | | FINAL | | AH | IG | MK | GG | © Copyright 2025 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party. | |
| Rev. | Date | Purpose of revision | | Drawn | Check'd | Rev'd | Appr'd | Aconnex Number TWP-BOW-JCB-ONE-DWG-00054 | |
| Scale @ A4 | | Scale: 1:70,000 | | DO NOT SCALE | | Drawing Status FINAL | | | |
| Jacobs No. | | B2487500 | | | | | | Figure 10.2 | |

| | | | |
|----------------|--|--------------|----------------|
| Client | | | |
| Project | Bowdun Offshore Wind Farm Onshore EIA Report | | |
| Drawing Title | Superficial Deposits | | |
| Aconnex Number | TWP-BOW-JCB-ONE-DWG-00054 | | Drawing Status |
| | | FINAL | |
| | | Sheet 1 of 1 | |



| Bedrock | |
|---------|---|
| | DUNNOTTAR-CRAWTON GROUP - SANDSTONE AND CONGLOMERATE, INTERBEDDED |
| | ARBUTHNOTT-GARVOCK GROUP - SANDSTONE WITH SUBORDINATE CONGLOMERATE, SILTSTONE AND MUDSTONE |
| | UNNAMED EXTRUSIVE ROCKS, SILURIAN TO DEVONIAN - MAFIC LAVA AND MAFIC TUFF |
| | STRATHMORE GROUP - SANDSTONE WITH SUBORDINATE CONGLOMERATE, SILTSTONE AND MUDSTONE |
| | STONEHAVEN GROUP - SANDSTONE WITH SUBORDINATE CONGLOMERATE AND SILTSTONE |
| | HIGHLAND BORDER COMPLEX [UNDER REVIEW; POSSIBLY OBSOLETE] - SERPENTINITE, METABASALT, METALIMESTONE |
| | SOUTHERN HIGHLAND GROUP - PELITE |
| | SOUTHERN HIGHLAND GROUP - PSAMMITE AND PELITE |
| | UNNAMED IGNEOUS INTRUSION, LATE SILURIAN TO EARLY DEVONIAN - FELSIC-ROCK |

| Legend | |
|--------|--------------------------|
| | PPP Application Boundary |
| | Substation Search Area |
| | 250m Study Area |
| | 1km Study Area |

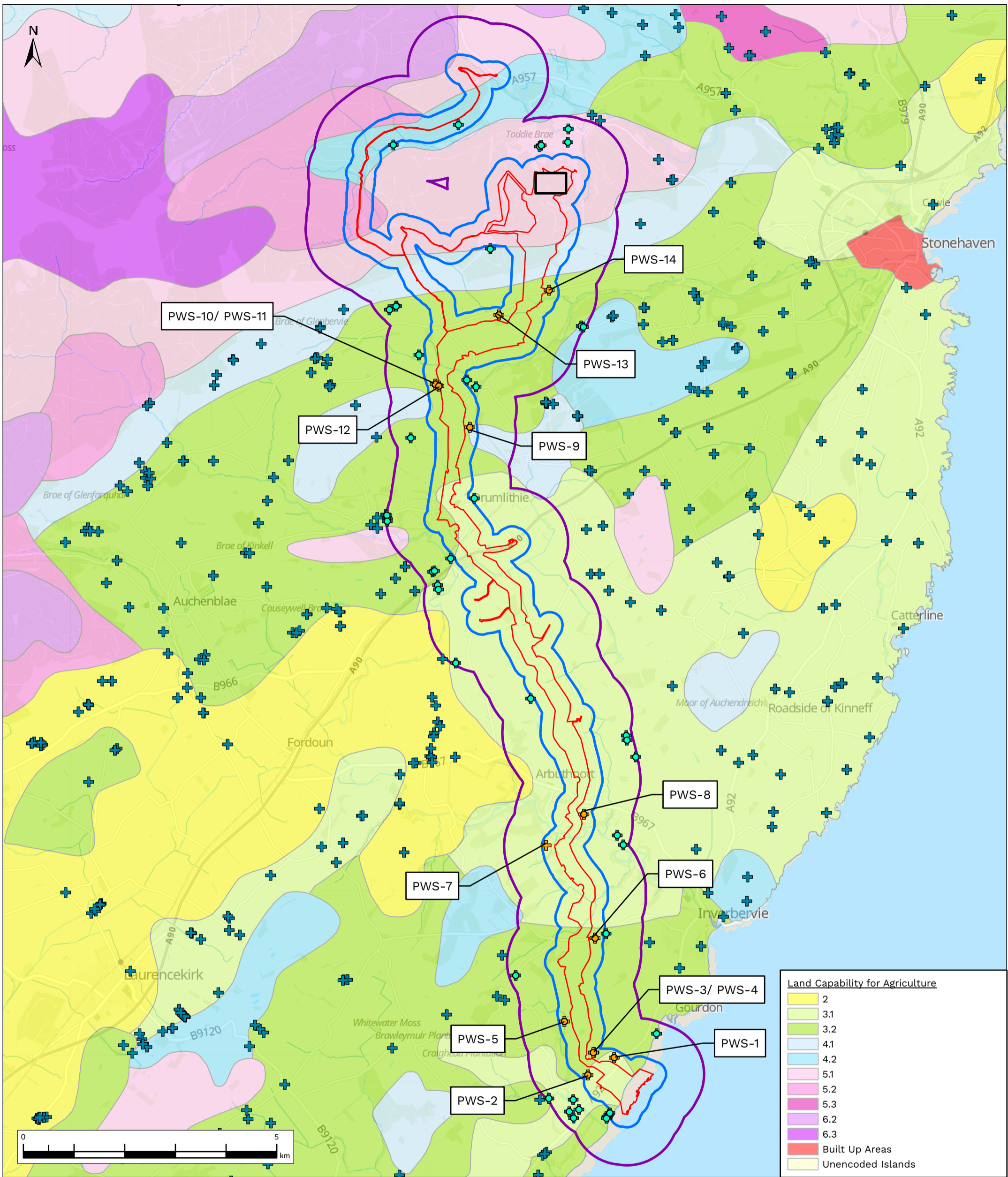


Contains British Geological Survey materials © UKRI 2025
 Contains OS data © Crown copyright and database rights 2025 Contains data from OS Zoomstack

| 02 | NOV 25 | FINAL | AH | IG | MK | GG |
|------------|-----------------|---------------------|--------------|---------|-------|--------|
| Rev. | Date | Purpose of revision | Drawn | Check'd | Rev'd | Appr'd |
| Scale @ A4 | Scale: 1:70,000 | | DO NOT SCALE | | | |
| Jacobs No. | B2487500 | | | | | |

© Copyright 2025 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party.

| | | |
|--|--|----------------|
| | | Client |
| | | Project |
| Bowdun Offshore Wind Farm Onshore EIA Report | | Drawing Title |
| Bedrock Geology | | Aconnex Number |
| TWP-BOW-JCB-ONE-DWG-00055 | | Drawing Status |
| FINAL | | Figure 10.3 |
| Sheet 1 of 1 | | |



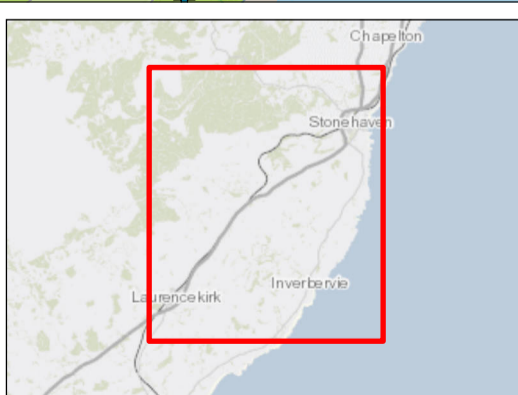
- Legend**
- PPP Application Boundary
 - Substation Search Area
 - 250m Study Area
 - 1km Study Area
 - Private Water Supplies
 - + Private Water Supply Properties*
 - + Private Water Supply Properties*
 - Private Water Supplies within 250m of PPP Application Boundary

Note: * This is likely to be an incomplete dataset and more data may become available

Contains OS data © Crown copyright and database rights 2025 Contains data from OS Zoomstack

| | | | | | | |
|------------|-----------------|---------------------|--------------|---------|-------|--------|
| 02 | NOV 25 | FINAL | AH | IG | MK | GG |
| Rev. | Date | Purpose of revision | Drawn | Check'd | Rev'd | Appr'd |
| Scale @ A4 | Scale: 1:70,000 | | DO NOT SCALE | | | |
| Jacobs No. | B2487500 | | | | | |

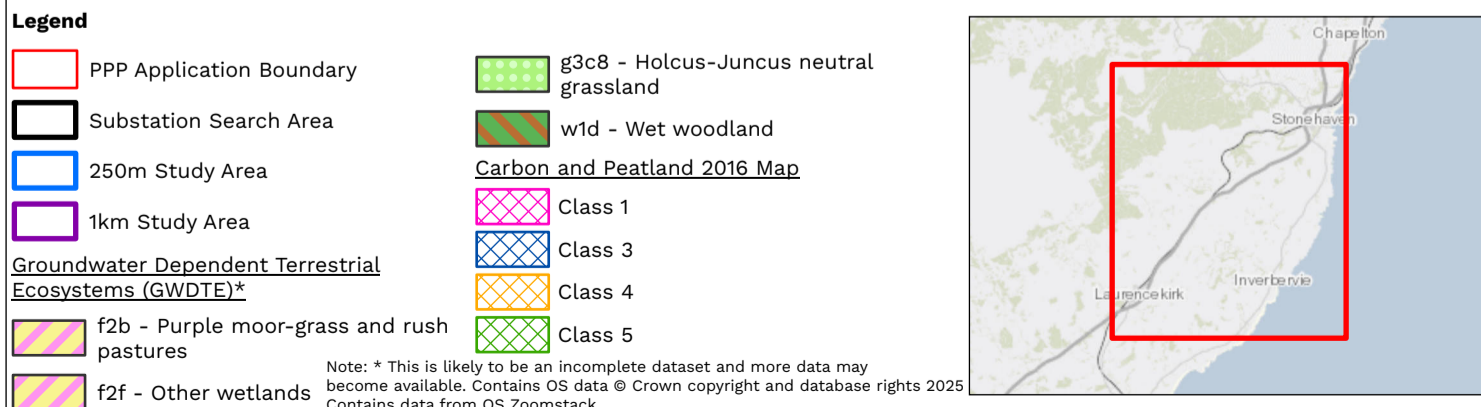
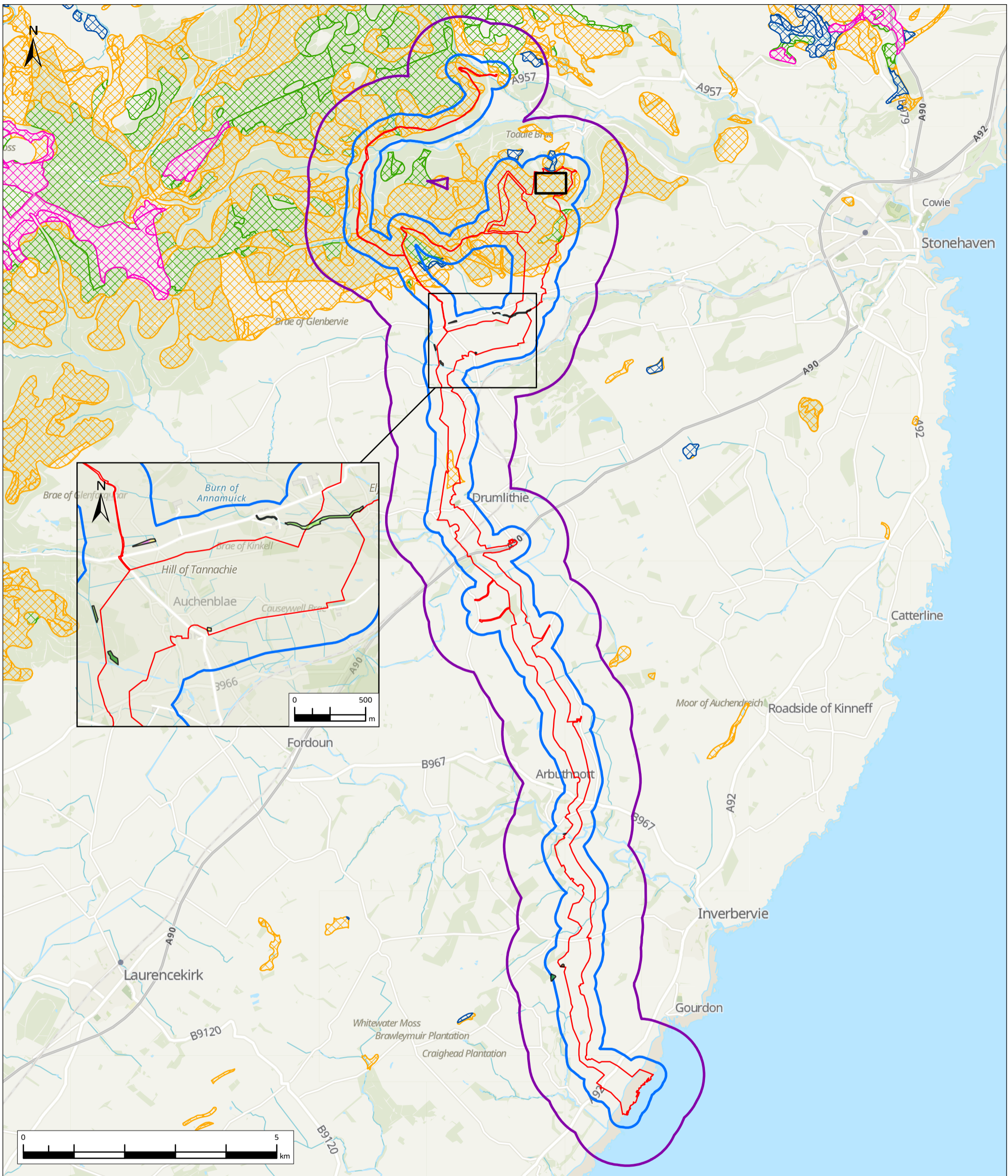
© Copyright 2025 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party.



Jacobs

TWP THISTLE WIND PARTNERS

| | | |
|----------------|---|----------------|
| Client | | |
| Project | Bowdun Offshore Wind Farm Onshore EIA Report | |
| Drawing Title | Land Capability for Agriculture (LCA) and Private Water Supplies | |
| Aconnex Number | TWP-BOW-JCB-ONE-DWG-00056 | Drawing Status |
| | | FINAL |
| Figure 10.4 | | Sheet 1 of 1 |



Note: * This is likely to be an incomplete dataset and more data may become available. Contains OS data © Crown copyright and database rights 2025. Contains data from OS Zoomstack



| | | | | | | |
|------------|-----------------|---------------------|--------------|---------|-------|--------|
| 02 | NOV 25 | FINAL | AH | IG | MK | GG |
| Rev. | Date | Purpose of revision | Drawn | Check'd | Rev'd | Appr'd |
| Scale @ A4 | Scale: 1:70,000 | | DO NOT SCALE | | | |
| Jacobs No. | B2487500 | | | | | |

© Copyright 2025 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party.

Jacobs

TWP THISTLE WIND PARTNERS

| | | |
|----------------|---|----------------|
| Client | | |
| Project | Bowdun Offshore Wind Farm Onshore EIA Report | |
| Drawing Title | Groundwater Dependent Terrestrial Ecosystems and Carbon Peatlands | |
| Aconnex Number | TWP-BOW-JCB-ONE-DWG-00057 | Drawing Status |
| | | FINAL |

Figure 10.5 Sheet 1 of 1