Environmental Impact Assessment Report
Volume 3, Appendix 20.1: Detailed Hydrological and Hydrogeological Baseline Report

MarramWind Offshore Wind Farm

December 2025

MarramWind

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1. Detailed Hydrological and Hydrogeological Baseline Report

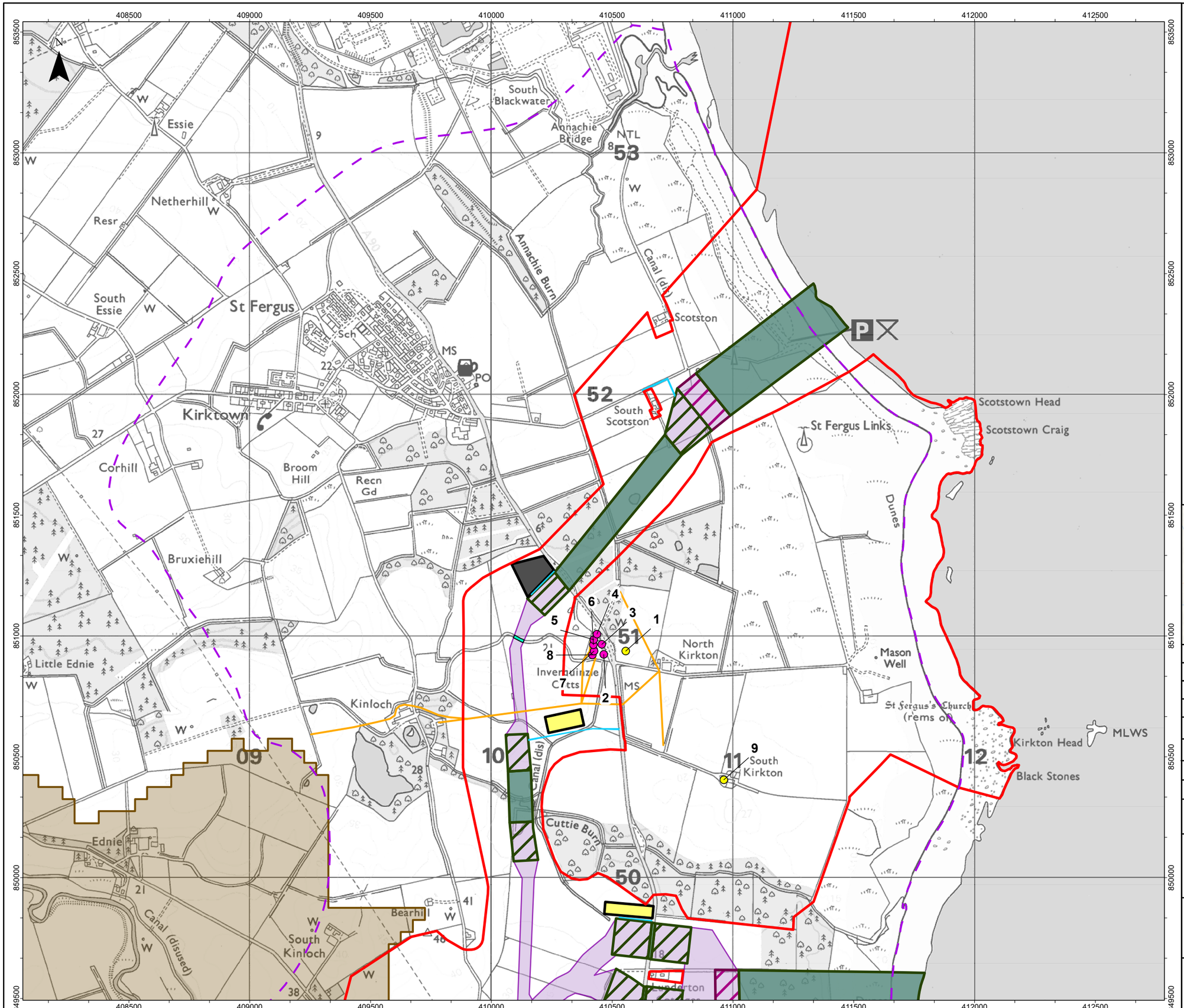
1.1 Introduction

1.1.1.1 As part of the works undertaken in support of the Environmental Impact Assessment (EIA) Report for the Project, this Appendix presents detailed results of the desktop studies carried out to establish the existing baseline hydrological and hydrogeological conditions. The detailed information within this report informs the summary baseline information and the assessment of potential and residual effects in **Volume 1, Chapter 20: Water Resources and Flood Risk** of the EIA Report. Background information on the approach to the assessment, including study area and data gathering methodologies, are also presented in **Volume 1, Chapter 20: Water Resources and Flood Risk** for reference.

1.2 Private water supplies

1.2.1.1 Private Water Supply (PWS) information was obtained from Aberdeenshire Council in May – July 2023. From the data received, 31 PWSs have been identified within the study area as presented in **Figure 1: Water Resources (PWS, Controlled Activity Regulations (CAR) abstractions and Drinking Water Protection Area).** As part of the data gathering for PWS information questionnaires were sent out to residents between July and October 2023 and site surveys were undertaken between 15 and 16 September 2024. **Table 1.1** presents information on PWSs which has been used to assess the potential for a complete source-pathway-receptor (S-P-R) linkage between the Project and the PWS sources. The findings from **Table 1.1** can be summarised as follows:

- twenty-six PWS sources are unlikely to be impacted by the Project, primarily due to intervening distance, or are connected to public water supply and require no further assessment (screened out); and
- five PWS sources are derived from groundwater and potentially at risk from the Project and require further risk assessment.

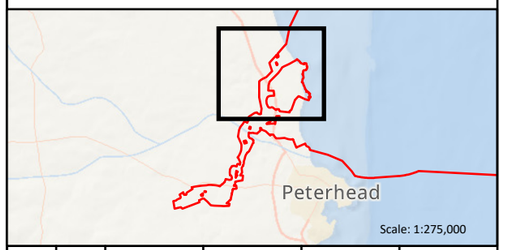


- Red Line Boundary
- Water resources and flood risk study area
- Indicative onshore export cable corridor
- Indicative trenchless crossing compound search area
- Indicative landfall construction compound search area
- Indicative trenchless crossing
- Indicative trenched crossing
- Indicative primary construction compound
- Indicative secondary construction compound
- Indicative temporary construction access road
- Indicative pipe connections
- River Ugie Drinking Water Protection Area (DWPA)

Private Water Supplies (PWS)

- Mains supply
- Mains supply assumed - due to network in the vicinity
- Private water supply
- PWS 250m Buffer
- SEPA CAR Licenses
- SEPA CAR Licenses 250m Buffer

0 0.5 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
3	10/09/2025	SS	LT	GD	MW
2	09/07/2025	SS	LT	GD	MW
1	27/06/2025	SS	LT	GD	MW

WSP DRAWING NUMBER	808368-WEIS-IA-E5-FG-W4-38760		
MarramWind DRAWING NUMBER	MAR-GEN-ENV-MAP-WSP-000161		
DATUM	OSGB 1936	PROJECTION	British National Grid
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PROJECT TITLE
MarramWind Offshore Wind Farm

DRAWING TITLE
Figure 1 Water Resources (Private Water Supplies, Controlled Activity Regulations abstractions and Drinking Water Protection Area)
Sheet 1 of 3
Environmental Impact Assessment Report
Appendix 20.1

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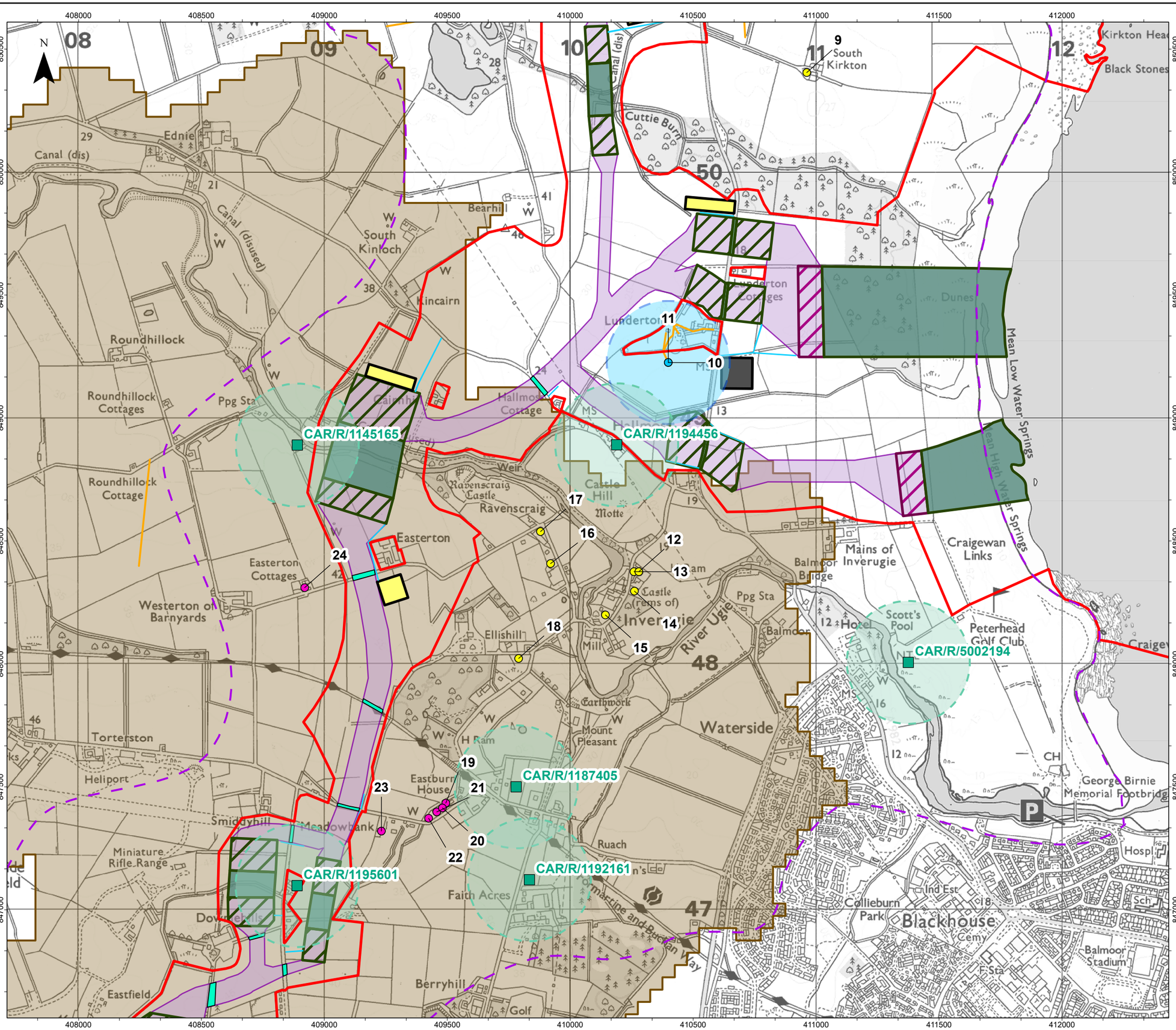

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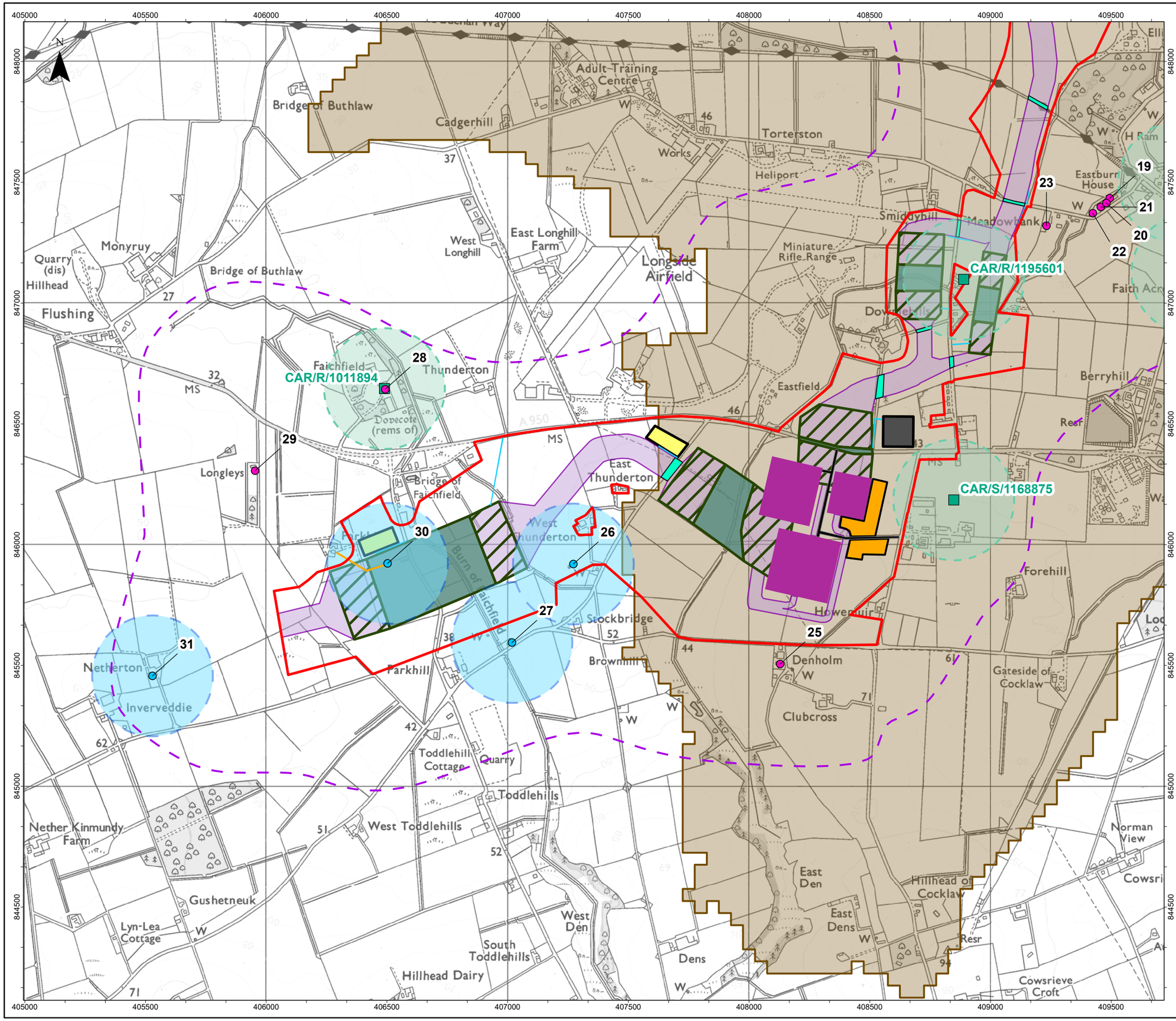

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Onshore substation site layout

Indicative temporary construction compound
Indicative permanent access road
Indicative permanent onshore substations' footprint
River Ugie Drinking Water Protection Area (DWPA)

Private Water Supplies (PWS)

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Mains supply assumed - due to network in the vicinity
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Table 1.1 Screening PWSs within the study area

PWS ID(s) (Appendix 20.1, Figure 1)	Property name(s)	Data source	Source / abstraction type (for instance, spring, well, borehole, surface water abstraction or mains supply)	National Grid Reference(s) (NGRs)	PWS / property from nearest proposed infrastructure	Potential complete S-P-R link. Screened in for further assessment?
1	Bethel Cottage.	Aberdeenshire Council data.	Unknown	NK 10556 50938	Approximately 300 metres (m) and similar gradient to the south from nearest part of the Onshore Red Line Boundary (A90 crossing). Source unconfirmed, but potentially on the same shared system as the Inverquinzie Cottages (see ID 2-8 below).	There is no S-P-R. **Screened out** on the basis that these water supplies are mains supplied and piped to the properties in a private water pipe, and because the good industry practice to be followed (including horizontal directional drilling (HDD) (or similar trenchless technique) below the private water pipe) means that it is unlikely that the supply quality or quantity would be affected.
2,3,4,5,6,7 and 8	• Carleena; • Ardlui; • 3 Inverquinzie Cottages;	Aberdeenshire Council data, questionnaire and field survey.	Mains and shared private piped system from Kinloch Estate (~800m west).	NK 10465 50924 NK 10457 50966 NK 10437 51008 NK 10424 50985	Approximately 120m and similar gradient to east from nearest part	There is no S-P-R. Screened out on the basis that these water supplies are

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	• 4 Inverquinzie Cottages; • Inverquinzie House; • 2 Inverquinzie Cottages; and • 1 Inverquinzie Cottages.			NK 10422 50964 NK 10425 50938 NK 10418 50922	of Onshore Red Line Boundary. Private water pipe from the Kinloch Estate mains to the properties is crossed by the onshore export cable corridor.	mains supplied and piped to the properties in a private water pipe, and because the good industry practice to be followed (including HDD (or similar trenchless technique) below the private water pipe) means that it is unlikely that the supply quality or quantity would be affected.
9	South Kirkton.	Aberdeenshire Council data.	Unknown	NK 10962 50405	Approximately 425m and marginally upgradient to east from nearest part of Onshore Red Line Boundary.	There is no S-P-R. **Screened out** on the basis that these water supplies are mains supplied and piped to the properties in a private water pipe, and because the good industry practice to be

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						followed (including HDD (or similar trenchless technique) below the private water pipe) means that it is unlikely that the supply quality or quantity would be affected.
10 and 11	Lunderton Farmhouse and Westfield.	Aberdeenshire Council data and questionnaire.	Well to pumphouse to properties.	NK 10402 49347	Well, pumphouse and properties are all within the Onshore Red Line Boundary.	There is a potential S-P-R. **Screened in** for assessment due to its proximity to proposed infrastructure.
12, 13, 14, 15, 16, 17 and 18	• Bronte Cottage; • Gardeners Cottage; • Pleasant View; • Castlebrae House; • Rhannachan; • Ravenscraig; and • Woodcote.	Aberdeenshire Council data.	Unknown. However, questionnaire responses for ID 19-23 (below) confirmed multiple other properties along the same street were all supplied by the mains, so these	NK 10279 48375 NK 10259 48375 NK 10261 48296 NK 10143 48199 NK 09920 48408 NK 09879 48538 NK 09790 48022	Approximately 245m and downgradient to the east from nearest part of the Onshore Red Line Boundary.	There is no S-P-R. **Screened out** on the basis that these water supplies in Inverugie are all likely to be on the mains supply (as per nearby properties in the built-up area of Peterhead ID19-23).

PWS ID(s) (Appendix 20.1, Figure 1)	Property name(s)	Data source	Source / abstraction type (for instance, spring, well, borehole, surface water abstraction or mains supply)	National Grid Reference(s) (NGRs)	PWS / property from nearest proposed infrastructure	Potential complete S-P-R link. Screened in for further assessment?
			PWS are also assumed to be supplied by the mains.			
19, 20, 21, 22 and 23	• Lonach; • Chimney Springs; • The Coppice; • Denwood; and • Meadowbank.	Aberdeenshire Council data and questionnaire.	Mains supply.	NK 09494 47434 NK 09480 47414 NK 09457 47398 NK 09424 47372 NK 09232 47320	Approximately 110m and downgradient to the east from the nearest part of the Onshore Red Line Boundary.	There is no S-P-R. **Screened out** on the basis that all these PWS are on the mains supply.
24	3 Easterton Cottages.	Aberdeenshire Council data and questionnaire.	Mains supply.	NK 08920 48310	Approximately 170m and similar gradient to the west from the Onshore Red Line Boundary.	There is no S-P-R. **Screened out** on the basis that all these PWS are on the mains supply.
25	2 Denholm.	Aberdeenshire Council data and questionnaire.	Mains supply.	NK 08129 45506	Approximately 30m and similar gradient to the west from the Onshore Red Line Boundary.	There is no S-P-R. **Screened out** on the basis that the PWS are on the mains supply.
26	West Thunterton.	Aberdeenshire Council data and questionnaire.	Groundwater borehole.	NK 07293 46070	Located within the Onshore Red Line Boundary which associated with onshore export cable	There is a potential S-P-R. **Screened in** for assessment due to its proximity to

PWS ID(s) (Appendix 20.1, Figure 1)	Property name(s)	Data source	Source / abstraction type (for instance, spring, well, borehole, surface water abstraction or mains supply)	National Grid Reference(s) (NGRs)	PWS / property from nearest proposed infrastructure	Potential complete S-P-R link. Screened in for further assessment?
					corridor (onshore substations to Netherton Hub point of connection).	proposed infrastructure.
27	Parkhill Cottage.	Aberdeenshire Council data and questionnaire.	Groundwater borehole.	NK 07018 45595	Located approximately 86m to the south and very slightly further upgradient of the part of the Onshore Red Line Boundary which is associated with onshore substations to Netherton Hub point of connection.	There is a potential S-P-R. **Screened in** for assessment due to its proximity to proposed infrastructure.
28 and 29.	Faichfield House and Longleys.	Aberdeenshire Council data and questionnaire.	Mains supply.	NK 06493 46643 NK 05954 46306	Located approximately 415m and on similar gradient north from the Onshore Red Line Boundary.	There is no S-P-R. **Screened out** on the basis that the PWSs are on the mains supply.
30	Parkhill	Netherton Hub PWS Risk Assessment (SSEN Transmission, 2024).	Groundwater well.	NK 06503 45919	Located within the Onshore Red Line Boundary which is associated with onshore substations to Netherton Hub point of connection.	There is a potential S-P-R. **Screened in** for assessment due to its proximity to proposed infrastructure.

PWS ID(s) (Appendix 20.1, Figure 1)	Property name(s)	Data source	Source / abstraction type (for instance, spring, well, borehole, surface water abstraction or mains supply)	National Grid Reference(s) (NGRs)	PWS / property from nearest proposed infrastructure	Potential complete S-P-R link. Screened in for further assessment?
31	Netherton	Aberdeenshire Council data.	Unknown	NK 05529 45457	Located 550m upgradient to the west from the Onshore Red Line Boundary.	There is no S-P-R. **Screened out** due to its distance and lack of hydrological connection to the Project.

1.3 Scottish Environment Protection Agency CAR abstractions

1.3.1.1 Scottish Environment Protection Agency (SEPA) was contacted in October 2022 to obtain records of CAR applicable activities within the study area.

1.3.1.2 There are ten SEPA CAR abstractions within the study area, as presented in **Table 1.2**, and illustrated in **Appendix 20.1, Figure 1**. From the eight SEPA CAR abstractions within the study area, five have been screened in for further assessment due to their potential hydrological connectivity with the Project.

Table 1.2 SEPA CAR abstractions within the study area

CAR abstractions	Site address	NGR	Authorisation activity	Distance from nearest proposed infrastructure	Potential hydrological connection to proposed infrastructure
CAR/R/1194456	1 Hallmoss Cottages Peterhead.	NK 10189 48891	Unknown	Approximately 20m to the south and at a similar elevation to the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Potential hydrological connection. **Screened In.**
CAR/R/1145165	Abstraction on River Ugie, near Stonemill, Peterhead.	NK 88900 48980	Abstraction used for Fish Production.	Approximately 90m to the west of the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Potential hydrological connection. **Screened In.**
CAR/R/5002194	Craigewan Links, Peterhead Golf Club, Riverside Drive, Peterhead, AB42 1LT.	NK 11375 48006	Engineering - Abstraction and / or Borehole Construction and Operation for a Registration level abstraction.	Approximately 260m to the south-west of the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Potential hydrological connection. **Screened In.**
CAR/R/1187405	Site adjacent to The Hawthorns, Inverurie -	NK 9780 47500	Unknown	Approximately 600m to the east of the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Due to distance to nearest part of the Onshore Red Line Boundary and being on far side of a hill with various features (forestry, small unnamed watercourses, multiple small roads) in between - low likelihood of hydrological connection. **Screened Out.**
CAR/R/1192161	Site adjacent to Faith Acres, Inverugie, Peterhead -	NK 9834 47122	Unknown	Approximately 720m to the east of the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Due to distance to nearest part of the Onshore Red Line Boundary and intervening topography of the

CAR abstractions	Site address	NGR	Authorisation activity	Distance from nearest proposed infrastructure	Potential hydrological connection to proposed infrastructure
					catchments - low likelihood of hydrological connection. **Screened Out.**
CAR/R/1195601	Smiddyhill Bungalow, Peterhead.	NK 8889 47098	Unknown	Approximately 10m to the west of the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Potential hydrological connection. **Screened In.**
CAR/R/1011894	Faichfield - Longside, Peterhead AB42 3ED.	NK 6490 46646	Mining and quarrying.	Approximately 430m to the north-west of the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Due to various features (forestry, small unnamed watercourses, multiple small roads) between abstraction and nearest part of the Onshore Red Line Boundary - low likelihood of hydrological connection. **Screened Out.**
CAR/S/1168875	Buchan Biogas, Blackhills, Peterhead.	NK 8848 46185	Unknown	Approximately 180m to the east of the nearest part of the Onshore Red Line Boundary associated with the onshore export cable corridor.	Potential hydrological connection. **Screened In.**

1.4 Wetlands

1.4.1.1 As noted in the consultation Section 20.2 of **Volume 1, Chapter 20: Water Resources and Flood Risk**, SEPA has identified some wetlands in relation to the Project. The Scottish Wetland Inventory (SEPA, 2025a) identifies numerous wetlands, and Aberdeenshire Council (Aberdeenshire Council, 2024) provided pre-application advice for consideration of non-specified wetlands, which are presented for the Study Area in **Table 1.3** and in **Volume 2: Figure 20.1: Surface Water Bodies and Wetlands**.

Table 1.3 Relevant wetlands located within the study area

Wetland Object ID / NGR	National Vegetation Classification (NVC) code / wetland type	NVC code listed as a potential Groundwater Dependent Terrestrial Ecology (GWDTE) community?	Potential hydrological connection to the Project
NK 10754 52759	SD17 Dune Slacks.	Yes	There is a group of five dune slacks which intersect the Onshore Red Line Boundary associated with Scotstown landfall. **Screened In**.
NK 11572 51172	SD17 Dune Slacks.	No	There are two dune slacks which avoids the Onshore Red Line Boundary associated between the Scotstown and Lunderton North landfalls - unlikely there is a hydrological connection. **Screened Out**.
NK 10390 51951	Non-specified wetland	No	Non-specified wetland within the Onshore Red Line Boundary, west of the Scotstown Landfall. During the site visit in September 2024 this was found to be an ephemeral area of pooling which coincided with some of the indicative extent of fluvial floodplain of the Annachie Burn (**Appendix 20.2**, Figure 1: Indicative Fluvial Flood Risk Areas). **Screened in.**
NK 11518 49754	S28 Swamp.	No	Swamp following a watercourse which intersects the Onshore Red Line Boundary associated with Lunderton North landfall. **Screened In**.
NK 11704 50093	S19 Swamp.	Yes	Two small swamps following a watercourse within the Onshore Red Line Boundary associated with Lunderton North landfall. **Screened In.**
NK 11360 49142	S28 Swamp.	No	Swamp following a watercourse within the Onshore Red Line Boundary associated with Lunderton North / South landfall. **Screened In**.

Wetland Object ID / NGR	National Vegetation Classification (NVC) code / wetland type	NVC code listed as a potential Groundwater Dependent Terrestrial Ecology (GWDTE) community?	Potential hydrological connection to the Project
NK 10762 49185	Non-specified wetland	No	Non-specified wetland within the Online Red Line Boundary between the Lunderton North / South landfall. The location is situated within an agricultural field, coinciding with an indicative surface water flood risk area (**Appendix 20.2,** Figure 2 Indicative Surface Water Flood Risk Areas**)** to the east of the A90 highway. During the site visit in September 2024 there was no evidence of this being an extensive wetland area, and there were only limited, localised signs of ephemeral pooling along the fringes of field boundary ditches. Nonetheless as part of a precautionary approach it has been **Screened in.**
NK 11705 47471	SM16 Saltmarsh.	No	Group of three saltmarshes located at the River Ugie estuary, approximately 640m south of the Lunderton South landfall. Due to distance from Red Line Boundary and proposed crossing being via HDD (or similar trenchless technique), there is not likely to be significant impact on these saltmarshes. **Screened Out**.

1.5 Groundwater Dependent Terrestrial Ecosystems

1.5.1 Habitat surveys

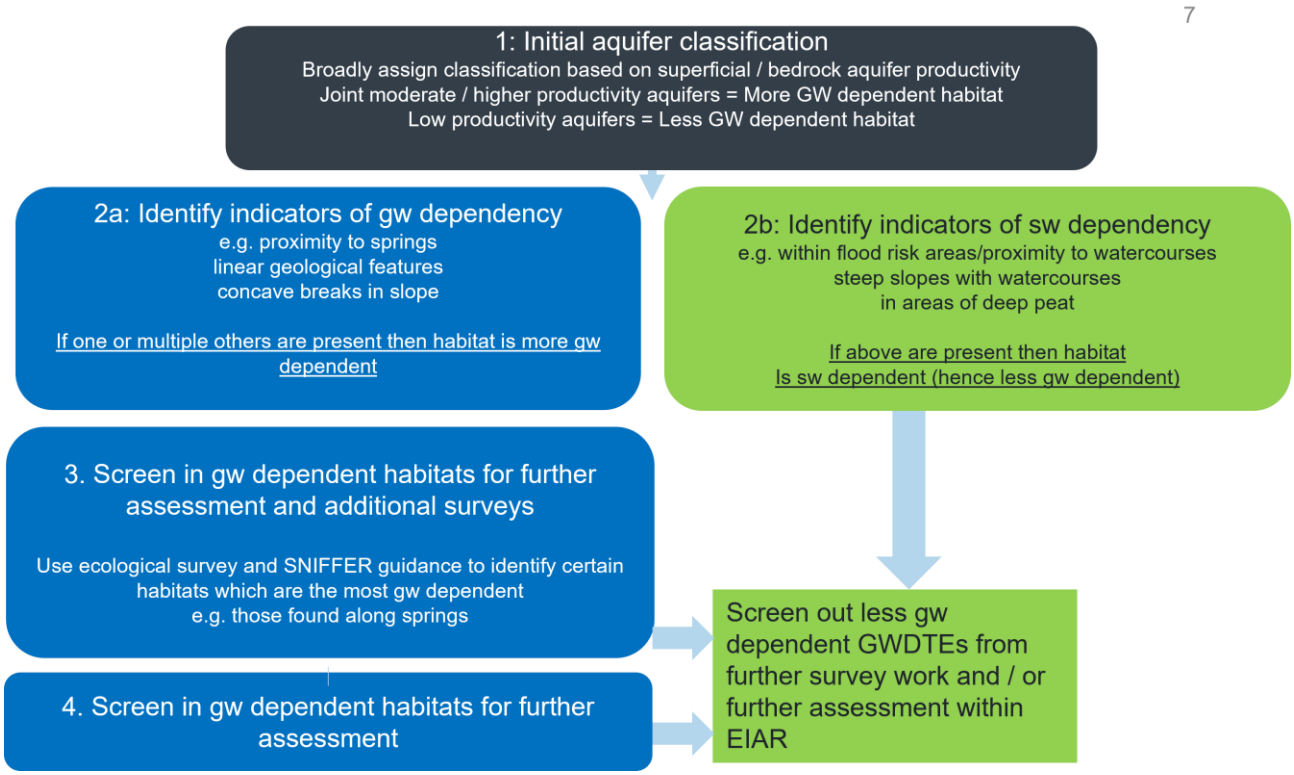
1.5.1.1 NVC surveys were completed (see **Appendix 23.2: Habitats and Vegetation Report**) within the relevant 100m and 250m buffers (for excavations <1m and > 1m respectively) that map across to potential NVC communities listed in new guidance (SEPA, 2025b) as being potential GWDTE habitat communities.

1.5.2 Screening approach

1.5.2.1 An evaluation has also been undertaken to clearly provide appropriate evidence for screening out areas where there is a reduced likelihood of groundwater dependency, based on a number of relevant parameters. This has enabled more focus upon the assessment and data collection at the remaining areas (screened in), which are more likely to be sensitive to groundwater change. This follows key guidance including the new SEPA guidance on GWDTE and the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) WFD66 Wetland Hydrogeomorphic Classification for Scotland (SNIFFER, 2007). The SNIFFER guidance notes that the likelihood of dependency varies from wetland to wetland, which can either be a receptor of groundwater dependency or surface water dependency. This process has been categorised by application of a series of

steps, illustrated in **Plate 1.1** and described briefly from **paragraphs 1.5.2.2** to **1.5.2.7** below.

Plate 1.1 Overview of screening approach



Stage 1: initial aquifer classification

1.5.2.2 The SNIFFER Water Framework Directive guidance sets out the following assumptions to define likelihood of groundwater dependence towards a groundwater body:

- high likelihood of dependency: Intergranular, High Productivity Drift Aquifer and Dominantly Intergranular, Highly Productivity Aquifer;
- moderate Likelihood of Dependency: Moderate Productivity Drift Aquifer and Fractured, Very Low Productivity Aquifer; and
- low Likelihood of dependency: Intergranular, Low Productivity Drift Aquifer and Very Low Productivity Aquifer.

1.5.2.3 Based on the above criteria, **Table 1.4** identifies the scoring applied to indicate the level of groundwater dependency associated with aquifers across the Project.

Table 1.4 Initial aquifer classification

Superficial Productivity (SP)	Bedrock Productivity (BP)	Derived Groundwater Dependency, based on SP and BP	Groundwater Dependency Group
High	High	High	Dependent
High	Moderate	Moderate - High.	Dependent
Moderate	Moderate	Moderate	Dependent
Moderate	Low	Moderate	Dependent
Low - Moderate	Moderate	Low – Moderate (for instance, combined scoring < Moderate).	Non-dependent
Low	Low	Low	Non-dependent

1.5.2.4 The British Geological Survey (BGS) report on Aquifers in Scotland (BGS, 2015a), User Guide: Aquifer Productivity (Scotland) Geographical Information Services datasets (BGS, 2015b), 1:50k Bedrock and Superficial Geology and BGS 50k Hydrogeology Map (BGS, 2025) have been used to help classify aquifer productivity as part of this initial exercise. These publications provide initial high-level groupings of superficial and bedrock aquifer productivities. The following bullets focus on the types of geology encountered within the study area.

Superficial deposits

- Moderate to High Productivity: Alluvium and river terrace deposits (unless specified as clay and silt);
- Low to Moderate Productivity: Marine, raised marine, blown sand, lacustrine beach deposits, tidal and intertidal deposit (unless specified as clay and silt); and
- not a significant aquifer (for instance, Low productivity): Till, moraine, hummocky / moundy glacial deposits, head, lacustrine deposits were dominated by clay and silt and all other deposits dominated by clay and silt.

Bedrock deposits

- Fracture Flow; Low Productivity: intrusive igneous rocks.

Stage 2: relative scoring of groundwater and surface water indicators

1.5.2.5 Following Stage 1, other site-specific information has been utilised to either increase or lower the initial aquifer scoring, based on the presence of other site-specific groundwater (2a) and / or surface water indicators (2b). For each habitat parcel, the total number of groundwater and surface water indicators have been collated to determine whether there is a justification for adjusting the Stage 1 scoring, either increased ('+' relative scoring), or lowered ('-' relative scoring), before assigning a final overall groundwater dependency score.

2a Indicators for groundwater dependency

1.5.2.6 The indicators that have been included for groundwater dependency have been informed by the new SEPA guidance on GWDTE (SEPA, 2025b), and are as follows:

- the use of available data on springs, including Ordnance Survey (OS) and water supply data sources, to identify springs within 100m of the UK Habitat Classification parcels. This indicator has been triple weighted during counting on the basis that it tends to be one of the clearest indicators of groundwater dependency.
- habitat parcels which are intersected by linear geological features (BGS faults displayed on 1:50k linear feature data) are counted.
- upper edge of GWDTE aligns with concave breaks in slope are counted.
- the new SEPA guidance also identifies waterlogging on steep well drained slopes as an indicator, however these conditions were not identified from the OS mapping in the locations of potential GWDTE habitats.

2b indicators for surface water / precipitation dependency

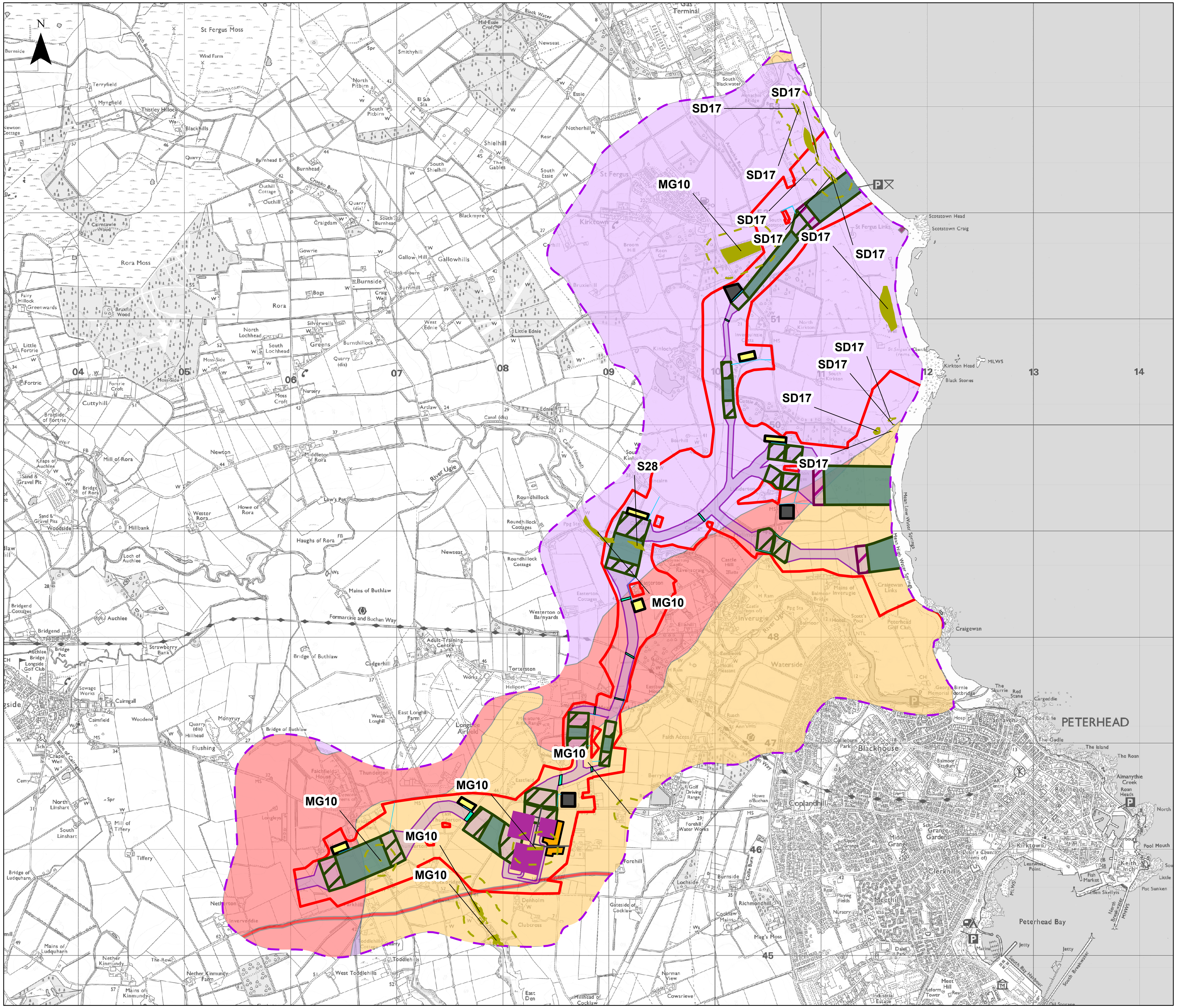
1.5.2.7 A number of characteristics which are indicative of surface water dependency (as opposed to groundwater dependency, which help define 'true GWDTE') have been identified, as follows:

- habitats within high areas of flood risks (SEPA high risk of fluvial and / or surface water flood risk mapped extent) (SEPA, 2025c);
- habitat within floodplain or close proximity (10m) to a watercourse (open rivers dataset); or
- majority of the habitat (>50%) is in area of Peat (Class 1 or 2 area shown on the Carbon and Peatland Map) (NatureScot, 2025).

Screening results

1.5.2.8 The steps outlined above have been utilised to identify areas having greater potential for groundwater dependency. **Table 1.5** provides a summary of the GWDTE screening results for each of the potential GWDTE habitats. **Appendix 20.1,** Figure 2: Potential GWDTE and Bedrock Geology, Figure 3: Potential GWDTE and Superficial Geology and Figure 4: GWDTE and Indicators also provide a visual illustration of the screening process.

1.5.2.9 From the nine potential GWDTE parcels considered, three are assessed as having a final groundwater dependency score of three or more (for instance, moderate or greater potential groundwater dependency). The three parcels have been subject to screening to determine whether they have connectivity to the Project. Of these three, only two are considered to have a potential hydrological connection to the Project, due to their proximity and topographical position relative to the Project (for example, where GWDTE is situated downgradient of infrastructure with no intervening hydrogeological barriers / obstructions), and these parcels have been screened in and taken forward for further assessment within **Volume 1, Chapter 20: Water Resources and Flood Risk**.



- Red Line Boundary
- Water resources and flood risk study area
- Indicative onshore export cable corridor
- Indicative trenchless crossing compound search area
- Indicative landfall construction compound search area
- Indicative trenchless crossing
- Indicative trenched crossing
- Indicative primary construction compound
- Indicative secondary construction compound
- Indicative temporary construction access road

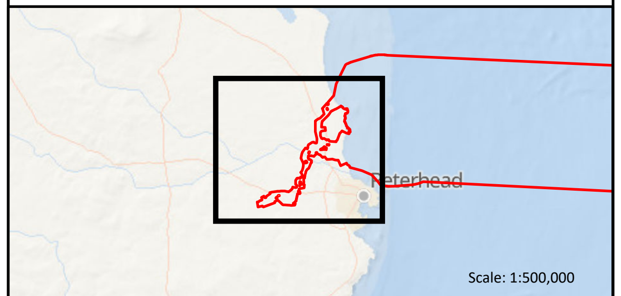
Onshore substation site layout

- Indicative temporary construction compound
- Indicative permanent access road
- Indicative permanent onshore substations' footprint
- Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE)
- Potential GWDTE 250m Buffer

British Geological Survey (BGS) 1:50k Bedrock Geology

- Strichen Formation - Metalimestone and calcsilicate-rock. Metamorphic bedrock
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Microdiorite. Igneous bedrock
- Collieston Formation - Pelite, semipelite and psammite. Metamorphic bedrock
- Crinan Subgroup and Tayvallich Subgroup - Semipelite, pelite and psammite. Metamorphic bedrock
- North Britain Late Carboniferous Tholeiitic Suite - Quartz-microgabbro. Igneous bedrock
- Forest Of Deer Pluton - Melagranite, biotite. Igneous bedrock
- Peterhead Pluton - Granite, Igneous bedrock

0 1 Kilometres



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1	27/06/2025	SS	LT	GD	MW

WSP DRAWING NUMBER 808368-WEIS-IA-E5-FG-W4-47287

MarramWind DRAWING NUMBER MAR-GEN-ENV-MAP-WSP-000162

DATUM	OSGB 1936	PROJECTION	British National Grid
SCALE	1:35,000	PAGE SIZE	A3

PROJECT TITLE

MarramWind Offshore Wind Farm

DRAWING TITLE

Figure 2 Potential Groundwater Dependent Terrestrial Ecosystems and bedrock geology

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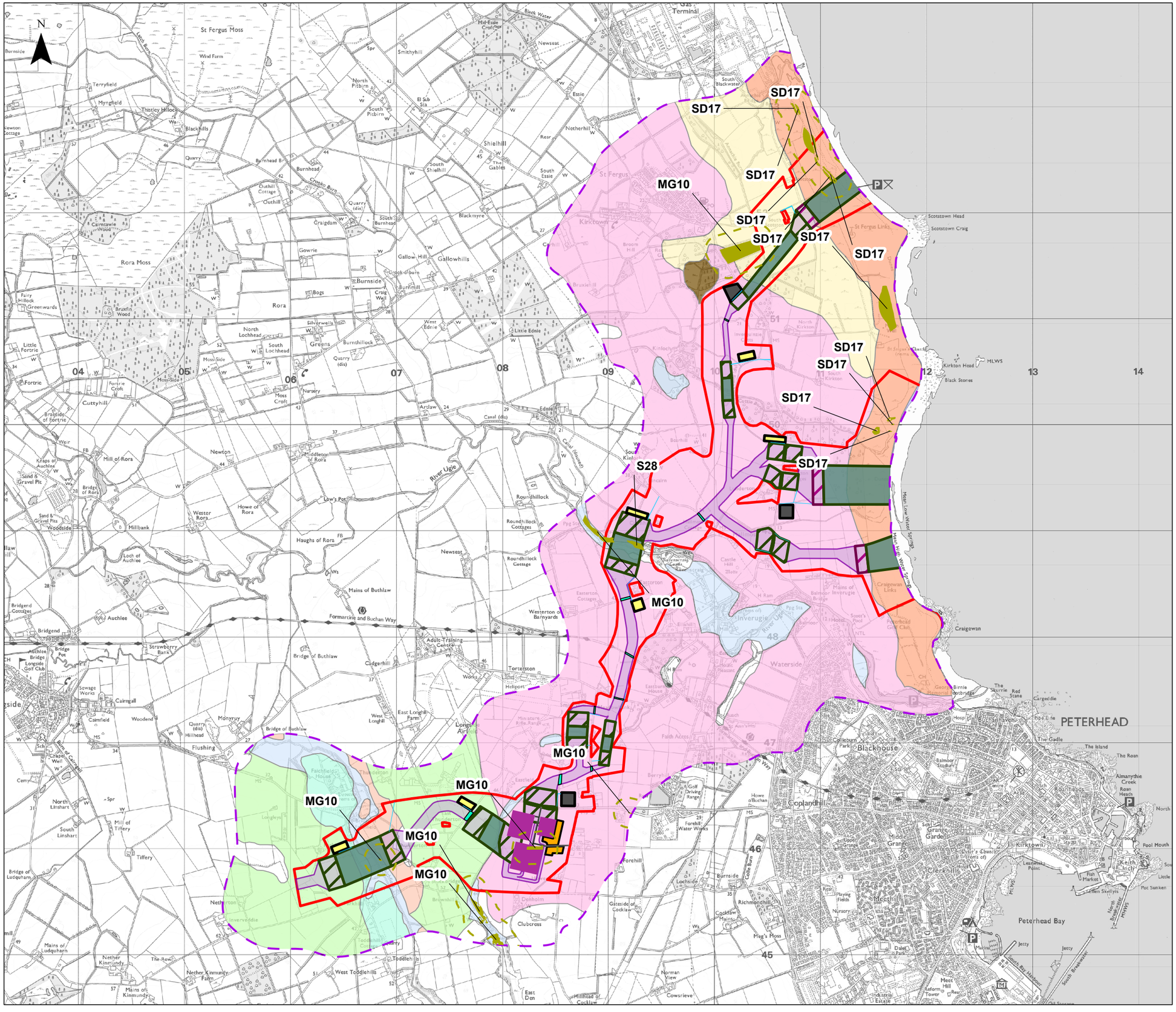

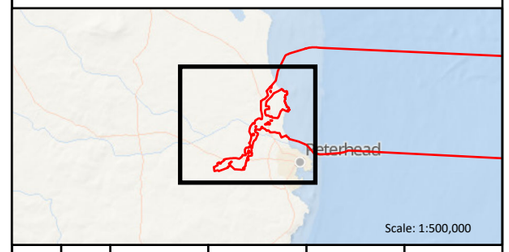

- Red Line Boundary
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- Indicative onshore export cable corridor
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- Indicative primary construction compound
- Indicative secondary construction compound

Onshore substation site layout

- Indicative temporary construction compound
- Indicative permanent access road
- Indicative permanent onshore substations' footprint

- Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE)
- Potential GWDTE 250m Buffer

British Geological survey (BGS) 1:50k Superficial Geology

- ALLUVIUM
- BANCHORY TILL FORMATION
- BLOWN SAND
- GLACIOFLUVIAL ICE CONTACT DEPOSITS
- GLACIOFLUVIAL SHEET DEPOSITS
- HATTON TILL FORMATION
- LACUSTRINE DEPOSITS
- MARINE BEACH DEPOSITS
- PEAT

0 1 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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DATUM	OSGB 1936	PROJECTION	British National Grid
SCALE	1:35,000	PAGE SIZE	A3

PROJECT TITLE
MarramWind Offshore Wind Farm

DRAWING TITLE
Figure 3 Potential Groundwater Dependent Terrestrial Ecosystems and superficial geology

Environmental Impact Assessment Report
Appendix 20.1

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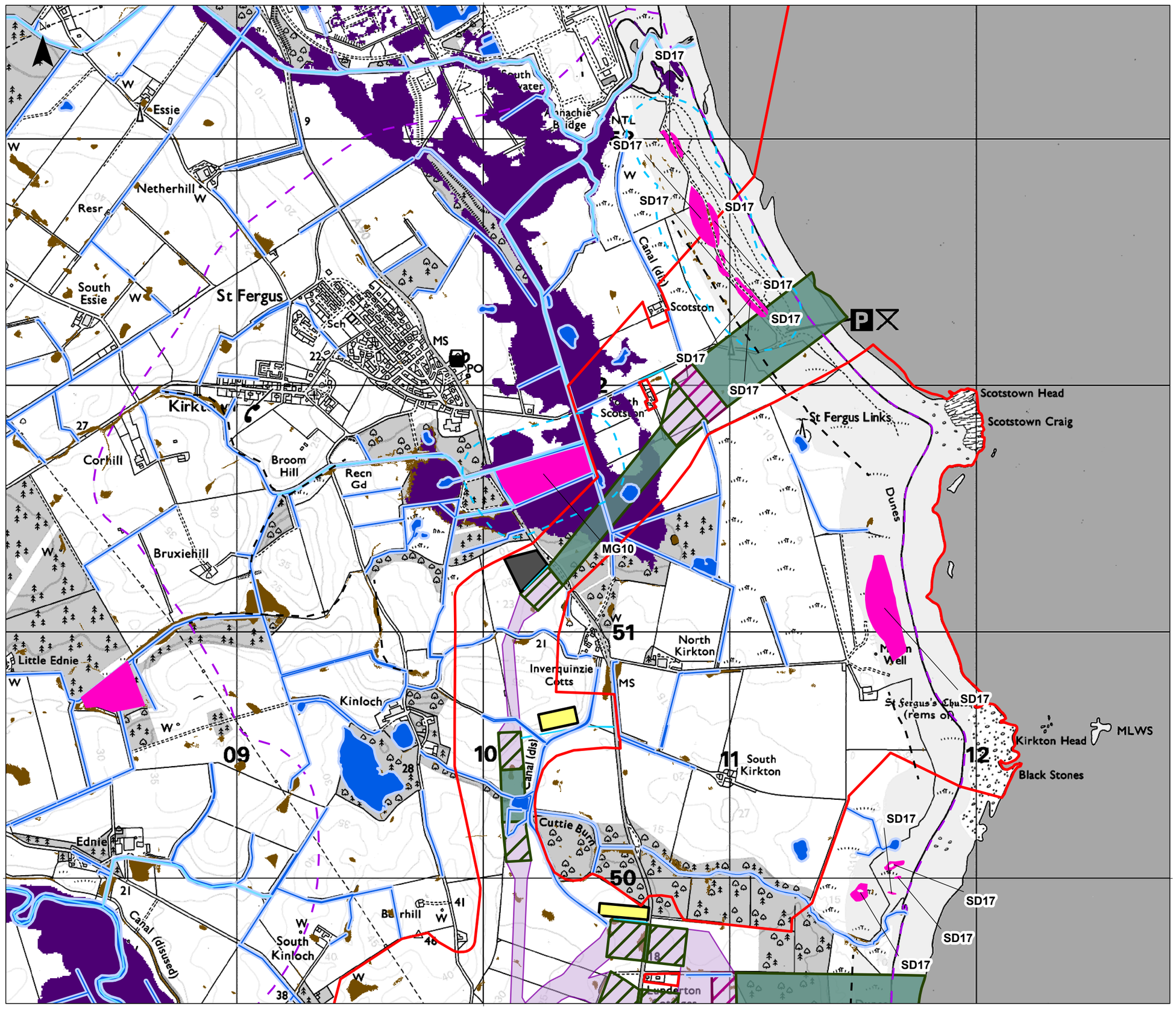

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- Indicative temporary construction access road

Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE)

- Screened In
- Screened Out
- Potential GWDTE 250m Buffer

Surface Water Indicators

- OS Open Rivers
- OS OML Surface Water Line
- OS OML Surface Water Area
- 10m Surface Water Features Buffer

Carbon and Peatland 2016 Map

- Class 1
- Class 2

SEPA Indicative Flood Risk Extents

- SEPA Surface Water Flood Risk – High Likelihood (i.e. Each year this area has a 10% chance of flooding)
- SEPA Fluvial Flood Risk – High Likelihood (i.e. Each year this area has a 10% chance of flooding)

Groundwater Indicator

- BGS 50K Linear Features

0 0.5 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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2	09/07/2025	SS	LT	GD	MW
1	27/06/2025	SS	LT	GD	MW

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PROJECT TITLE
MarramWind Offshore Wind Farm

DRAWING TITLE
Figure 4 Potential Groundwater Dependent Terrestrial Ecosystems and indicators Sheet 1 of 3
Environmental Impact Assessment Report
Appendix 20.1

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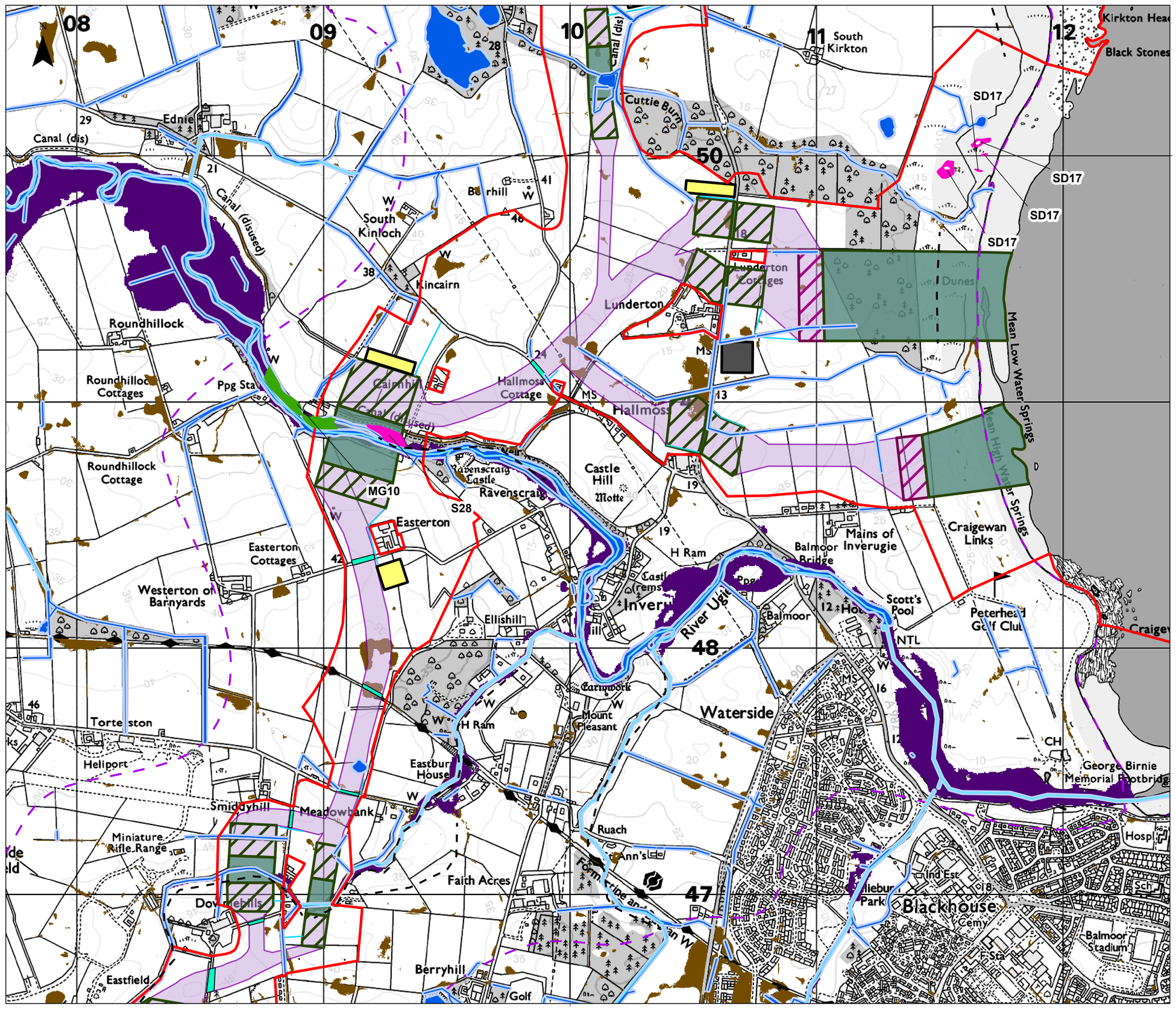

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1	27/06/2025	SS	LT	GD	MW

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PROJECT TITLE

MarramWind Offshore Wind Farm

DRAWING TITLE

Figure 4 Potential Groundwater Dependent Terrestrial Ecosystems and indicators
Sheet 2 of 3

Environmental Impact Assessment Report
Appendix 20.1

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MarramWind

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405000

Red Line Boundary
Water resources and flood risk study area
Indicative onshore export cable corridor
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Screened In
Screened Out
Potential GWDTE 250m Buffer

Surface Water Indicators

OS Open Rivers
OS OML Surface Water Line
OS OML Surface Water Area
10m Surface Water Features Buffer

Carbon and Peatland 2016 Map

Class 1
Class 2

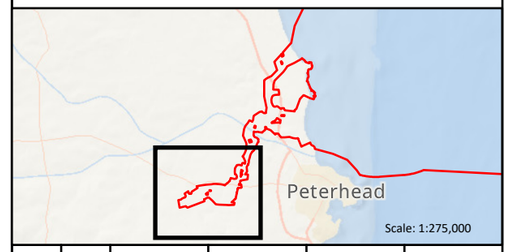
SEPA Indicative Flood Risk Extents

SEPA Surface Water Flood Risk – High Likelihood (i.e. Each year this area has a 10% chance of flooding)
SEPA Fluvial Flood Risk – High Likelihood (i.e. Each year this area has a 10% chance of flooding)

Groundwater Indicator

BGS 50K Linear Features

0 0.5 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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PROJECT TITLE
MarramWind Offshore Wind Farm

DRAWING TITLE
Figure 4 Potential Groundwater Dependent Terrestrial Ecosystems and indicators
Sheet 3 of 3
Environmental Impact Assessment Report
Appendix 20.1

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Table 1.5 Summary of potential GWDTE screening results

Wetland object ID / NGR	NVC code / NVC community name	Superficial deposits type (1:50k)	SP (Low, Medium, or High)	Main bedrock geology type (1:50k)	BP (Low, Medium, or High)	Stage 1 initial aquifer rating (based on SP and BP)	Stage 1 aquifer classification score (on scale 1-5)	Stage 2a Groundwater Indicator count	2b Surface Water / Precipitation Indicator count	Aquifer classification score + relative dependency score	Final groundwater dependency score (adjusted to Scale 1-5)	Screened in based on groundwater dependency?	Screened in based on potential for hydrological connectivity with the Project?
NK 11070 52456	SD17 Dune Slacks.	Blown sand – sand.	Low – Moderate.	Crinan subgroup and tayvallich subgroup (undifferentiated) - semipelite, pelite and psammite.	Low	Low - Moderate.	2	0 (for example, no springs, concave slopes, faults or waterlogging on well drained slopes).	0 (for example, not in flood risk areas, peatland areas or nearby watercourses).	2	2	No	N/A
NK 11647 51130	SD17 Dune Slacks.	Blown sand – sand.	Low - Moderate.	Crinan subgroup and tayvallich subgroup (undifferentiated) - semipelite, pelite and psammite.	Low	Low - Moderate.	2	0 (for example no springs, concave slopes, faults or waterlogging on well drained slopes).	0 (for example, not in flood risk areas, peatland areas or nearby watercourses).	2	2	No	N/A
NK 11595 49923	SD17 Dune Slacks.	Blown sand – sand.	Low - Moderate.	Crinan subgroup and tayvallich subgroup (undifferentiated) - semipelite, pelite and psammite.	Low	Low - Moderate.	2	0 (for example no springs, concave slopes, faults or waterlogging on well drained slopes).	1 (nearby watercourse).	1	1	No	N/A
NK 10273 51625	MG10 Holcus lanatus - Juncus effusus rush-pasture.	Hatton Till Formation (Diamicton, clay, sand and gravel) Lacustrine deposits, clay silt and sand.	Low	Crinan subgroup and tayvallich subgroup (undifferentiated) - semipelite, pelite and psammite.	Low	Low	1	0 (for example no springs, concave slopes, faults or waterlogging on well drained slopes).	2 (nearby watercourse and in Annachie Burn floodplain).	-1	1	No	N/A
NK 08900 48966	MG10 Holcus lanatus - Juncus effusus rush-pasture.	Hatton Till Formation (Diamiction, clay, sand and gravel) Lacustrine deposits, clay silt and sand and Alluvium - clay, silt, sand and gravel.	Low - Moderate.	Crinan subgroup and tayvallich subgroup (undifferentiated) - semipelite, pelite and psammite.	Low	Low - Moderate.	2	4 (partly adjacent to a well and along the edge of concave slope).	2 (nearby watercourse and in River Ugie floodplain).	4	4	Yes	The habitat is partly crossed by the Onshore Red Line Boundary and onshore export cable corridor and therefore has a potential hydrological connection with the Project. **Screened in**.

Wetland object ID / NGR	NVC code / NVC community name	Superficial deposits type (1:50k)	SP (Low, Medium, or High)	Main bedrock geology type (1:50k)	BP (Low, Medium, or High)	Stage 1 initial aquifer rating (based on SP and BP)	Stage 1 aquifer classification score (on scale 1-5)	Stage 2a Groundwater Indicator count	2b Surface Water / Precipitation Indicator count	Aquifer classification score + relative dependency score	Final groundwater dependency score (adjusted to Scale 1-5)	Screened in based on groundwater dependency?	Screened in based on potential for hydrological connectivity with the Project?
NK 09602 48709	S28	Hatton Till Formation (Diamiction, clay, sand and gravel) Lacustrine deposits, clay silt and sand and Alluvium - clay, silt, sand and gravel.	Low - Moderate.	Crinan subgroup and tayvallich subgroup (undifferentiated) - semipelite, pelite and psammite.	Low	Low - Moderate.	2	1 (along edge of concave slope).	2 (nearby watercourse and in River Ugie floodplain).	1	1	No	N/A
NK 08215 45979	MG10 Holcus lanatus - Juncus effusus rush-pasture.	Hatton till formation - diamicton, clay, sand and gravel.	Low	Peterhead pluton - granite.	Low	Low	1	0 (for example no springs, concave slopes, faults or waterlogging on well drained slopes).	0 (for example, not in flood risk areas, peatland areas or nearby watercourses).	1	1	No	N/A
NK 07779 45373	MG10 Holcus lanatus - Juncus effusus rush-pasture.	Alluvium - clay, silt, sand and gravel.	Moderate* (due to the presence of clay / silt).	Peterhead pluton - granite.	Low	Moderate	3	4 (partly adjacent to a well and along edge of concave slope).	2 (within surface water flood risk area and adjacent to surface watercourse).	5	5	Yes	The habitat parcel is situated upgradient of the Onshore Red Line Boundary and onshore export cable corridor and therefore has no potential hydrological connection with the Project. **Screened out.**
NK 07017 45850	MG10 Holcus lanatus - Juncus effusus rush-pasture.	Alluvium - clay, silt, sand and gravel.	Moderate* (due to the presence of clay / silt).	Peterhead pluton - granite.	Low	Moderate	3	0	0	3	3	Yes (it is noted that the parcel overlies an area of former gravel working / extraction so is likely to be partly fed by surface and / or rainwater). Nonetheless it has been screened in as part of a precautionary approach based on the superficial geological conditions which may lend themselves to some degree of groundwater dependency.	The habitat is crossed by the Onshore Red Line Boundary and onshore export cable corridor and therefore has a potential hydrological connection with the Project. **Screened in**.

2. References

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3. Glossary of Terms and Abbreviations

3.1 Abbreviations

Acronym	Definition
BGS	British Geological Survey
BP	Bedrock Productivity
CAR	Controlled Activity Regulations
EIA	Environmental Impact Assessment
GWDTE	Groundwater Dependent Terrestrial Ecology
HDD	Horizontal Directional Drilling
m	Metres
NGR	National Grid Reference
NVC	National Vegetation Classification
OS	Ordnance Survey
PWS	Private Water Supply
SEPA	Scottish Environment Protection Agency
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
SP	Superficial Productivity
S-P-R	source-pathway-receptor

3.2 Glossary of terms

Term	Definition
Alluvium	Material transported by rivers and deposited along its course.
Ordnance Survey	OS stands for Ordnance Survey, which is the national mapping agency for Great Britain. It carries out the official surveying of Great Britain and provides the most accurate and up-to-date geographic data for the country, which is relied on by government, business and individuals.
Scottish Environment Protection Agency	A non-departmental public body of the Scottish Government, responsible for environmental regulation. This includes ensuring that the environment and human health are protected, and that Scotland's natural resources and services are used as sustainably as possible and contribute to sustainable economic growth.

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