Bowdun Offshore Wind Farm, Onshore EIA Report

Volume 1, Chapter 11: Water Quality and Flood Risk

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11.1 Introduction

11.1.1 This chapter of the Onshore Environmental Impact Assessment (EIA) Report considers the potential effects on Water Quality and Flood Risk receptors for the Onshore Infrastructure of the Bowdun Offshore Wind Farm ('the Project'). The Onshore Infrastructure of the Project, are the works landward of Mean Low Water Springs (MLWS), including the intertidal area to the Grid Connection Point (GCP), and are referred to as 'the Proposed Development'. This Onshore EIA Report accompanies the application to Aberdeenshire Council for Planning Permission in Principle (PPP) for the Proposed Development.

11.1.2 This chapter assesses the potential impacts from the construction, operation and maintenance (O&M), and decommissioning of the Proposed Development on these receptors. Where required, mitigation measures are proposed and any residual impacts and their significance assessed.

11.1.3 The assessment presented is supported by the following technical reports:

- Volume 2, Appendix 11.1: Flood Risk and Drainage Assessment; and
- Volume 2, Appendix 11.2: Schedule of Watercourse Crossings.

11.1.4 Whilst receptors associated with groundwater quality (aquifers, private water supplies and Ground Water Dependent Terrestrial Ecosystems (GWDTE)) have been listed as 'key receptors' within this chapter due to linkages between groundwater and surface water (with the potential for surface waters to infiltrate to groundwater, and for groundwater to contribute to base river flows), the assessment of potential impacts from contaminated land and effects on wider groundwater is set out within Volume 1, Chapter 10: Geology and Ground Conditions.

11.2 Water Quality and Flood Risk Study Area

11.2.1 The study area for Water Quality and Flood Risk is presented in Figure 11.1 (Annex – Figures) and focuses on areas where potential impacts arising from activities within the PPP Application Boundary are most likely to occur on water quality and flood risk receptors. The associated buffers used to define the Water Quality and Flood Risk Study Area are as follows:

- One kilometre (km) buffer of the (the PPP Application Boundary) this includes the following elements of the Proposed Development:
    - Landfall and Transition Joint Bays (TJBs) situated approximately 1.3 km south-west of Gourdon where the Offshore Export Cables are jointed to the Onshore Export Cables within the TJBs;
    - Onshore Export Cable Corridor: The area landward of MLWS, which connects the offshore export cable corridor with the Landfall; and the area of land which connects the Landfall with the Substation, within which the Onshore Export Cables will be installed;

- Substation: the proposed Substation containing the components for transforming the power supplied from the Project from 220/275 kV up to 400 kV;
- 400 kV Cable Corridor: The 400 kV cables will provide the onward connection from the Substation to the proposed Hurlie Substation; and
- Associated temporary construction compounds and construction access tracks.

11.2.2 This study area is considered appropriate in identifying any existing receptors, assets or infrastructure that have the potential to be affected by Water Quality and Flood Risk as a result of the construction, O&M, and decommissioning phases of the Proposed Development.

11.3 Legislative, Policy and Guidance Context

11.3.1 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 Water Quality and Flood Risk are provided in Table 11.1 below, with other relevant policy provisions set out in Table 11.2.

Table 11.1: Summary of legislative provisions relevant to Water Quality and Flood Risk

Relevant Legislation	Summary of Legislation and how/where considered within this chapter
European Union (EU) 2000/60/EC Water Framework Directive (WFD)	Implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003 (WEWSA). This Act introduced a regulatory system for the water environment with Scottish Environment Protection Agency (SEPA) as the lead authority working alongside the public, private and voluntary sectors. The Act ensures that all human activities with the potential to cause a harmful effect on the water environment can be controlled by establishing a framework for co-ordinated controls on water abstraction and impoundment, engineering works affecting watercourses, and discharges to the water environment. Consideration is given in the assessment in Section 11.10 to potential impacts controlled by the Directive and in identifying appropriate mitigation in Section 11.9.
European Commission (EC)'s Groundwater Directive	Provides specific measures to protect groundwater against pollution and deterioration. This Directive is implemented through the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) (as amended), introduced under WEWSA to provide the main regulatory controls for protecting the water environment from harm. CAR introduced specific controls for activities affecting watercourses and waterbodies (both surface water and groundwater). Consideration is given in the assessment in Section 11.10 to potential impacts controlled by the Directive and in identifying appropriate mitigation in Section 11.9.
The Water Resources (Scotland) Act 2013	Makes provision for the development of Scotland's water resources. Taken into account in identifying baseline for this assessment.

Relevant Legislation	Summary of Legislation and how/where considered within this chapter
The Water Environment (Controlled Activity) (Scotland) Regulations 2011 (as amended)	Controls engineering works in the vicinity of inland surface waters as well as point source discharges, abstractions and impoundments, supporting implementation of the WFD (2006/60/EC) in Scotland. This legislation was superseded on the 1st November 2025 by the Environmental Authorisation (Scotland) Regulations 2018, see below. Considered in Volume 2, Appendix 11.2: Schedule of Watercourse Crossings.
Environmental Authorisation (Scotland) Regulations (EASR) 2018	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. Compliance with licensing requirements/ level of authorisation is considered in the assessment in Section 11.10 and in identifying appropriate mitigation in Section 11.9.
The Flood Risk Management (Scotland) Act 2009	Provides a coordinated approach to manage flood risk at a national and local level. Taken into account in defining flood risk and approach to assessment in this chapter.
The Private Water Supplies (Scotland) Regulations 2006	Ensures the provision of clean drinking water from private sources. Taking into account in identifying receptors in the baseline (Section 11.8), identifying mitigation in Section 11.9 and the impact assessment in Section 11.10.
The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017	Aims to maintain the provision of clean drinking water from private sources for supplies which provide water to less than 50 persons or less than 10 m^3 a day. The Regulations transpose the Drinking Water Directive exemption (for supplies which provide water to less than 50 persons or less than 10 m^3 a day) and replace The Private Water Supplies (Scotland) Regulations 2006 with respect to Type A supplies. Taking into account in identifying receptors in the baseline (Section 11.8), identifying mitigation in Section 11.9 and the impact assessment in Section 11.10.

Table 11.2: Summary of Policies Relevant to Water Quality and Flood Risk

Relevant Policy	Summary of Relevant Policy	How and Where considered in this Chapter
National Planning Framework 4 (NPF4)	Policy 2 (Climate mitigation and adaptation) Development proposals will be sited and designed to adapt to current and future risks from climate change. Policy 10 (Coastal development) Development proposals in undeveloped coastal areas will only be supported where necessary for essential	A Flood Risk Assessment for the Proposed Development has been undertaken and is presented within Volume 2, Appendix 11.1: Flood Risk Assessment. The Flood Risk Assessment includes relevant mitigation measures to manage flood risk within the PPP Application Boundary. The Offshore Export Cables and Onshore Export Cables are to be jointed together below

Relevant Policy	Summary of Relevant Policy	How and Where considered in this Chapter
	infrastructure, where there is a specific locational need and no other suitable site. Policy 11 (Energy) Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported. These include wind farms including repowering, extending, expanding and extending the life of existing wind farms. In addition, project design and mitigation shall demonstrate how the impacts on hydrology, the water environment and flood risk are addressed. Policy 22 (Flood Risk and Water Management) Development proposals at risk of flooding or in a flood risk area shall only be supported if they are for essential infrastructure where the location is required for operational reasons. Development proposals will: • Not increase the risk of surface water flooding to others, or itself be at risk. • Manage all rain and surface water through sustainable drainage systems (SuDS), which should form part of and integrate with proposed and existing blue-green infrastructure. All proposals should presume no surface water connection to the combined sewer. • Seek to minimise the area of impermeable surface.	ground at the Landfall within TJBs. The maintenance covers will be standard ground level chambers, providing access to link boxes. It is proposed to use Horizontal Directional Drilling (HDD) or other trenchless techniques to cross beneath coastal features. An assessment of effects to water quality and flood risk has been undertaken within Section 11.10 and mitigation measures to be adopted as part of the Proposed Development are presented in Sections 11.9 and 11.10. Appropriate mitigation measures to reduce the impacts on the water environment are set out in Volume 2, Appendix 2.2: Outline Construction Environmental Management Plan (CEMP) which has been prepared as part of the application. This includes measures relating to control of impacts to the water environment during construction.
Aberdeenshire Local Development Plan 2023 (ALDP)	At the local level, the ALDP contains policies of relevance	

Relevant Policy	Summary of Relevant Policy	How and Where considered in this Chapter
	to the water environment. This includes: • Policy R1 Special Rural Areas; • Policy PR1 Protecting Important Resources; • Policy C4 Flooding; and • Policy RD1 Providing suitable services.	

11.3.2 The following guidance documents have also been considered:

- Design Manual for Roads and Bridges, Road Drainage and the Water Environment LA 113 (National Highways, 2020)
- Guidance for Pollution Prevention (GPP) (NetRegs, 2025):
  - GPP1: Understanding your environmental responsibilities – good environmental practices (SEPA, Northern Ireland Environment Agency (NIEA) and Natural Resource Wales (NRW), 2020);
  - GPP2: Above ground oil storage (SEPA, NIEA and NRW, 2021a);
  - GPP5: Works and maintenance in or near water (SEPA, NIEA and NRW, 2018);
  - GPP6: Working on construction and demolition sites (SEPA, NIEA and NRW, 2023); and
  - GPP21: Pollution incident response planning (SEPA, NIEA and NRW, 2021b).
- SEPA guidance and advice notes (SEPA, 2024a):
  - Flood Risk Standing Advice for Planning Authorities (SEPA, 2024b);
  - Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (SEPA, 2024c).
- Construction Industry Research and Information Association (CIRIA) Guidance:
  - C532: Control of water pollution from construction sites - Guidance for consultants and contractors (Masters-Williams et al, 2001);
  - C753: The SuDS Manual (CIRIA, 2015);
  - C768: Guidance on the construction of Sustainable Drainage Systems (SuDS) (Illman and Wilson, 2017);
  - C624: Development and flood risk – guidance for construction industry (CIRIA, 2004);
  - C648: Control of pollution from linear construction projects – Technical guidance (Murnane et al. 2006a); and
  - C649 Control of pollution from linear construction projects – Site guide (Murnane et al. 2006b).

- Scottish Government Planning Advice Notes (PAN) (Scottish Government, 2025):
  - PAN 51 – planning, environmental proception and regulation (Scottish Government, 2006a);
  - PAN 61 – sustainable urban drainage systems (Scottish Government, 2001);
  - Flood Risk: planning advice (Scottish Government, 2015); and
  - PAN 79 – water and drainage (Scottish Government, 2006b).

11.4 Consultation

11.4.1 The approach to consultation for the Proposed Development is set out in Chapter 4: Stakeholder Engagement and Consultation. A summary of the issues raised during consultation activities undertaken to date specific to Water Quality and Flood Risk is presented in Table 11.3, together with how these issues have been considered in the production of this assessment.

Table 11.3: Summary of key consultation issues raised during consultation activities undertaken for the Proposed Development relevant to Water Quality and Flood Risk

Date	Consultee and Type of Consultation	Summary of Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
September 2024	Bowdun Scoping Opinion (SEPA, 2024)	Agree potential interruption of PWS should be scoped into the EIA. All sources of any PWS will need to be identified. The Scoping Report references the incorrect SEPA Flood Risk Mapping. NPF4 now refers to SEPA Future Flood Risk mapping rather than low/medium/high likelihoods. Highlight [SEPA] are likely to request a planning condition restricting any temporary storage of materials (including excavated material from trenching) and buildings are located outwith the Future Flood extent. Recommend the applicant undertakes further geomorphological assessments of any proposed crossing and/or infrastructure located near the Bervie Water (which has recommended 50 m buffers in places), Forthie Water and Carron Water. SEPA recommends riparian planting as part of any biodiversity net gain proposals on the following watercourses: Burn of Benholm, Bervie Water, Forthie Water and Carron Water. SEPA has also included details of standard guidance relating to the assessment and submission.	Private Water Supplies (PWS) are considered in Volume 1, Chapter 10: Geology and Ground Conditions and within this chapter. Volume 2, Appendix 11.1: Flood Risk and Drainage Assessment makes reference to the correct Future Flood Risk Mapping. There is a commitment that any temporary storage of materials (including excavated material from trenching) and buildings are located outwith the Future Flood extent. HDD will be the preferential crossing methodology for all WFD watercourses and salmonid watercourses. Therefore, there will be no direct interaction with the bed or banks of these watercourses. A summary of the baseline conditions of the watercourses encountered which may be affected by the Proposed Development is presented in Volume 2, Appendix 11.2: Schedule of Watercourse Crossings. Recommendation noted, refer to Volume 1, Chapter 7: Biodiversity, Terrestrial Ecology and Ornithology for a commitment to develop a Habitat Management Plan at Matters Subject to Condition Stage. Consideration of standard guidance and assessment has been included in Section 11.3.
September 2024	Bowdun Scoping Opinion (Scottish Water, 2024)	<u>Drinking Water Protected Areas:</u> No Scottish Water drinking water catchments or water abstraction sources, which are designated as	Noted response in relation to Drinking Water Protected Areas and Surface Water.

Date	Consultee and Type of Consultation	Summary of Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		Drinking Water Protected Areas (DWPA) under the Water Framework Directive, in the area that may be affected by the proposed activity. Asset Impact Assessment: Scottish Water records indicate that there is live infrastructure in the proximity of [the] development area that may impact on existing Scottish Water assets. The applicant must identify any potential conflicts with Scottish Water assets and contact [Scottish Waters] Asset Impact Team via [the] Customer Portal for an appraisal of the proposals. Any conflict with assets identified will be subject to restrictions on proximity of construction. Written permission must be obtained before any works are started within the area of [Scottish Water] apparatus. Surface Water: For reasons of sustainability and to protect [Scottish Waters] customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system.	Any interaction with Scottish Water assets be considered during future design, as noted in Section 11.8.37. It is not envisaged that a surface water connection to the combined sewer system will be required as part of the Proposed Development.
September 2025	SEPA Abstractions and Discharges Data	Details of licenced abstractions and discharges within the Study Area.	The locations of licenced abstractions and discharges has been recorded in the baseline presented in Section 11.8.
September 2025	Aberdeenshire Council Private Water Supply Data	Details of private water supplies within the Study Area.	The locations of the recorded water supplies have been taken into account in the baseline presented in Section 11.8.

11.5 Data Sources

11.5.1 A variety of topic specific information has been reviewed and analysed to inform the baseline within the Water Quality and Flood Risk study area.

11.5.2 Site surveys have been undertaken to further assess the baseline conditions from information gathered from the desk-based assessment.

Desktop Study

11.5.3 Information on Water Quality and Flood Risk within the study area was collected through a detailed desktop review of existing studies and datasets which are summarised in Table 11.4.

Table 11.4: Summary of Key Data Sources

Title	Source	Extent	Year	Author
Abstractions and Discharges	Information provided by SEPA	Water Quality and Flood Risk study area	2025	SEPA
Flood Estimation Handbook (FEH)	https://fehweb.ceh.ac.uk/	Catchments within Water Quality and Flood Risk study area	2025	UK Centre for Ecology and Hydrology (UKCEH)
Location-Specific Long-Term Averages	https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages	Inverbervie No 2 Station	2025	Met Office
Ordnance Survey 1:50,000 scale map and 1:25,000 scale map	Ordnance Survey (OS) mapping	N/A	2025	OS
Private Water Supplies (PWS)	Information provided by Aberdeenshire Council	Water Quality and Flood Risk study area	2025	Aberdeenshire Council
Scotland's Environment Map	https://map.environment.gov.scot/sewebmap/	Water Quality and Flood Risk study area	2025	NatureScot
SEPA Flood Maps	https://map.sepa.org.uk/floodmaps	Water Quality and Flood Risk study area	2025	SEPA
River Basin Management Plans (RBMP)	https://www.sepa.org.uk/data-visualisation/water-classification-hub/	Water Quality and Flood Risk study area	2024	SEPA
UK Climate Projections (UKCP)	https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index	UK	2018	Met Office

Site-Specific Surveys

11.5.4 Site-specific surveys were undertaken to inform this assessment. A summary of the surveys is outlined in Table 11.5.

Table 11.5: Summary of Site-Specific Survey Data

Title	Extent of Survey	Overview of Survey	Survey Contractor	Date
Hydrological Survey	Various locations within the PPP Application Boundary.	Hydrological survey undertaken to record typical watercourses within the Proposed Development. Recording of key features and characteristics.	Jacobs	June 2025

11.5.5 Watercourses that were visible on the 1:50,000 mapping were visited during the hydrological survey. A schedule of watercourse visited is presented in Volume 2, Appendix 11.2: Schedule of Watercourse Crossings.

11.6 Methodology for Assessment of Effects

Overview

11.6.1 The Water Quality and Flood Risk assessment of effects has followed the methodology set out in Volume 1, Chapter 3: Environmental Impact Assessment Methodology. Specific to the Water Quality and Flood Risk assessment, the Design Manual for Roads and Bridges (DMRB) LA 113: Road drainage and the water environment (Highways England, 2020) has also been considered in the absence of sector specific assessment guidance. This guidance has been considered appropriate as a framework for assessing impacts on the water environment arising from linear infrastructure projects.

Criteria for Assessment

11.6.2 Information about the Proposed Development (including the Maximum Design Scenario (MDS) discussed in Section 11.7 below) and the proposed activities within all stages of the Proposed Development life cycle (construction, O&M, and decommissioning) shall be combined with information about the environmental baseline to identify the potential interactions between the Proposed Development and the environment.

11.6.3 These potential interactions are known as potential impacts. The potential impacts are then assessed for the level of significance of their effect on the receptors.

11.6.4 'Impact' is defined as a change caused by an action that occurs during a project's lifetime. This includes changing the environment through either project actions or the presence of the Proposed Development. Impacts are categorised through various characteristics as shown in Table 11.6.

Table 11.6: Descriptions of Categories Related to EIA Impacts

Impact Categories	Description
Direct or Indirect	Direct impacts occur at the same time as an action and occur within the same area, as opposed to indirect impacts which still result from an action but arise later or in a different area.
Adverse or Beneficial	Adverse impacts have an adverse effect on the environment while beneficial impacts have a beneficial effect on the environment.
Reversible or Irreversible	Reversible impacts are temporary, with natural recovery possible, unlike irreversible impacts, where natural recovery is not possible.
Cumulative	Impacts that arise from a combination of the Proposed Development and other projects.
Inter-related	The potential effects of multiple impacts from the construction, O&M and decommissioning of the Proposed Development, affecting one receptor.

11.6.5 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: Environmental Impact Assessment Methodology.

11.6.6 The criteria for defining magnitude in this chapter are outlined in Table 11.7 and assumes a worse case scenario. As a result, Table 11.7 only includes High adverse to Negligible magnitude of impact. Each assessment considered 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).

Table 11.7: Definition of Terms relating to Magnitude of Impact

Magnitude of Impact	Definition	Example
High	Total loss of, or alteration to, resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.	Surface Water • Reduction in water body WFD classification. • Loss or extensive change to a designated nature conservation site or fishery. Surface Water Supply • Loss of regionally important public water supply. Groundwater Quality • Reduction in water body WFD classification. Flood Risk

Magnitude of Impact	Definition	Example
		• Increase in peak flood level (likely >100 mm).
Medium	Loss of resource, or alteration to, but not adversely affecting integrity of resource; partial loss of/damage to key characteristics, features or elements.	Surface Water • Contribution to reduction in water body WFD classification. • Partial loss in productivity of a fishery. Surface Water Supply • Degradation of regionally important public water supply or loss of significant commercial/industrial/agricultural supplies. Groundwater Quality • Contribution to reduction in water body WFD classification. Flood Risk • Increase in peak flood level (likely > 50 mm).
Low	Some small measurable change in attributes, quality or vulnerability, minor loss or, alteration to, one (maybe more) key characteristics, features or elements.	Surface Water • Minor effects on water body WFD classification. Surface Water Supply • Minor effects on water supplies. Groundwater Quality • Minor effects on water body WFD classification. Flood Risk • Increase in peak flood level (likely > 10 mm)
Negligible	Very minor change from baseline, which is barely distinguishable to one or more characteristics, features or elements.	Surface Water • Minor effects on water body not WFD classified. Surface Water Supply • Not applicable as surface water supply assigned from High to Low. Groundwater Quality • Minor effects on water body not WFD classified. Flood Risk • Approximate to a 'no change' situation.

11.6.7 The criteria for defining sensitivity in this chapter are outlined in Table 11.8.

Table 11.8: Definition of Terms Relating to the Sensitivity of the Receptor

Sensitivity of Receptor	Criteria	Definition
Very High	Very high importance and rarity, international receptor with no potential or very limited potential for recovery.	Surface Water • Watercourse having a WFD classification shown in a RBMP and Q95 likely to be ≥ 1.0 m^3/s. • Watercourse part of a site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water). Non WFD classified watercourses may be applicable if part of a protected site. Surface Water Supply • Water resource extensively exploited for public, private domestic and/or agricultural and/or industrial use, supplying ten or more properties. Groundwater Quality • Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK legislation. • Groundwater locally supports GWDTE. Flood Risk • Receptor is at high risk from flooding (10% chance of flooding). • Receptor is categorised as Most Vulnerable or Essential Infrastructure.
High	High importance and rarity, international and / or national receptor and limited potential for recovery.	Surface Water • Watercourse having a WFD classification shown in a RBMP and Q95 likely to be <1.0 m^3/s. • Species protected under EC or UK legislation. Surface Water Supply • Valuable water supply resource due to exploitation for public, private domestic and/or agricultural and/or industrial use, supplying fewer than 10 properties. Groundwater Quality • Principal aquifer providing locally important resource or supporting a river ecosystem. • Groundwater supports a GWDTE. Flood Risk • Receptor is at moderate risk from flooding (0.5% chance of flooding).

Sensitivity of Receptor	Criteria	Definition
		Receptor is categorised as Highly Vulnerable.
Medium	High or medium importance and rarity, regional receptor, and potential for recovery.	Surface Water • Watercourses not having a WFD classification shown in a RBMP and Q95 likely to be >0.001 m^3/s. Surface Water Supply • Not applicable as all water supplies are always either assigned Very High or High importance. Groundwater Quality • Aquifer providing water for agricultural or industrial use with limited connection to surface water. Flood Risk • Receptor is at low risk from flooding (less than 0.1% chance of flooding). • Receptor is categorised as Least Vulnerable.
Low	Low or medium importance and rarity, local receptor and high potential for recovery.	Surface Water • Watercourses not having a WFD classification shown in a RBMP and Q95 likely to be ≤0.001 m^3/s. Surface Water Supply • Not applicable as all water supplies are always either assigned Very High or High importance. Groundwater Quality • Unproductive strata. Flood Risk • Receptor is not at risk of flooding. • Receptor is categorised as Water Compatible.
Negligible	Very low importance and rarity, local receptor and very high potential for recovery.	Surface Water • Watercourses not having a WFD classification shown in a RBMP with minimal hydrological importance to sensitive or protected ecosystems and/or economic and social uses. Surface Water Supply • Not applicable as all water supplies are always either assigned Very High or High. Groundwater Quality • Not applicable

Sensitivity of Receptor	Criteria	Definition
		Flood Risk • No risk of flooding.

11.6.8 The magnitude of the impact and the sensitivity of the receptor are combined when determining the significance of the effect upon Water Quality and Flood Risk. The particular method employed for this assessment is presented in Table 11.9 and Table 11.10.

11.6.9 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.

11.6.10 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 11.9: Matrix Used for the Assessment of the Significance of the Effect

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or Minor	Negligible of Minor	Minor
Low	Negligible or Minor	Negligible of 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 11.10: 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.

11.7 Key Parameters for Assessment

Maximum Design Scenario

11.7.1 The MDS identified in Table 11.11 are 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. It should be noted that potential impact regarding contamination relates to contamination arising from construction activities and not contaminated land, which is considered in Volume 1, Chapter 10: Geology and Soils.

Table 11.11: Maximum Design Scenario Considered for Each Potential Impact as Part of the Assessment of Likely Significant Environmental Effects on Water Quality and Flood Risk

Potential Impact	Phase			Maximum Design Scenario
	C	O&M	D	
Increased pollution and contaminated runoff that may migrate to surface water and groundwater receptors.	✓	×	✓	**Construction phase:** Landfall The Offshore Export Cables will be brought under the intertidal area to a location above MHWS where they will be connected to the Onshore Export Cables underground within TJBs. There will be a maximum of three TJBs, each up to 80 m^2 in area and 4 m in depth. The total duration of the entry pit works is between 12 – 15 months. These works will take place within a temporary construction compound approximately 3 ha. **Construction phase:** Onshore Export Cable Corridor and 400 kV Cable Corridor Open cut trenching: the maximum number of three cable trenches will be required for the Onshore Export Cable Corridor. The trench width at ground level will be 4.2 m for the Onshore Export Cable Corridor with a target installation depth of 1.65 m. A typical construction corridor width of 50 m, 35 m of which will be permanent with a length of up to 22 km for the Onshore Export Cable Corridor. A maximum of two cable trenches will be required for the 400 kV Cable Corridor. The trench width at ground level will be 2.7 m with a target installation depth of 1.65 m. A typical construction corridor width of 35.2 m, of which 15.2 m will permanent with a length of up to 1.3 km for the 400 kV Cable Corridor. Cable joints will be required approximately every 500 m to 1,500 m along the Onshore Export Cable Corridor, based on this it is assumed
Increased flood risk arising from additional surface water runoff from the Proposed Development.	✓	✓	×	
Increased flood risk from construction works within the floodplain.	✓	×	✓	
Impacts on hydromorphological quality of watercourses associated with works within or in close proximity to watercourses, including physical change to the watercourses and longer-term changes associated with sediment deposition.	✓	×	✓	

Potential Impact	Phase			Maximum Design Scenario
	C	O&M	D	
				up to 63 cable joints will be required. In addition to the cable joints, link boxes will be required, again it is assumed that up to 63 link boxes will be required. Trenchless crossings: trenchless crossing techniques (HDD) will be used at larger or sensitive watercourses. Each HDD location will have launch pit dimensions of 70 m x 50 m and reception pit dimensions of 50 m x 40 m. There will be a number of construction compounds along the Onshore Export Cable Corridor. Open cut trenching associated with the installation of the Onshore Export Cables will result in the larger area of disturbance (compared to trenchless techniques). This represents the MDS in terms of potential for contaminated runoff, spillage and direct disturbance to the water environment as a result of construction activities. In terms of areas affected by the Onshore Export Cable Corridor, the 400 kV Cable Corridor and Substation, the MDS is represented by the largest working areas and number of trenches. In terms of duration, the MDS is represented by a sequential construction of the Proposed Development. Where trenchless techniques have already been committed for specific watercourses, this would represent the minimum number required. **Construction phase:** Substation The total area for the Substation including associated mitigation and land required for construction occupies approximately 19 ha. This includes the switchgear buildings, transformers, other electrical equipment, landscaping and drainage.

Potential Impact	Phase			Maximum Design Scenario
	C	O&M	D	
				A temporary construction compound associated with the Substation works will be up to 18,400 m^2 over a duration of 45 months. The MDS is represented by the largest permanent areas of impermeable surface/hardstanding which equates to the worst-case in terms of changes in runoff rates and flood risk potential to the surrounding area. **Decommissioning phase:** At the end of the operational lifetime of the Proposed Development, it is anticipated that the decommissioning works cables will be removed via the TJBs with no additional excavations required. Impacts during decommissioning are considered likely to be broadly similar to those in the construction phase. Decommissioning is likely to operate within the parameters identified for construction. Decommissioning is likely to operate within the parameters identified for construction. Watercourses crossed by HDD will not be excavated to remove the cable ducts.
Impacts to local drainage structures that may alter existing surface water pathways with potential impacts on PWS and abstractions.	✓	×	✓	The Onshore Export Cable Corridor is within 250 m of potential PWS sources. Permanent diversion of water runoff pathways may affect downstream receptors such as PWS and abstractions. Cable trenches create pollution pathways that may impact on PWS and abstractions. It may not be possible to move the Onshore Export Cable Corridor away from PWS and abstractions, as the Onshore Export Cable Route within the Onshore Export Cable Corridor is unknown so a worst-case assumption has been used.

Potential Impact	Phase			Maximum Design Scenario
	C	O&M	D	
Changes to catchments and pathways may alter existing surface water flows within potential impacts on PWS and abstractions.	×	✓	×	Onshore Export Cable Corridor of up to 50 m wide. Onshore Export Cable Corridor is potentially within 250 m of an active PWS. Permanent diversion of water runoff pathways may affect downstream receptors such as PWS and abstractions. Cable trenches create pollution pathways that may impact on PWS and abstractions. It may not be possible to move the Onshore Export Cable Route away from PWS and abstractions, as the Onshore Export Cable Route within the Onshore Export Cable Corridor is unknown so a worst-case assumption has been used.
Permanent impact to the hydromorphological and ecological quality of water features associated with works within or in close proximity to water features.	×	✓	×	Onshore Export Cable Corridor of up to 50 m wide. Open cut crossings are intended to be used on all watercourses within the exception of WFD and other sensitive watercourses. The detailed design of watercourse crossings is not available, therefore open cut crossings are assumed for the majority of watercourses.

Impacts Scoped Out of the Assessment

11.7.2 On the basis of the baseline environment and the Project Description outlined in Volume 1, Chapter 2: The Proposed Development, a number of impacts are scoped out of the assessment for Water Quality and Flood Risk. Many of these impacts 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.

11.7.3 The potential impact is outlined, together with a justification for scoping it out, in Table 11.12.

Table 11.12: Impact Scoped Out of the Assessment for Water Quality and Flood Risk During Scoping (Tick Confirms the Impacts Scoped Out)

Potential Impact	Phase Scoped Out			Justification
	C	O&M	D	
The impact of increased flood risk arising from damage to existing flood defences during construction, O&M and decommissioning of elements of the Proposed Development.	✓	✓	✓	As discussed within Volume 2, Appendix 11.1: Flood Risk and Drainage Impact Assessment, there are no existing flood defences within Water Quality and Flood Risk Study Area.
The impact of contaminated runoff on the quality of surface water and ground receptors during O&M of the Proposed Development.	n/a	✓	n/a	Activities associated with the O&M of the Proposed Development are unlikely to generate contaminated runoff. Therefore, the potential impact of contaminated runoff on the quality of surface water receptors during the O&M of the Proposed Development is unlikely to be significant and is proposed to be scoped out of the assessment for Water Quality and Flood Risk. Runoff from the Substation during operation is to be captured by drainage outlined in Appendix 11.1, which includes mitigation measures to ensure potential contaminated runoff does not reach surface and groundwater receptors.
The impact of increased flood risk arising from additional surface water runoff during the O&M of the Landfall, Onshore Export Cables and 400 kV Cables.	n/a	✓	n/a	Link box covers will be installed to ensure O&M of the Landfall, Onshore Export Cable, 400 kV Cable and associated infrastructure. This will result in a minor increase in the total area of impermeable land. However, the increase in impermeable land arising from the O&M of the Landfall, Onshore Export Cable and 400 kV Cable is unlikely to result in a notable change in drainage patterns and surface water runoff rates. Therefore, the potential impact of flood risk arising from additional surface water runoff

Potential Impact	Phase Scoped Out			Justification
	C	O&M	D	
				during the O&M of the Landfall, Onshore Export Cable and 400 kV Cable is unlikely to be significant and is proposed to be scoped out of the assessment.
The impact of increased flood risk arising from watercourse diversion associated with the operation and maintenance and decommissioning of the Substation.	✓	✓	✓	During operation and maintenance and decommissioning, any watercourses diverted as part of construction phase development will continue to adequately convey flow downstream without increasing flood risk upstream. Therefore, the potential impact of increased flood risk arising from a watercourse diversion during operation and maintenance and decommissioning of the Proposed Development is unlikely to result in significant effects and is proposed to be scoped out of the assessment for Water Quality and Flood Risk.
The impact of damage to existing water and sewer pipelines during the construction, O&M and decommissioning of the Proposed Development.	✓	✓	✓	Standard mitigation to be implemented during construction and decommissioning will mitigate the risk of construction activities potentially damaging water and sewer pipelines during the construction and decommissioning of the Proposed Development is unlikely to be significant and is proposed to be scoped out of the assessment for Water Quality and Flood Risk. Activities that could damage existing water supply and drainage infrastructure are to take place during construction and decommissioning only. As such it is unlikely that damage would be caused to water and sewer pipelines during operation. Therefore, the potential impact of damage to field drainage during O&M of the Proposed Development is unlikely to result in significant effects and is proposed to be scoped out of the assessment for Water Quality and Flood Risk.
The impact of damage to existing field drainage during the construction, O&M and decommissioning of the Proposed Development.	✓	✓	✓	Standard mitigation measures and best practices will be implemented to avoid damage to existing water and sewer pipelines/field drainage. Any potential impacts are expected to be localised and temporary. Therefore, this impact is unlikely to

Potential Impact	Phase Scoped Out			Justification
	C	O&M	D	
				result in significant effects and is proposed to be scoped out of the assessment for Water Quality and Flood Risk.

11.8 Baseline Environment

11.8.1 The following sections provide a summary of the Water Quality and Flood Risk baseline environment.

Topography and Land Use

11.8.2 The Proposed Development features a landfall approximately 3 km south of Inverbervie at sea level and extends northward past Drumlithie and between the Hill of Trusta (320 m AOD) and Hill of Swanley (229 m AOD).

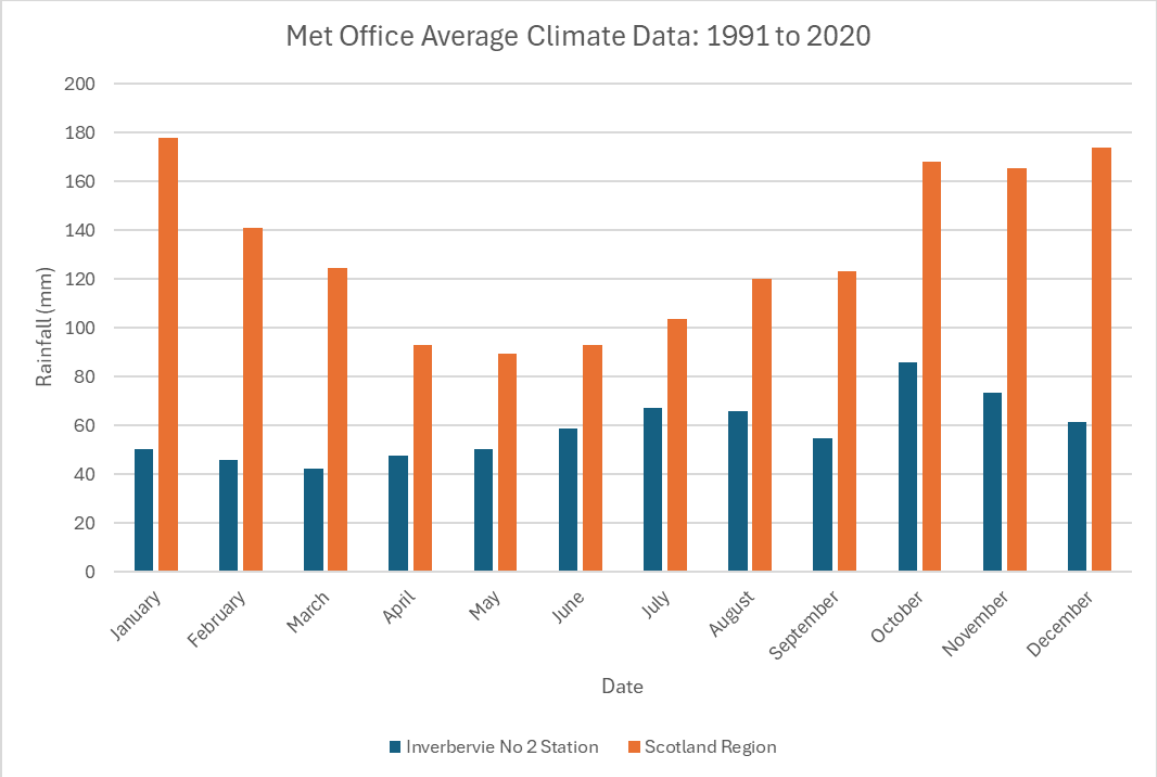
11.8.3 In general, the existing land use of the PPP Application Boundary is predominantly agricultural with commercial forestry present where the location of the Substation is proposed.

Climate

11.8.4 The Met Office 1991-2020 annual rainfall total from the nearest climate station (Inverbervie No 2 station) is 703.44 mm which is considerably lower than the Scotland regional total of 1,572.72 mm. The Inverbervie No 2 station is located approximately 3 km from the Proposed Development and is located on the coastline at National Grid Reference (NGR) NO 83997 73427 which provides a good indication of expected climatic conditions.

11.8.5 Graph 11.1 below presents the average monthly rainfall comparison between Inverbervie No 2 station and the national data between 1991 to 2020. As the Proposed Development is located in the east of Scotland it receives less average monthly rainfall in comparison to the Scottish monthly average. As presented below, the wet season in Scotland is defined as October through to January with the dry season between April to July. However, the Inverbervie No 2 station indicates that July and August features increased rainfall compared to December and January.

Source: Met Office (2025)



Graph 11.1: Average Monthly Rainfall Data from Inverbervie No 2 station and Scotland Region Over the 1991 to 2020 Period

Surface Water and Groundwater Quality

WFD Catchments

11.8.6 The majority of the Study Area is located within the North East WFD sub basin district with the exception of the landfall location of the Proposed Development to Knox Hill which is situated within the Tay WFD sub basin district. The Study Area is located across two large river and coastal waterbodies, comprising the Kincardine and Angus Coastal in the south and north and the Bervie Water in the central region.

11.8.7 There are six surface river waterbody catchments within the study area classified under the WFD. These WFD waterbodies are detailed in Table 11.13 and presented in Figure 11.2 (Annex – Figures).

Table 11.13: WFD Classified Waterbodies within the Study Area

WFD Waterbody Name	ID	Current Overall Status (2023)	Overall Ecology	Water Quality
Burn of Benholm	23260	Moderate	Moderate	Moderate
Bervie Water – Lower Catchment	23264	Poor ecological potential (heavily modified waterbody)	Bad	Moderate
Bervie Water – Upper Catchment	23262	Moderate ecological potential (heavily modified waterbody)	Poor	Moderate

WFD Waterbody Name	ID	Current Overall Status (2023)	Overall Ecology	Water Quality
Forthie Water	23263	Moderate ecological potential (heavily modified waterbody)	Bad	Moderate
Carron Water	23257	Moderate ecological potential (heavily modified waterbody)	Bad	Moderate
Cowie Water – Fetteresso Forest	23254	High	High	High

11.8.8 There are four groundwater catchments within the Study Area classified under the WFD. These WFD waterbodies are detailed in Table 11.14 and presented in Figure 11.2 (Annex – Figures).

Table 11.14: WFD Classified Groundwater Bodies within the Study Area

WFD Waterbody Name	ID	Current Overall Status (2023)	Drinking Water Protected Area (DWPA)	Water Quality
St Cyrus	150524	Good	Good	Good
Drumlithie	150585	Good	Good	Good
Stonehaven	150550	Good	Good	Good
Portlethen	150625	Good	Good	Good

Watercourses

11.8.9 Through the review of Ordnance Survey (OS) mapping, the following watercourses area presented in Table 11.15 are located within the study area and are shown on Figure 11.3 (Annex – Figures).

Table 11.15: Named Watercourses within the Study Area

Waterbody Name	Location
Burn of Benholm	Located in the southern part of the study area, south east of Benholm. Flows north west to south east.
Peattie Burn	Located in the southern part of the study area, west of Inverbervie. Flows south west to north east.
Hareden Burn	Located in the central part of the study area. Flows south west to north east.
Bervie Water	Located in the central part of the study area. Flows west to east.
Burn of Pitcaries	Located in the central part of the study area, west of Arbuthnott. Flows north to south.
Forthie Water	Located in the central part of the study area, south of the A90. Flows east to west.
Drumlithie Burn	Located in the central part of the study area, east of Drumlithie. Flows west to east.
Carron Water	Located in the northern part of the study area, south of Tannachie. Flows west to east.
Killer Burn	Located in the northern part of the study area, west of Tannachie. Flows north to south.

Waterbody Name	Location
Burn of Annamuick	Located in the northern part of the study area, north of Tannachie. Flows north west to south east.
Burn of Elfhill	Located in the northern part of the study area, north of Tannachie. Flows north west to south east.
Burn of Baulks	Located in the northern study area, south of Fetteresso Forest. Flows north west to south east.
Burn of Day	Located in the northern part of the study area, within Fetteresso Forest. Flows north west to south east.
Whiting Burn	Located in the northern part of the study area, within Fetteresso Forest. Flows north to south.
Burn of Finglennie	Located in the northern part of the study area, within Fetteresso Forest. Flows south to north.
Queel Burn	Located in the northern part of the study area, within Fetteresso Forest. Flows south to north.
Cowie Water	Located in the northern part of the study area, within Fetteresso Forest. Flows west to east.
West Dumer Burn	Located in the northern part of the study area, within Fetteresso Forest. Flows west to east.
East Dumer Burn	Located in the northern part of the study area, within Fetteresso Forest. Flows north west to south east.
Irish Burn	Located in the northern part of the study area, within Fetteresso Forest. Flows north to south.
Black Burn	Located in the northern part of the study area, within Fetteresso Forest adjacent to Slug Road (A957). Flows north west to south east.

11.8.10 In addition to these watercourses, there are numerous artificial agricultural and forestry drainage features, ponds and small tributaries located throughout the Study Area. These features, where present on 1:25,000 scale OS mapping have been identified and are presented in Figure 11.3 (Annex – Figures).

Surface Water Catchments

Salmonid watercourses

11.8.11 Watercourses that have been identified as Salmonid watercourses within the Study Area include the following:

- Bervie Water;
- Forthie Water;
- Carron Water; and
- Cowie Water.

11.8.12 Further information on fish and aquatic features are outlined in Volume 1, Chapter 7: Biodiversity, Terrestrial Ecology and Ornithology.

Water Resources

Public Water Supplies

11.8.13 By reviewing the available information on Scotland's Environment map, there are no surface Drinking Water Protection Areas (DWPAs) within the Study Area.

11.8.14 In terms of DWPA for groundwater, there are multiple protected areas that are listed below:

- St Cyrus (ID: 150524);
- Drumlithie (ID: 150585);
- Stonehaven (ID: 150550); and
- Portlethen (ID: 150625).

Licenced Abstractions and Discharges

11.8.15 As advised by SEPA (Table 11.16), there are discharges and abstractions licenced under CAR within the Study Area. There are 139 licenced activities within the Study Area with a description of the records summarised in Table 11.16 and shown in Figure 11.4 (Annex – Figures).

11.8.16 There is one abstraction related to agricultural activities at Broombank Farm (NGR NO 78210 80300). Scottish Water have three authorised activities within the Study Area. There are two public sewage treatment works discharges, one at Drumlithie WWTP (NGR NO 79309 81046) and one at Netherknox WWTP (NGR NO 82000 70200). There is also a Combined Sewer Overflow (CSO) discharge at Drumlithie Sewage Treatment Works (NGR NO 79309 81046). The remaining 135 authorised activities relate to private sewage treatment work discharges at properties located throughout the Study Area.

Table 11.16: SEPA Licenced Activities (Abstractions and Discharges) within the Study Area

Surface Water Catchment	Total Number of Licenced Activities	Description
Burn of Benholm	39	Private sewage treatment works discharge (39)
Bervie Water	68	Abstraction for agricultural irrigation (1) Public sewage treatment works discharge (1) Combined Sewer Overflow (CSO) discharge (1) Private sewage treatment works discharge (65)
Carron Water	23	Private sewage treatment works discharge (23)
Cowie Water	9	Private sewage treatment works discharge (9)

Private Water Supplies

11.8.17 Aberdeenshire Council were contacted to request information on the presence of PWSs within the Study Area. There are 61 properties that potentially utilise a PWS within the Study Area as shown in Figure 11.4 (Annex – Figures). Source details were provided for nine properties.

11.8.18 One supply has been classified as surface water fed, Fetteresso Substation located at NGR NO 78997 85876. This supply is located in the Burn of Elfhill catchment which discharges into the Carron Water at BNG NO 79951 84820. The source is indicated at the same position as the property. Fetteresso Substation is indicated as a Category A1 supply serving less than 100 m^3/day. It is positioned upgradient of the Onshore Export Cable Corridor. The remaining supply types include boreholes (2), groundwater springs (10), wells (5) and not classified (43). Given the level of uncertainty on the supply type and source locations, PWSs

have been considered here and in Volume 1, Chapter 10: Geology and Ground Conditions.

Flood Risk

11.8.19 SEPA Flood Maps (SEPA, 2025a) identify areas of flooding which are classified into three categories:

- High likelihood: 10% (1 in 10) chance of flooding each year;
- Medium likelihood: 0.5% (1 in 200) chance of flooding each year; and
- Low likelihood: 0.1% (1 in 1000) chance of flooding each year.

11.8.20 Table 11.17 provides a summary of flooding from various sources within the Study Area. Further details can be found in Volume 2, Appendix 11.1: Flood Risk and Drainage Assessment.

Table 11.17: Source and Risk of Flooding in the Study Area

Source of Flooding	Risk of Flooding	Description
Fluvial/River	High	Areas of medium and high likelihood of river flooding along main watercourses (Bervie Water, Carron Water, Cowie Water) and tributaries. Flood risk constrained mostly to channel extents.
Pluvial/Surface Water	High	Widespread areas of low, medium and high likelihood surface water flood risk, particularly along tributaries and in topographical depressions. Present within the Substation location.
Coastal	High	Areas of low, medium and high likelihood coastal flood risk at the Landfall location. No risk at Substation location due to distance/elevation.
Groundwater	Negligible	No identified risk of groundwater flooding within the Study Area.
Artificial Sources	Negligible	No artificial flood sources or flood defences present that could pose a risk.

Designated Sites

11.8.21 Within the Study Area, there are no internationally important designated sites that have hydrological qualifying features.

Modifying Influences

11.8.22 Information regarding climate change was obtained from the UK Climate Projections (UKCP18) website. (Met Office, 2025). The UKCP18 is a climate analysis tool which features comprehensive projections for different regions of the UK. General climate change trends projected over UK land for the 21st century show an increased chance of warmer, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of weather extremes. This is seen in the Probabilistic (25 km), Global (60 km), Regional (12 km), and Local (2.2 km) projections.

11.8.23 Warmer and wetter winters suggest less snow and more rain. This will create increased risk for flood events which may become more frequent and of greater impact. If climate predictions are correct, summer months will become drier. This will create pressure on the needs of water abstractions and on sensitive

ecosystems that rely on aquatic habitats. Evidence also suggests that although the summer months will have an average decrease in rainfall, summer storms will be more frequent and intense. This may lead to more extreme flow values during and immediately following such events, with consequential flooding and water quality issues. This is of key importance for the hydrological environment during summer construction periods.

11.8.24 To ensure that future development can provide a safe and working environment throughout its lifetime, national planning policy requires proposals in areas of high flood risk to be accompanied by an assessment of flooding consequences taking into account the impacts of climate change.

11.8.25 In accordance with SEPA guidance (SEPA, 2025), climate change allowances have been based on the latest available information of climate change projections and emission scenarios.

11.8.26 SEPA peak river flow allowances are based on climate change allowances derived from UKCP18 projections to the year 2100. SEPA guidance states that climate change allowances should be used for the following:

- River catchments greater than 50 km^2 excluding catchments in Orkney and Shetland; and
- River catchments between 30 km^2 and 50 km^2 where the peak river flow uplift is greater than the flow increase resulting from using the peak rainfall intensity uplift.

11.8.27 The Study Area is located within the Tay River Basin Region (SEPA, 2025) and the peak river flow allowance for this region is 53%.

11.8.28 SEPA peak rainfall intensities are based on climate change allowances derived from UKCP18 projections to the year 2100 and these should be used for the following:

- River catchments smaller than 30 km^2;
- River catchments between 30 km^2 and 50 km^2 where the peak river flow uplift is smaller than the flow increase resulting from using the peak rainfall intensity uplift; and
- Surface water flooding.

11.8.29 The Study Area is located within the Tay River Basin Region (SEPA, 2025) and the peak rainfall intensity allowance for this region is 39%.

11.8.30 SEPA expect sea level rise to increase over the coming decades due to the impacts of climate change. The cumulative sea level rise from 2017 to 2100 is based on the outputs from the UKCP18 projections. Sea level rise is expected to increase the risk from tidal flooding. Between 2017 and 2100, a cumulative sea level rise of 0.85 m for the Tay River Basin Region.

Future Baseline Scenario

11.8.31 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.

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

11.8.33 Without the Proposed Development, it is likely that existing land use would continue to be agricultural, and commercial forestry within Fetteresso Forest. The recorded baseline scenario for Water Quality and Flood Risk has the potential to change as a result of climate change scenarios. This includes, but is not limited to:

- An increase in intense rainfall events that have the potential to increase the risk of flooding to receptors downstream of the Proposed Development; and
- Prolonged periods of drier, warmer weather reducing the availability of water for water resources and watercourses.

Data Limitations and Assumptions

11.8.34 The information presented in this assessment is based on a combination of desk studies and site-specific surveys. There is a potential that further constraints may be identified in later stages. Should further constraints be identified, these will be assessed and appropriately mitigated prior to construction.

11.8.35 A data request for information on PWSs was made to Aberdeenshire Council. A response was received however there are gaps in information on source at this stage. However, a precautionary approach has been applied and further surveys will be undertaken at detailed design to collect data on properties and abstractions within areas of potential impact.

11.8.36 Information on abstractions and discharges were provided by SEPA following a data request. SEPA note that "As a result of losing access to much of our Public Register documentation in December 2020, documentation from before 1 January 2021 is not always complete or verified. Requests for this information will be fulfilled with the best available information, but use is at the requester's own risk".

11.8.37 Scottish Water has indicated in their Scoping response that "*there is live infrastructure in the proximity of your development area that may impact on existing Scottish Water assets*." During the detailed design phase, contact will be made with their Asset Impact Team. Any conflicts with assets identified, will be subject to restrictions on proximity of construction. Written permission will be obtained before any works commence within a Scottish Water asset area.

11.8.38 A hydrological walkover was completed to supplement the desk-based available information and record the characteristics of the watercourses and focused on areas where land parcel access was agreed. Data captured on the site visit is limited with no ground investigations undertaken at this stage of the assessment. The information collected is considered appropriate to inform the impact assessment.

11.9 Embedded Measures and Mitigation

11.9.1 As part of the Proposed Development design process, a number of embedded measures have been proposed to reduce the potential for impacts on Water Quality and Flood Risk (see Table 11.18). They are considered at every stage of the Proposed Development through design and best practice and, as there is a commitment to implementing these measures, these have been considered in the assessment presented in Section 11.11 (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These embedded measures are considered standard industry practice for this type of development.

Table 11.18: Embedded Measures Adopted as Part of the Proposed Development

Mitigation Reference	Embedded Measures Adopted as Part of the Proposed Development	Justification
GEN1	Preparation of a surface water drainage strategy to include appropriate SuDS measures to manage surface water runoff from the permanent infrastructure.	Mitigating increased discharge rates and flood risk potential, as well as consideration of water quality criteria set out in the SuDS Manual (CIRIA, 2015).
	Where reasonably practicable, a 50 m buffer will be implemented around all watercourses considered to have continuous flow throughout the year. Where this is not achievable, for example, where a watercourse will require to be crossed, these works will be regulated under the EASR regime, and all necessary licences will be sought from SEPA prior to construction works.	Implementation of the 50 m buffer reduces the potential for adverse impacts on the quantity and/or quality of watercourses. Where watercourse crossings are required, designs will be undertaken with the consideration of the watercourse type to ensure that designs are in accordance with SEPA guidance (Volume 2, Appendix 11.2: Schedule of Watercourse Crossings).
GEN2	A CEMP will be in place to control potentially polluting activities to reduce the potential for adverse impacts on downstream receptors during the construction phase so far as reasonably practicable. An outline CEMP is provided in Volume 2, Appendix 2.2: Outline Construction Environmental Management Plan. A subsequent detailed CEMP will be developed post consent in advance of the commencement of construction.	Measures will be adopted to ensure that the potential for release of pollutants from construction is reduced so far as reasonably practicable. These will likely include: • compliance with industry standard practices relating to sediment and pollution control management; • designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines; • regular checks and maintenance of vehicles for leakages and deterioration; • implementation of temporary SuDS; • management of runoff and discharge of water from work areas and near watercourses;

Mitigation Reference	Embedded Measures Adopted as Part of the Proposed Development	Justification
		• management of dewatering activities through dewatering permits and method statements (where required); and • careful consideration to the location of topsoil and subsoil storage areas.
	Flood Control Measures	The Contractor will produce a Flood Risk Drainage Assessment (FRDA) will inform the detailed CEMP and will include a Detailed Drainage Strategy discussing the drainage approach and the implementation of SuDS. Temporary haul roads will be installed comprising permeable gravel overlying a permeable geotextile membrane. A buffer between watercourses and temporary construction compounds/storage areas will be set. A Flood Evacuation and Response Plan will be applied to areas within 'medium' to 'high' likelihood of flooding.
GEN5	Onshore Decommissioning Plan	To be developed prior to decommissioning, including provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure, with details relevant to flood risk, pollution prevention and avoidance of ground disturbance.
WQFR1	Watercourse crossing flood risk management	For all watercourse crossings, including those with identified surface water flood risk: • Works will be planned to coincide with periods of typically lower flow where possible, based on long-term hydrological data; • Temporary flood defences or pumping equipment will be deployed where necessary, based on site-specific risk assessments; • Construction activities will be sequenced to minimise the duration of works within flood-sensitive areas; • Stockpiles of materials will be located away from watercourses and areas of flood risk; and • Weather forecasts will be monitored, with clearly defined protocols for stopping works and site evacuation in the event of flood warnings.

Mitigation Reference	Embedded Measures Adopted as Part of the Proposed Development	Justification
WQFR2	Preparation of a foul water drainage strategy to safely manage foul water arisings from the O&M of the Proposed Development.	Any foul water arising from the Proposed Development is to be properly managed, treated and discharged in accordance with SEPA guidance.
WQFR3	Onshore Infrastructure Construction Drainage Scheme	Will include measures to maintain existing land drainage during construction and identify specific drainage measures for each area of land. It will include measures to control surface water runoff and prevent flooding.
WQFR4	Onshore Infrastructure Operational Drainage Scheme	Will include measures such that existing land drainage is reinstated and/or maintained, including measures to limit discharge rates and attenuate flows at the Substation.
WQFR5	Monitoring of Private Water Supplies	The CEMP will include requirements of additional assessment of future design to establish a risk to surface water and PWS. If required, monitoring will be proposed

11.10 Assessment of Significance

11.10.1 Table 11.11 summarises the potential effects arising from the Proposed Development. An assessment of the likely significance of the effects of the Proposed Development on the Water Quality and Flood Risk receptors caused by each identified impact is given below.

Construction Phase

Magnitude of Impact

Surface Water

11.10.2 The construction of the Proposed Development may result in temporary changes to surface water flow paths, increased sediment loading and potential for pollution to enter watercourses. However, with the implementation of embedded mitigation measures to control runoff during construction within the CEMP, the magnitude of impact is considered to be low. The predicted impact to the receptors will be direct, short-term, intermittent and reversible.

Surface Water Supply

11.10.3 Construction activities near PWSs including trench excavation, HDD operations, dewatering, Substation construction and watercourse crossings could potentially impact water quality or quantity. Private water supplies will be protected through the implementation of mitigation measures outlined in the CEMP, including pollution prevention controls, management of dewatering activities and implementation of buffer zones around watercourses. The preparation of surface water and foul water drainage strategies, along with specific drainage measures for construction and O&M phases, will help protect water quality and quantity for PWSs. Given the proposed mitigation measures, the magnitude of impact is considered to be low. The predicted impact to the receptors will be indirect, short-term, intermittent and reversible.

11.10.4 Construction activities, including trench excavation, HDD operations, dewatering and earthworks for the Substation could potentially impact nearby abstractions and discharges. These activities may alter groundwater levels, flow paths or introduce contaminants. However, with the implementation of embedded mitigation measures such as the CEMP, 50 m watercourse buffers where practicable and adherence to EASR authorisations (formerly CAR licensing requirements), the magnitude of impact is considered to be low. The predicted impact to abstractions and discharges will be indirect, short-term, intermittent and reversible.

Groundwater Quality

11.10.5 The potential for contamination of groundwater during construction is limited due to the implementation of pollution prevention measures. The magnitude of impact on groundwater quality is considered to be low. The predicted impact to groundwater quality will be indirect, short-term, intermittent and irreversible.

Flood Risk

11.10.6 Construction activities, such as the removal of soil may increase runoff and increase downstream fluvial and surface water flood risk. A CEMP will be in place during the construction and will include a detailed drainage strategy outlining temporary measures to control increases in surface runoff. A Flood Evacuation and Response Plan will be in place for any construction activities taking place within the functional floodplain. With the implementation of these flood risk control measures, the magnitude of impact is considered to be low. The predicted impact to receptors downstream of construction activities will be direct, short-term, intermittent and reversible.

Sensitivity of the Receptor

Surface Water

11.10.7 The sensitivity of surface water receptors varies from medium to high, depending on WFD classification and ecological importance. For example, the Cowie Water - Fetteresso Forest has a high sensitivity due to its 'High' WFD status, while the Bervie Water - Lower Catchment has a medium sensitivity due to its 'Poor ecological potential' classification.

Surface Water Supply

11.10.8 Private water supplies (including abstractions) are considered to have high sensitivity due to their importance for local water provision.

Groundwater Quality

11.10.9 Groundwater quality sensitivity is considered to be medium to high, based on the presence of moderately productive aquifers in the area, which provide locally important resources and potentially support GWDTEs.

Flood Risk

11.10.10 The sensitivity to flood risk is considered high for the Proposed Development, given the presence of areas with medium to high likelihood of flooding as identified in the SEPA Flood Maps. This includes areas along main watercourses such as the Bervie Water, Carron Water and Cowie Water.

Significance of the Effect

11.10.11 Where an outcome from the significance of effects matrix presented in Table 11.9 indicates two potential results (e.g. Minor or Moderate), professional judgment has been applied to determine the most likely outcome. This judgment considers factors such as the extent and duration of the impact, the likelihood of occurrence and the specific characteristics of the affected receptors.

Surface Water

11.10.12 Overall, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered up to high. The effect has been determined to be of Minor adverse significance, which is not significant in EIA terms. Minor adverse significance was selected based on the temporary nature of construction impacts and the effectiveness of proposed mitigation measures in the CEMP.

Surface Water Supply

11.10.13 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be high. The effect has been determined to be of Minor adverse significance, which is not significant in EIA terms. Minor adverse significance was chosen due to the localised nature of potential impacts and the comprehensive protection measures outlined in the CEMP for private water supplies.

Groundwater Quality

11.10.14 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be high. The effect has been determined to be of Minor adverse significance, which is not significant in EIA terms. The selection of Minor adverse significance reflects the limited potential for groundwater contamination given the proposed pollution prevention measures.

Flood Risk

11.10.15 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be high. The effect has been determined to be of Minor adverse significance, which is not significant in EIA terms. Minor adverse significance was selected due to the implementation of a detailed drainage strategy and Flood Evacuation and Response Plan, which will effectively manage flood risks during construction.

Summary

11.10.16 The Minor adverse significance of effect has been chosen based on the low magnitude of impact reflecting limited but measurable changes to surface water quality, groundwater quality and flood risk. Impacts are expected to be short-term and reversible, particularly during construction with embedded mitigation measures like the CEMP and drainage strategy are expected to effectively manage any significant adverse impacts.

Additional Mitigation and Residual Effect

11.10.17 No additional mitigation is considered necessary during the construction phase because the likely effect based on the assessment and embedded mitigation is not significant in EIA terms.

Proposed Monitoring

11.10.18 This section outlines the proposed monitoring related to Water Quality and Flood Risk as outlined in Table 11.19. The CEMP will include requirements of additional assessment of future design to establish a risk to surface water and PWS. If required, monitoring will be proposed (WQFR5).

Table 11.19: Proposed Monitoring for Water Quality and Flood Risk

Potential Environmental Effect	Monitoring Commitment	Means of Implementation
Surface Water Quality Monitoring Plan	Commitment to engage with SEPA, Aberdeenshire Council, Marine Scotland Science and Scottish Water to prepare a Surface Water Quality Monitoring Plan (SWQMP), included as part of the final CEMP to understand the impact on surface water quality from construction.	A SWQMP will form part of the CEMP and consist of three phases: 1. Baseline 2. Construction 3. O&M It will be the responsibility of the appointed Contractor to undertake this monitoring. **Baseline monitoring** will take place on a monthly basis prior to construction for a period of time that is agreed with the relevant stakeholders (typically 12 months). **Construction monitoring** will take place on a monthly basis through the duration of construction. **O&M monitoring** will take place on a monthly basis for an agreed period. Can typically be 6 to 12 months.
Private Water Supply Monitoring Plan	Commitment to engage with Aberdeenshire Council and local residents to prepare a Private Water Supply Monitoring Plan to understand the impact of construction on PWSs.	A PWS Monitoring Plan will form part of the CEMP and include: • Landowner surveys to identify PWS locations and types within 250 m of construction areas. • Assessment of potential impacts on PWS quantity and quality. • Development of protection plans for potentially affected supplies. • Implementation of a monitoring program during construction.

Potential Environmental Effect	Monitoring Commitment	Means of Implementation
		• Provision of alternative water sources if needed during temporary impacts. • Establishment of new connections or replacement sources for any permanent impacts. It will be the responsibility of the Contractor to undertake this monitoring plan.

Operation and Maintenance Phase

Magnitude of Impact

Surface Water

11.10.19 During O&M, the potential for impacts on surface water quality is limited. Routine maintenance activities are unlikely to cause significant disturbance. The magnitude of impact is considered to be negligible. The impact will be direct, long-term, intermittent and reversible.

Surface Water Supply

11.10.20 O&M activities are not expected to significantly affect PWSs, abstractions or discharges. The magnitude of impact is considered to be negligible. The impact will be indirect, long-term, intermittent and reversible.

Groundwater Quality

11.10.21 The potential for groundwater contamination during O&M is minimal due to the implementation of appropriate drainage and pollution prevention measures. The magnitude of impact is considered to be negligible. The impact will be indirect, long-term, intermittent and reversible.

Flood Risk

11.10.22 The O&M of the Substation may slightly increase flood risk due to the increase in impermeable surfaces. However, with the implementation of SuDS, the magnitude of impact is considered to be low. The impact will be direct, long-term, continuous and reversible.

Sensitivity of the Receptor

Surface Water

11.10.23 The sensitivity of surface water receptors varies from medium to high, depending on WFD classification and ecological importance. For example, the Cowie Water - Fetteresso Forest has a high sensitivity due to its 'High' WFD status, while the Bervie Water - Lower Catchment has a medium sensitivity due to its 'Poor ecological potential' classification.

Surface Water Supply

11.10.24 Private water supplies (including abstractions) are considered to have high sensitivity due to their importance for local water provision.

Groundwater Quality

11.10.25 Groundwater quality sensitivity is considered to be medium to high, based on the presence of moderately productive aquifers in the area, which provide locally important resources and potentially support GWDTEs.

Flood Risk

11.10.26 The sensitivity to flood risk is considered high for the Proposed Development, given the presence of areas with medium to high likelihood of flooding as identified in the SEPA Flood Maps. This includes areas along main watercourses such as the Bervie Water, Carron Water and Cowie Water.

Significance of the Effect

Surface Water

11.10.27 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium to high. The effect has been determined to be of Minor adverse significance, which is not significant in EIA terms. Minor adverse significance was chosen due to the limited potential for impacts during routine O&M activities and the ongoing implementation of operational environmental management practices.

Surface Water Supply

11.10.28 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect is of Minor adverse significance, which is not significant in EIA terms. O&M activities are not expected to significantly affect water supplies, and any potential impacts would be effectively managed through operational procedures.

Groundwater Quality

11.10.29 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium to high. The effect has been determined to be of Minor adverse significance, which is not significant in EIA terms. The selection of Minor adverse significance reflects the minimal potential for groundwater contamination during O&M due to the implementation of appropriate drainage and pollution prevention measures.

Flood Risk

11.10.30 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be high. The effect has been determined to be of Minor adverse significance, which is not significant in EIA terms. Minor adverse significance was selected because, while there may be a slight increase in flood risk due to additional impermeable surfaces, the implementation of SuDS is expected to effectively manage and mitigate this risk.

Summary

11.10.31 The Minor adverse significance of effect has been chosen based on the low magnitude of impact reflecting limited but measurable changes to surface water quality, groundwater quality and flood risk. Operational impacts may be longer-term but are generally of lower magnitude when compared to the

construction phase. Embedded mitigation measures and compliance with regulations mean any impacts will be effectively managed.

Additional Mitigation and Residual Effect

11.10.32 No additional Water Quality and Flood Risk mitigation is considered necessary because the likely effect based on the assessment and embedded mitigation is not significant in EIA terms.

Decommissioning Phase

11.10.33 The decommissioning phase has been scoped out of further assessment for Water Quality and Flood Risk. This is because the potential impacts during decommissioning are expected to be less than those identified for the construction phase. Standard mitigation measures, similar to those implemented during construction, will be applied during decommissioning to manage any potential impacts on Water Quality and Flood Risk.

11.10.34 The buried cables are likely to be left in-situ, minimising ground disturbance. Any above-ground infrastructure will be removed following industry best practice and in accordance with the relevant regulations at the time of decommissioning. A Decommissioning Plan will be developed prior to the end of the Proposed Developments operational life, which will include specific measures to protect water quality and manage flood risk during the decommissioning activities.

11.10.35 Given the implementation of these measures and the temporary nature of decommissioning activities, no significant effects on Water Quality and Flood Risk are anticipated during this phase.

Additional Mitigation and Residual Effect

11.10.36 No additional Water Quality and Flood Risk mitigation is considered necessary because the likely effect based on the assessment and embedded mitigation is not significant in EIA terms.

11.11 Inter-Related Effects

11.11.1 A description of likely inter-related effects arising from the Proposed Development on geology, ground conditions, biodiversity and terrestrial ecology is provided below.

11.11.2 For geology and ground conditions, the following potential impacts have been considered within the inter-related assessment:

- There may be an inter-related effect between possible mobilisation of contaminants through connectivity of surface waters and groundwater. Additional information is provided in Volume 1, Chapter 10: Geology and Ground Conditions.

11.11.3 For biodiversity and terrestrial ecology, the following potential impacts have been considered within the inter-related assessment:

- It is anticipated there may be an inter-related effect between possible surface water contamination of habitats downstream and detrimental

effects to ecology. Additional information is provided in Volume 1, Chapter 7: Biodiversity, Terrestrial Ecology and Ornithology.

11.11.4 For Water Quality and Flood Risk a number of effects have been identified as summarised in Section 11.10. 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 manage sediment runoff within the CEMP.

11.12 Cumulative Effects Assessment

Methodology

11.12.1 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. Further details on CEA methodology are provided in Volume 1, Chapter 3: Environmental Impact Assessment Methodology.

11.12.2 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 within Table 11.20 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.

11.12.3 The cumulative effects have been discussed within the context of the Water Quality and Flood Risk Study Area and are outlined in Section 11.12.5 to 11.12.7.

Table 11.20: Screening of Other Projects for Consideration within the CEA for Water Quality and Flood Risk

Project	Overlap with the Proposed Development	Screened into CEA (Yes/No)
Tier 2		
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
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
Grains Of Fetteresso Indoor Play Area	No overlap anticipated due to the distance from the Proposed Development being greater than the 1 km	No

Project	Overlap with the Proposed Development	Screened into CEA (Yes/No)
APP/2025/0058	screening distance for the Water Quality and Flood Risk Cumulative Effects Assessment.	
S36 Windfarm, Fetteresso Forest, ECU00001851, APP/2019/1341		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
Tier 3		
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 Water Quality and Flood Risk 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

11.12.4 The MDS identified in Table 11.21 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 11.21: Maximum Design Scenario Considered for Each Impact as part of the assessment of Likely Significant Cumulative Effects on Water Quality and Flood Risk

Potential Cumulative Effect	Phase*			Tier	Maximum Design Scenario
	C	O&M	D		
Increased flood risk from surface water runoff	✓	✓	✓	2 and 3	**Construction Phase** There is potential for activities from multiple construction projects to occur simultaneously within the same hydrological catchments, potentially increasing surface water runoff and flood risk over an greater area. **Operation and Maintenance Phase** The combined impermeable areas from multiple projects could result in increased surface water runoff and flood risk. **Decommissioning Phase** Similar to construction phase, there is potential for simultaneous activities to occur in the same catchments.
Degradation of water quality	✓	✓	✓	2 and 3	**Construction Phase** There is potential for cumulative impacts on water quality from multiple construction projects, including increased sediment loading and risk of contaminant releases. **Operation and Maintenance Phase** Ongoing maintenance activities and drainage from multiple projects could potentially impact water quality in receiving watercourses. **Decommissioning Phase** Similar to construction phase, there is potential for simultaneous activities to occur in the same catchments.
Alteration of surface water flow patterns	✓	✓	×	2 and 3	**Construction Phase** Cumulative changes to surface water flow patterns from multiple construction projects, including temporary and permanent drainage alterations. **Operation and Maintenance Phase** Long-term changes to surface water flow patterns from multiple projects and associated drainage infrastructure.

Cumulative Effects Assessment

11.12.5 An assessment of the likely significance of the cumulative effects of the Proposed Development upon Water Quality and Flood Risk receptors arising from each identified impact is given below.

11.12.6 While the same Water Quality and Flood Risk receptors may be affected by the Projects outlined in Table 11.20, it is reasonable to assume they would adopt basic good practice with regards to the management of water resources and flood risk. Therefore, no significant combined effects are considered likely for Water Quality and Flood Risk for the following reasons:

- Many of the identified projects are spatially separated, reducing the likelihood of cumulative impacts on the same water bodies or flood risk areas;
- The construction and operation phases of the various projects are likely to occur at different times, further reducing the potential for cumulative impacts;
- All projects will be required to comply with relevant environmental regulations and implement appropriate mitigation measures to protect water quality and manage flood risk;
- Any potential impacts on water quality are likely to be localised and subject to significant dilution effects within the wider hydrological catchments;
- Each project will be required to implement appropriate flood risk management measures, reducing the potential for cumulative flood risk impacts;
- It is assumed that all projects will implement industry standard best practice measures for water quality protection and flood risk management during construction and operation; and
- Operational drainage systems for each project will be designed to attenuate runoff and manage water quality, minimising cumulative impacts on receiving water bodies.

11.12.7 Given these factors, and the implementation of project-specific mitigation measures, it is concluded that no significant cumulative effects on Water Quality and Flood Risk are likely to occur as a result of the Proposed Development in combination with other identified projects.

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

11.13.1 The assessment has considered potential impacts on Water Quality and Flood Risk during the construction, O&M, and decommissioning phases of the Proposed Development. With the implementation of embedded mitigation measures, no significant effects are predicted for water quality or flood risk.

11.13.2 Key embedded mitigation measures include the implementation of a CEMP, and an operational drainage strategy for the Substation. These measures will help manage potential impacts on surface water quality, groundwater quality and flood risk.

11.13.3 During construction, potential impacts include temporary changes to surface water flow paths, increased sediment loading in watercourses, and potential effects on PWSs. With mitigation, these impacts are assessed as Minor adverse, which is not significant in EIA terms.

11.13.4 O&M impacts are generally considered to be of lower magnitude than construction impacts. The primary concern during O&M is the potential increase in flood risk due to additional impermeable surfaces at the Substation. However, with the implementation of SuDS, this impact is assessed as Minor adverse, which is not significant in EIA terms.

11.13.5 Decommissioning impacts are expected to be similar to or less than those identified for the construction phase, and no significant effects are anticipated with the implementation of standard mitigation measures.

11.13.6 Cumulative effects with other projects in the area have been assessed and no significant cumulative impacts on water quality or flood risk are predicted, assuming all projects implement appropriate mitigation measures. Additionally, the assessment has considered potential inter-related effects between Water Quality and Flood Risk and other environmental topics. Key inter-related effects identified include potential mobilisation of contaminants through connectivity between surface waters and groundwater (as discussed in Volume 1, Chapter 10: Geology and Ground Conditions) and possible impacts on downstream habitats and ecology due to surface water contamination (as outlined in Volume 1, Chapter 7: Biodiversity, Terrestrial Ecology and Ornithology). These inter-related effects have been taken into account in the overall assessment of impacts. The embedded mitigation measures proposed, including the CEMP and drainage strategies, are designed to address potential impacts across multiple environmental receptors. With these measures in place, no significant inter-related effects are anticipated. The proposed monitoring plans will further ensure that any unforeseen inter-related effects can be identified and addressed promptly during the Project lifecycle.

11.13.7 Proposed monitoring includes the implementation of a Surface Water Quality Monitoring Plan and a Private Water Supply Monitoring Plan. These will be developed in consultation with relevant stakeholders and will cover baseline, construction and O&M phases of the Proposed Development.

11.13.8 In conclusion, with the implementation of embedded mitigation measures and proposed monitoring plans, the Proposed Development is not expected to result in any significant effects on water quality or flood risk, either alone or cumulatively with other projects.

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Annex – Figures

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A957
B979
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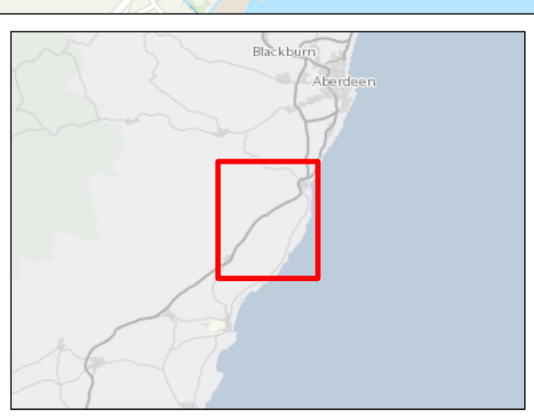
A92
Toddie Brae
Cowie
Stonehaven
Brae of Glenbervie
A90
A92
Brae of Glenfarquhar
Drumlithie
Brae of Kinkell
Auchenblae
Causeywell Brae
Catterline
A90
B966
Moor of Auchendreich
Roadside of Kinneff
Fordoun
B967
Arbuthnott
B967
A92
Inverbervie
A90
Laurencekirk
Gourdon
Whitewater Moss
Brawleymuir Plantation
Craighead Plantation
B9120
B9120
0
5
km

Legend

- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Water Quality and Flood Risk Study Area

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
02	NOV 25	FINAL	TM	EB	LR	GG
Scale @ A3		Scale: 1:70,000	DO NOT SCALE			
Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ONE-DWG-00018

Drawing Status: FINAL

Figure 11.1

N

Clachnaben

Peterculter

Sheeoch Burn

Water of Feugh - Burn of Curran

Cowie Water - Fetteresso Forest

Portlethen

Cowton Burn

Cowie Water - Rickarton to sea

Stonehaven

Carron Water

Bervie Water - upper catchment

Killin, Aberfeldy and Angus Glens

Forthie Water

Catterline Burn

Luther Water (Source to Dowrie Burn Confluence)

Drumlithie

Bervie Water - lower catchment

North Esk Sand and Gravel

Laurencekirk

Ducat Water

Den Finella

St Cyrus

Burn of Benholm

0 5 km

Legend

- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area

SEPA Classified Surface and Groundwater Bodies

Surface water
- High
- Good
- Moderate
- Poor

Groundwater
- Good
- Poor

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
02	NOV 25	FINAL	TM	EB	LR	GG
Scale @ A3		Scale: 1:70,000	DO NOT SCALE			
Jacobs No.		B2487500				

Jacobs

Client: THISTLE WIND PARTNERS

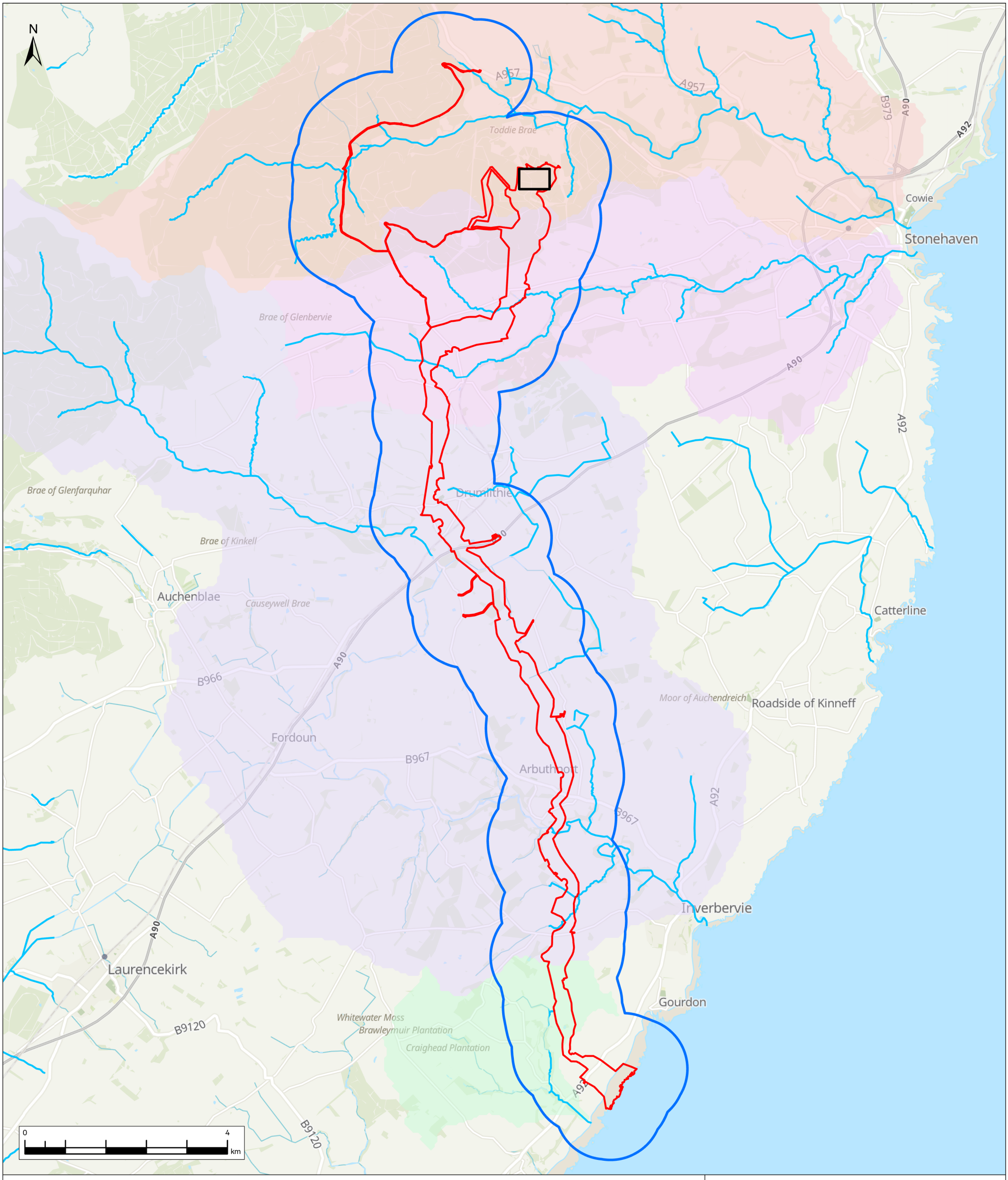
Project: Bowdun Offshore Wind Farm Onshore EIA Report

Drawing Title: Surface and Groundwater Quality

Aconnex Number: TWP-BOW-JCB-ONE-DWG-00019

Drawing Status: FINAL

Figure 11.2

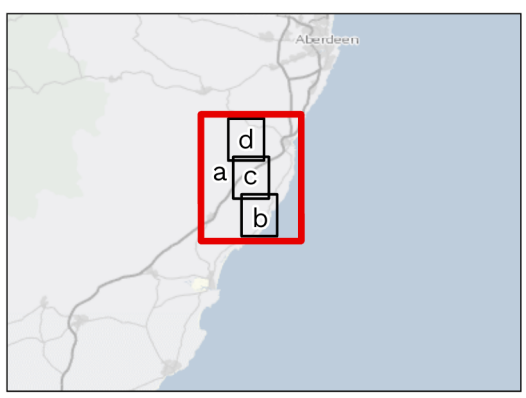


Legend

- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Watercourses

FEH Catchments

- Bervie Water
- Burn of Benholm
- Cowie Water
- Carron Water



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
02	NOV 25	FINAL	TM	EB	LR	GG
Scale @ A3		Scale: 1:70,000	DO NOT SCALE			
Jacobs No.		B2487500				

Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Surface Water Features

Aconnex Number	Drawing Status
TWP-BOW-JCB-ONE-DWG-00020	FINAL

Figure 11.3a

N

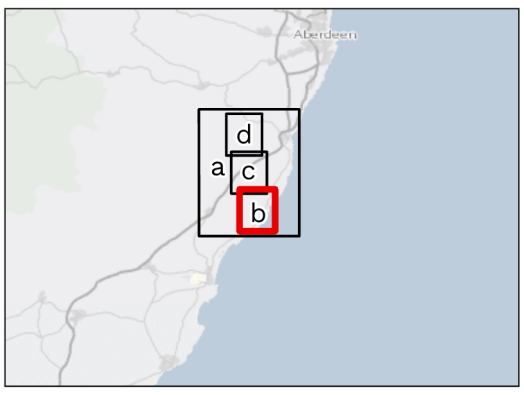
Arbuthnott
Burn of Pitcarles
Gallow Hill
Corbieknowe
Cot Hillock
Kailbank Wood
Kirkton Wood
B967
Townhead Strip
Bervie Water
Crow Wood
Chapelwaird Wood
Allardice
Birniehill Wood
Hareden Wood
Will's Wood
Hareden Burn
Pitcarry Burn
Seppie Wood
Den of Davo or Woodburn Den
Banff Wood
Meir's Den
Hallgreen Wood
Bervie Brow
Banff Burn
Banff Hill
Inverbervie
A92
Bervie Bay
Carling Den
Kenshot Hill or King's Seat Hill
Dendoldrum Hill
Knox Hill
Temple Hill
Shakil Hill
Brae Rd
Horse Crook Bay
Lady's Plantation
Gourdon
Gourdon Hill or Bikmane Hill
Plantation
Damside Plantation
Craighead Plantation
Cotter House
Den of Stone of Benholm Plantation
Burn of Benholm
Beedies Brae
Boghead Wood
East Wolk Plantation
Cloch Hill
0
1.5
km
Bridgeton Hill

Legend

- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Watercourses

FEH Catchments

- Bervie Water
- Burn of Benholm



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Surface Water Features

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Scale @ A3		Scale: 1:25,000	DO NOT SCALE			
Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ONE-DWG-00020

Drawing Status: FINAL

Figure 11.3b

N

Drumlithie Burn

Pilketty Burn

Forthie Water

Bervie Water

Bridgend Burn

Burn of Pitcarles

Bervie Water

Burn of Leppie

Bervie Water

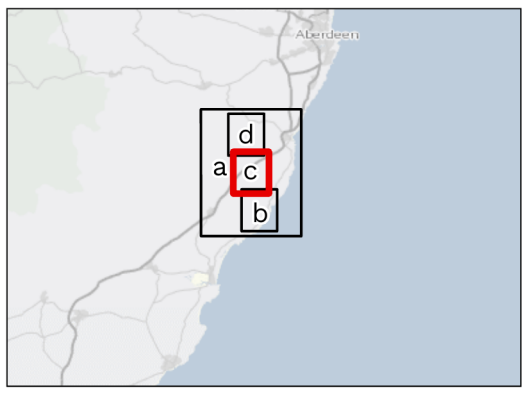
0 1.5 km

Legend

- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Watercourses

FEH Catchments

- Bervie Water
- Carron Water



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Surface Water Features

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
02	NOV 25	FINAL	TM	EB	LR	GG
Scale @ A3		Scale: 1:25,000	DO NOT SCALE			
Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ONE-DWG-00020

Drawing Status: FINAL

Figure 11.3c

N

Rumbleyond Burn

Black Burn

Irish Burn

Cowie Water

East Dumer Burn

Queel Burn

Burn of Day

Burn of Finglennie

Burn of the Happy Lodges

Forester's Grain

Burn of Annamuick

Killer Burn

Carron Water

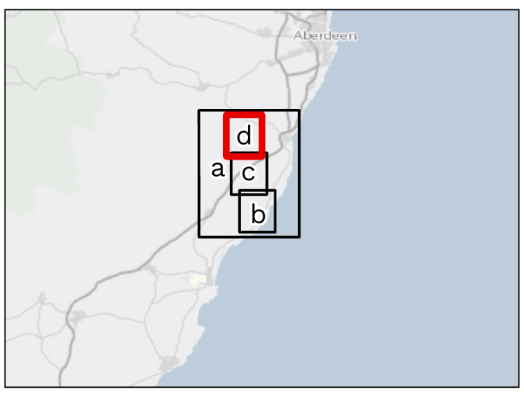
0 1.5 km

Legend

- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Watercourses

FEH Catchments

- Bervie Water
- Cowie Water
- Carron Water



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Surface Water Features

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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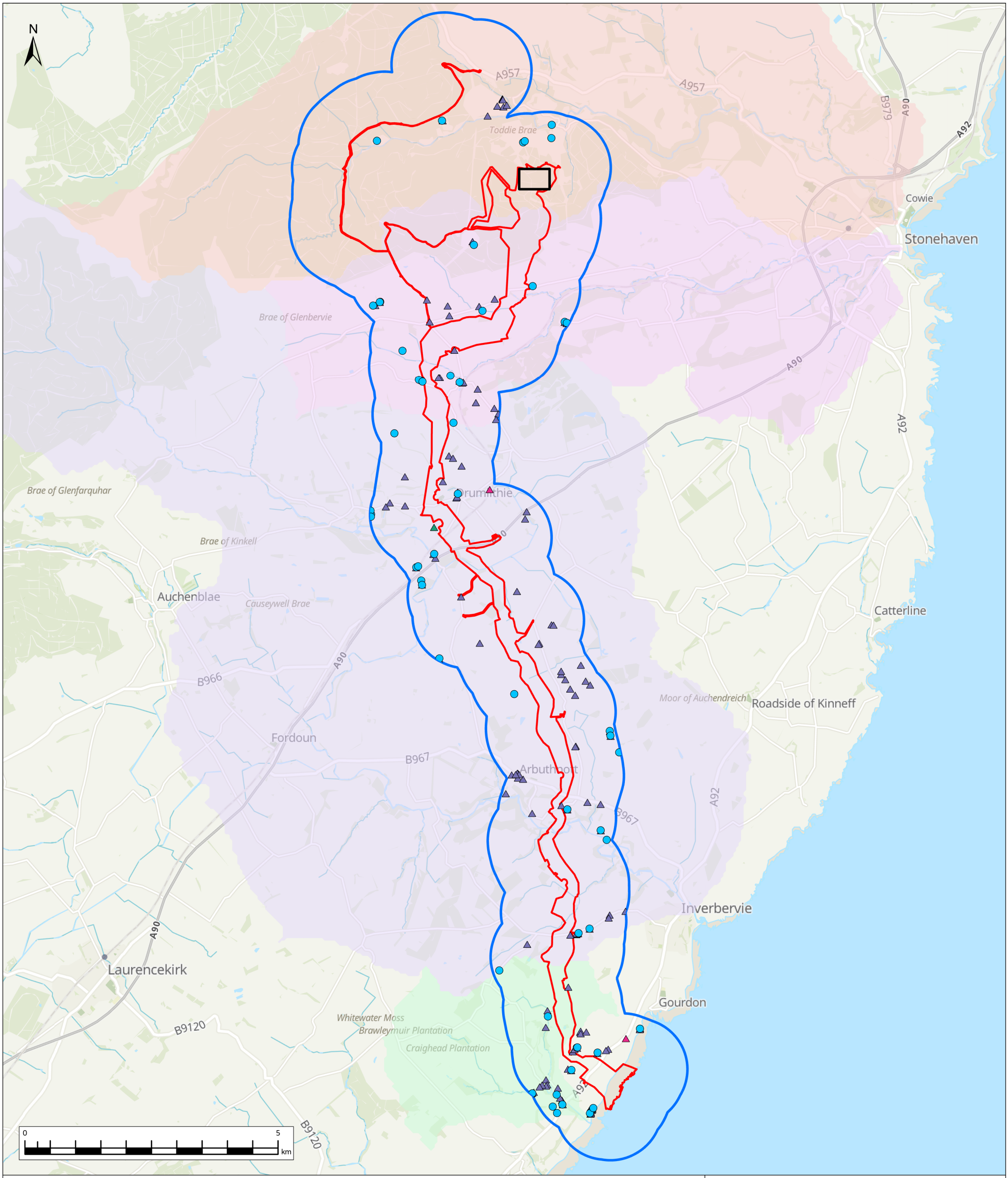
Scale @ A3		Scale: 1:25,000	DO NOT SCALE			
Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ONE-DWG-00020

Drawing Status: FINAL

Figure 11.3d



Legend

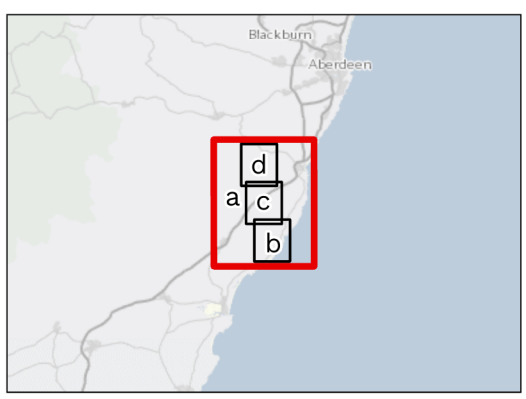
- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Private Water Supplies

Abstractions and Discharges

- Abstraction for agricultural irrigation
- Combined Sewer Overflow (CSO) discharge
- Private sewage treatment works discharge
- Public sewage treatment works discharge

FEH Catchments

- Bervie Water
- Burn of Benholm
- Cowie Water
- Carron Water



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Water Resources

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ONE-DWG-00028

Drawing Status: FINAL

Figure 11.4a

N

Arbuthnott
Burn of Pitcarles
Gallow Hill
Corbieknowe
Cot Hillock
Kailbank Wood
Kirkton Wood
B967
Townhead Strip
Crow Wood
Bervie Water
Chapelwaird Wood
Allardice
Birniehill Wood
Pitcarry Burn
Hareden Wood
Will's Wood
Den of Davo or Woodburn Den
Hareden Burn
Seppie Wood
Bervie Brow
Banff Wood
Hallgreen Wood
Meir's Den
Banff Burn
Beattie Burn
Banff Hill
Inverbervie
A92
Bervie Bay
Carling Den
Kenshot Hill or King's Seat Hill
Dendoldrum Hill
Knox Hill
Temple Hill
Shakil Hill
Brae Rd
Horse Crook Bay
Lady's Plantation
Gourdon
Gourdon Hill or Bikmane Hill
Plantation
Damside Plantation
Craighead Plantation
Cotter House
Den of Stone of Benholm Plantation
Burn of Benholm
Beedies Brae
Boghead Wood
East Walk Plantation
Cloch Hill
0
1.5
km
Bridgeton Hill

Legend

- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Private Water Supplies

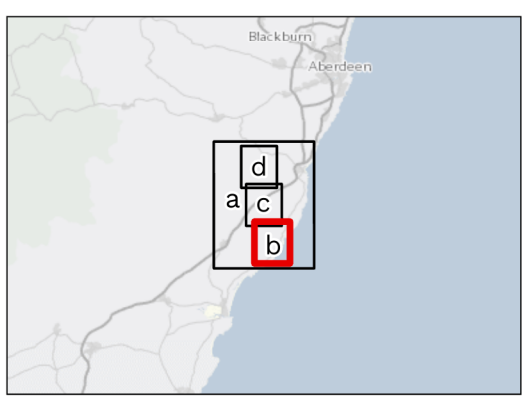
Abstractions and Discharges

- Private sewage treatment works discharge

- Public sewage treatment works discharge

FEH Catchments

- Bervie Water
- Burn of Benholm



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Water Resources

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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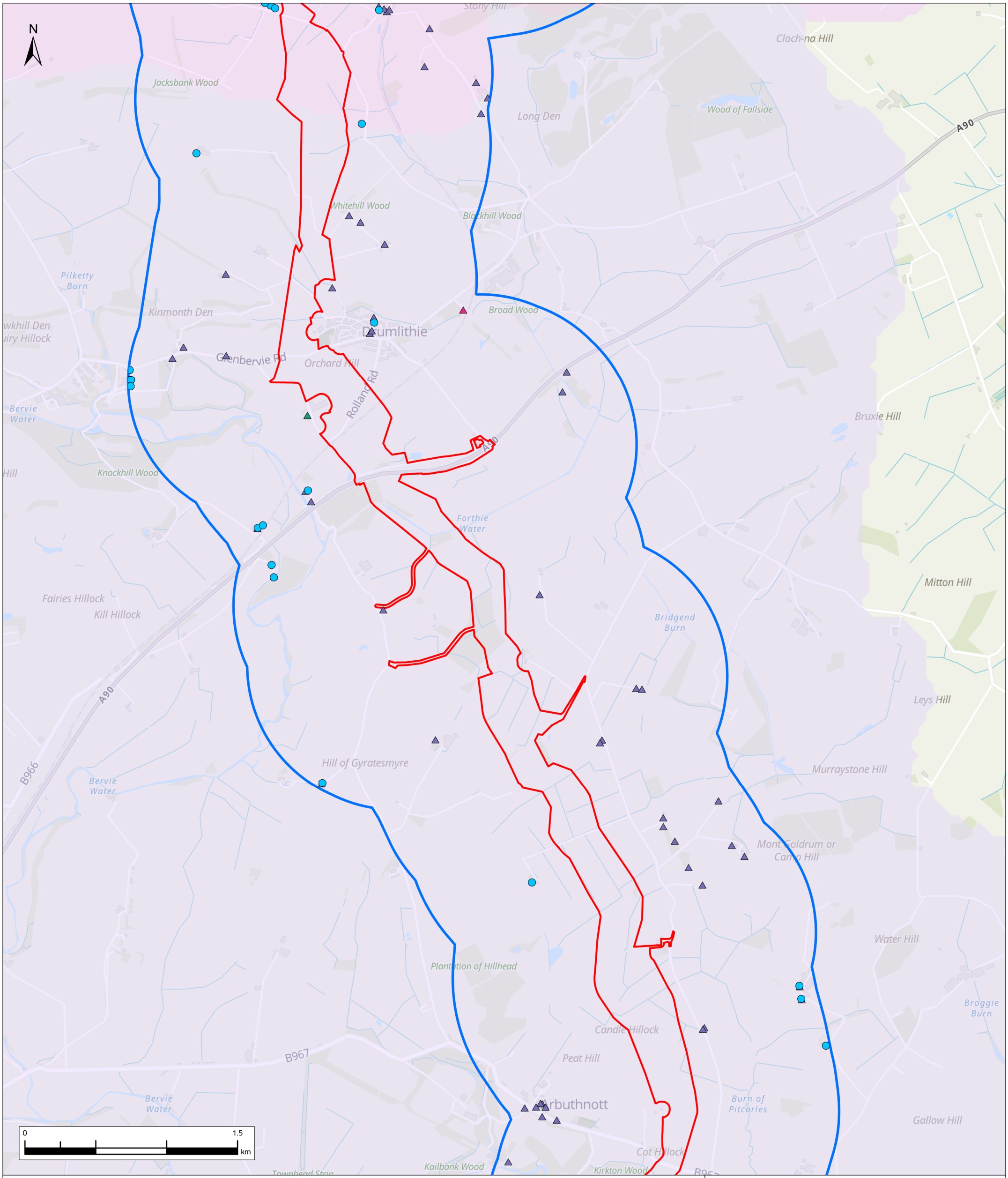
Aconnex Number: TWP-BOW-JCB-ONE-DWG-00028

Drawing Status: FINAL

Figure 11.4b



Legend

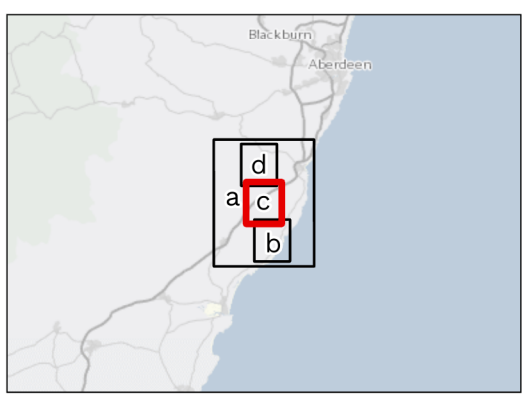
- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Private Water Supplies

Abstractions and Discharges

- Abstraction for agricultural irrigation
- Combined Sewer Overflow (CSO) discharge
- Private sewage treatment works discharge
- Public sewage treatment works discharge

FEH Catchments

- Bervie Water
- Carron Water



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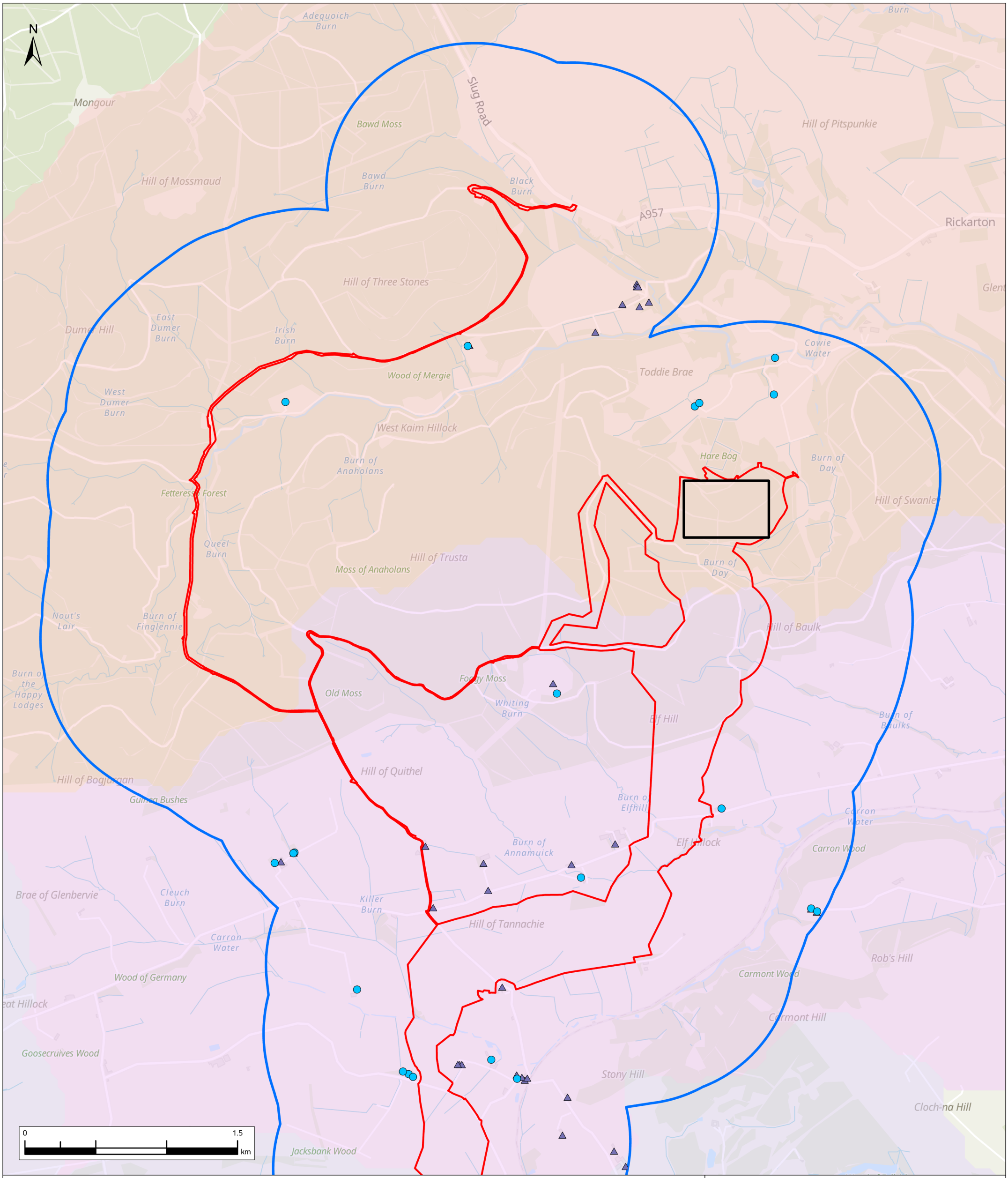
Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm Onshore EIA Report

Drawing Title: Water Resources

Aconnex Number	Drawing Status
TWP-BOW-JCB-ONE-DWG-00028	FINAL

Figure 11.4c



Legend

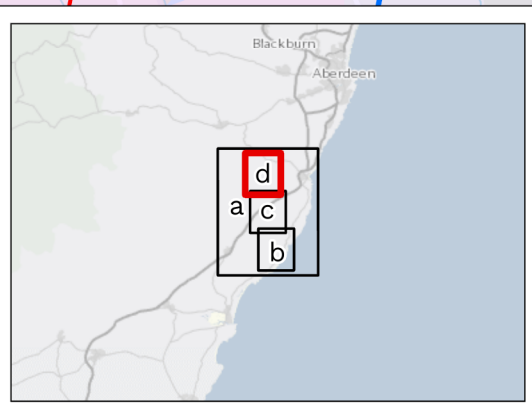
- PPP Application Boundary
- Substation Search Area
- Water Quality and Flood Risk Study Area
- Private Water Supplies

Abstractions and Discharges

- Private sewage treatment works discharge

FEH Catchments

- Bervie Water
- Cowie Water
- Carron Water



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Jacobs No.		B2487500				

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Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm Onshore EIA Report

Drawing Title: Water Resources

Aconnex Number	Drawing Status
TWP-BOW-JCB-ONE-DWG-00028	FINAL

Figure 11.4d