



Appendix 9.1 AECOM Desk Study



Shetland Space Centre

Desk Study and Site Appraisal

Shetland Space Centre

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The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between 14th November and 5th December 2019 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AECOM's attention after the date of the Report.

The opinions expressed in this report and the comments and recommendations given are based on a desk assessment of readily available information and an initial site reconnaissance by an AECOM Engineer. At this stage intrusive investigations have yet to be undertaken at site to establish actual ground and groundwater conditions and to provide data for an assessment of the geo-environmental status of the site.

Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

Reference to historical Ordnance Survey (OS) maps and/or data provides invaluable information regarding the land use history of a site. However, it should be noted that historical evidence will be incomplete for the period pre-dating the first edition and between the release of successive maps and/or data.

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1. Introduction

1.1 Background

AECOM Infrastructure & Environment UK Limited ('AECOM') was appointed by the Shetland Space Centre to undertake an initial Desk Study and Site Appraisal for a site proposed for the development as the Shetland Space Centre. The site is located at Lamba Ness, near Skaw on the island of Unst, which is part of the archipelago of the Shetland Isles in Scotland.

The area included within the initial study extends over approximately 245 hectares and includes access routes along the existing road network leading to the main site at Lamba Ness. The area being considered for the Launch Site extends over a smaller area, extending to 185 hectares on Lamba Ness and was an active RAF Radar Station (RAF Skaw) during World War 2 (WW2).

A Site Location Plan (drawing no.60617518-ACM-XX-00-DR-CE-0001), is included within Appendix A.

1.2 Objectives and Aims

The main objective of the Desk Study and Site Appraisal is to provide background information relating to the general setting of the site and to highlight any potential constraints to the proposed development that may impact the planning process.

Specific objectives included:

- Provide information on the history of the site;
- Obtain information on the geological setting and underlying ground conditions; and
- Review present access routes to the site and assess possible alternatives.

The scope of services for the study included:

- Commissioning and review of a Groundsure Report;
- Review of publicly available web-based sources, including the British Geological Survey (BGS), Historic Environment Scotland and Scottish Natural Heritage; and
- Site Walkover.

2. Site Details

2.1 Site Location

The site is located on a peninsula called Lamba Ness which is on the north east of the island of Unst within the Shetland archipelago. The site is approximately 77km north east from Lerwick. Access to the site is gained from the B9087 via Norwick and then from an unclassified road to Skaw, where the most northerly property on the British Isles is located.

The main site on Lamba Ness is at approximate national grid coordinates HP 66646 15569.

2.2 Site Description and Topography

The main site extends east from the unclassified Skaw Road to the headland of Lamba Ness. Large coastal cliffs form the perimeter of the peninsula, some extending to a height of approximately 50m above sea level. The peninsula covers an area of approximately 185 hectares and was previously utilised by the RAF as an early warning radar station during WW2.

A Groundsure Report was purchased which provided historical Ordnance Survey (OS) maps and Lidar data was provided by the client. From a review of these sources, the ground levels across the site are indicated to fall from west to east, with the ground levels at the access to the site starting at approximately 65m above ordnance datum (m AOD) and falling to approximately 10m AOD at its lowest point before rising again to approximately 30m AOD at the eastern tip. Using the Lidar data, a contoured plan was produced (drawing no. 60617518-ACM-XX-00-DR-CE-0010), along with a plan that assessed the slope angles across the site (drawing no. 60617518-ACM-XX-00-DR-CE-0011). Both drawings are contained within Appendix A.

To the west of the site, the land rises steeply to the Ward of Norwick at approximately 186m AOD and then on again to the present RAF Radar Station at Saxa Vord which is at a level of approximately 285m AOD.

2.3 Site History

A Groundsure Report was commissioned which included copies of historical OS maps for the site. It should be noted that no historic OS maps were available for the period between 1901 and 1970. This is assumed to be as a direct result of the site being occupied by RAF Skaw which was part of the Chain Home radar network which formed part of the defences of the Sullom Voe flying boat base.

Table 1 : Historic Map Summary

Source	Within the Site	Adjacent to Site
1878 County Series 1:10,560 map	There is a Cairn noted in the approximate centre of the site. There appears to be several buildings noted as Inner Skaw. Loch of Lambness is shown towards the east end of the site.	Approximately 250 to 750m north of the western end of the site a settlement named Skaw is present, consisting of several buildings, a foot bridge of the Burn of Skaw and at least two wells. To the west of the south west corner of the site there is a well noted. To the south off the south west corner of the site a property named Braehead is present above "The Cliffs".
1880 County Series 1:2,500 map	No significant changes.	No significant changes.
1900 County Series	No significant changes.	No significant changes.

1:10,560 map

1901 County Series	No significant changes.	No significant changes.
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1:2,500 map

	No historical maps available between 1901 and 1971	
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1971 – 1972 National Grid	The properties associated with Inner Skaw no longer appear. Several new buildings (approx. 40 in number) are now shown on the site. These are understood to be from the former RAF radar station on the site. None of the buildings are named.	Iron age potter found now noted north east of Skaw. Several track/roads now shown surrounding the site, including three cattle grids.
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1:10,000

2001 National Grid	Two quarries are shown on the site. Less of the (understood to be derelict) buildings are shown on the site.	One quarry shown immediately west of the site.
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1:10,000

2003 Landline	No significant changes.	No significant changes.
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1:1,250

2010 National Grid	No significant changes.	No significant changes.
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1:10,000

2019 National Grid	Fewer (derelict) buildings are shown on the site.	No significant changes.
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1:10,000

Due to the lack of historic OS maps, a further literature review was undertaken on-line. Detailed information was obtained from a blog titled, "A History of RAF Saxa Vord", created by Gordon Carle. From the anecdotal information provided in the blog, there was a great deal of activity on the site during WW2 with approximately 50 buildings constructed to house the 150 servicemen stationed at the site. Many of these buildings remain on site, albeit in a state of disrepair or ruin. The four radio masts were removed. However, their original foundations remain visible.

A summary of the information pertaining to the site that was obtained from the blog and other on-line sources is included in Appendix B

A copy of the Groundsure report can be found within Appendix H.

2.4 Archaeology

A review of PastMaps, the Historic Environment Scotland online interactive viewer, indicates that the former RAF base on Lamba Ness is a Scheduled Monument. A description of the Scheduled Monument is provided below with further details provided in Appendix C.

Scheduled Monument Skaw, radar station (SM13097)

The monument comprises the remains of a Second World War Chain Home radar station. The station is spread over two sites, a main and a reserve site, with over 50 buildings and structures reflecting its core early warning function and with supporting infrastructure and domestic blocks. The radar complex is the furthest north of its type in the United Kingdom. It is located on rough grazing land over two headlands (Lamba Ness and Blue Jibs) at the northeast corner of Unst.

This monument is of national importance because it has an inherent potential to make a significant addition to the understanding of the past, in particular the advance of radar technology and the development of an early warning

system protecting the sea and airspace around the United Kingdom. It survives in good condition as a complete example of the technical, support and domestic buildings and structures necessary to provide an early warning reporting function. The loss of the monument would significantly diminish our future ability to appreciate and understand the scale of the efforts employed on the home front in the defence of Britain.

In addition to the site being a Scheduled Monument, many of the buildings built during the war also have entries within Historic Environments online catalogue of National Records (Canmore). There are also a number of structures which pre-date the war and those with ancient archaeological interest including a cairn. Details from Canmore are summarised in Appendix D.

2.5 Sensitive Sites

A review of the Scottish Natural Heritage online interactive viewer, SiteLink, has indicated that the site at Lamba Ness is bounded by a Site of Special Scientific Interest (SSSI). There is a second SSSI further south within the village of Norwick which is close to an area where a new alignment for an access road is being considered.

The site adjacent to Lamba Ness, the **Norwick SSSI (Structural and metamorphic geology : Caledonian Structure)** is described as follows:

“Comprises rock outcrops at The Taing and Shure Taings at the head of Nor Wick and cliff exposures on the north side of the bay. The rocks are principally of interest because they show the boundary between the serpentine rocks of the Unst “ophiolite”, which were originally ocean floor, and the continental rocks that make up the rest of the island.”

This SSSI is contained within a Geological Conservation Review site, which contains features of national and international importance that are considered to qualify for designation in Sites of Special Scientific Interest (SSSIs).

The second SSSI within Norwick, the **Norwick Meadows (Valley Fen and Sand Dunes)** is described as follows:

“Norwick Meadows SSSI is located in the north-east of Unst, the most northerly isle of Shetland. The site consists of a valley fen, with swamp, mire and meadows along the course of the Burn of Norwick, from the Mires of Northdale through to the Norwick Meadows, and the sand dune complex at Norwick Beach.”

Refer to Appendix A for the Constraints Plan (drawing no.60617518-ACM-XX-00-DR-CE-0012), showing the location of the SSSI's and Geological Conservation Review site.

2.6 Site Geology

The following summary of the geology at the Lamba Ness site is based on a review of the BGS interactive map. The superficial geology predominantly comprised of glacial till. These deposits vary in lithology and are typically poorly sorted sandy, silty clay with possible laminated sand layers and coarse granular material. There is an area of blown sand approximately half way along the peninsula. Where the top of the cliff faces are exposed, a thin layer of superficial material overlies the exposed rock.

Based on the available aerial photography it is expected that peat deposits may be present locally, particularly on flat lying areas to the western side of the site. There appears to be many drainage ditches cut through the peat and areas of standing water. It is also expected that made ground associated with the historic development across the site will be present in areas previously developed.

The bedrock geology is formed from the Skaw Intrusion – a Porphyritic Microgranite which can be described as a medium-grained intrusive igneous rock with several dyke intrusions of North Britain Siluro-Devonian Calc-Alkaline Lamprophyre. There is a fault recorded approximately ¾ of the way along the peninsula.

Refer to Appendix E for extracts from the Drift and Solid geological maps for the site.

2.7 Hydrology

There is no major water course within the main Lamba Ness site. However, there are 3 smaller natural streams following the existing topography and flowing to the coast. Two of these flow to the north with a single stream flowing to the south. Drainage ditches have been cut in the flatter areas to aid drainage which flow into the natural streams. Lamba Ness site is a peninsula and is therefore surrounded by the North Sea on three sides.

Within the full development site there are many drainage ditches and small unnamed water courses, and the Burn of Norwick is located within the village of Norwick and the Norwick Meadows SSSI.

2.8 Hydrogeology

The bedrock on site is classified as a concealed aquifer, aquifer of limited potential and a region without significant groundwater. SEPA classified the groundwater on Unst as good quality in 2017.

2.9 Radon

The Groundsure reports the site to be in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level. As such, any buildings constructed on the site may require Radon protection measures.

2.10 Flooding

The Groundsure report shows the Lamba Ness to have localised areas at risk from Surface Water flooding (Pluvial). Further information can be found within the Groundsure report contained in Appendix H.

2.11 Unexploded Ordnance

Given the past use of the site as an RAF Radar Station, it was considered there was a reasonable risk it was subjected to attack during World War Two. As such Zetica UXO was consulted and initially their free maps were reviewed. These maps classified the site as low risk from potential unexploded bombs, with low risk classified as having 15 bombs per 1000 acres or less.

During an internet review of the sites history and information provided on the blog site "A History of RAF Saxa Vord" which provides anecdotal information from accounts provided by local residents and RAF personnel who were posted at RAF Saxa Vord, it was found that the site was targeted by both bombs and machine gun fire from German planes. The initial attacks prompted the installation of the anti-aircraft gunning positions.

This information was highlighted to Zetica UXO who in turn provided a Pre-Desk Study Assessment (PDSA) that contains a brief summary report detailing what sources of Unexploded Ordnance (UXO) (if any) may be present and whether further detailed desk-based assessment is required. This PDSA concluded that a detailed desk study is required to assess, and potentially zone, the UXO hazard level on the Site.

A further website called "War State and Society" was consulted which provides a collection of information on the domestic situation during WW2 which references 11 UK government agencies including The National Archives. This website provides an interactive map called Bombing Britain which comprises an air raid map showing the location of 32,000 German air raids on the UK. This indicates that on the RAF Skaw site 4 bomb attacks were undertaken.

Information from the above can be found in Appendix F.

3. Site Walkover

3.1 Lamba Ness Site

A detailed site walkover was undertaken by AECOM staff on Tuesday 19th November 2019. Due to the potential risk of unexploded ordnance (UXO), no intrusive investigation was undertaken at this stage.

Photographs were taken, and buildings and other features on site have been identified and summarised on drawings. Names and uses of buildings have been obtained from various sources, including the 'History of Saxa Vord', and other websites and drawings.

A subsequent visit to Unst Heritage Centre in Haroldswick and Shetland Museum and Archives in Lerwick was also carried out, which uncovered more useful information on the site, specifically relating to the various buildings and their use during the operation of the radar station.

Several buildings remain on the site, in various states of disrepair or ruin, including transmitter and receiver buildings, bunkers, gun emplacements, and the remains of the power station. The original crofters cottage and various dry-stone walls also remain.

An unsurfaced access track runs west-east along the full length of the peninsula, which would have provided access to each of the main buildings during the operation of the radar station. A section of this track towards the eastern end is built up where the existing ground level dips down. A cast in-situ concrete culvert passes underneath the track at this point.

Three small quarries have been identified on site. Two adjacent to the site entrance, and another approximately 600m further east. These quarries are likely to have been a source of roadstone for the access track to the radar station.

Bomb craters (both known and potential) were identified on site. These were further verified by information shown on historical drawings.

At many locations along the sea cliffs and at the quarries within the site, the soil profile was clearly exposed. This indicated that the superficial deposits comprise topsoil / peat overlying glacial till with rock at shallow depth. The depth of peat is generally of the order of 0.5m, where visible at sea cliffs and excavations at quarries. Drainage ditches are generally cut to a depth of up to 1m below surrounding ground level and are predominantly in peat.

A number of natural streams mainly flowing to the north were noted. These are fed by drainage ditches cut through areas of peat. A couple of small lochans are also present on the site.

A selection of photographs is contained within the Appendix G. Drawings 60617518-ACM-XX-00-DR-CE-0013 & 0014, which provide details of the locations of the photographs are contained within Appendix A.

3.2 Local Access Routes

It is anticipated that for access to the site, the existing road network across Unst will generally be adequate, but a closer visual inspection of local access roads nearer the site was carried out during the site visit.

It should be noted however that this visual inspection was purely an initial assessment of the potential route options. As the project progresses, a more detailed appraisal and specific design proposal exercise will be carried out.

3.2.1 Haroldswick to Saxa Vord Resort

For the section between the A968 approaching Haroldswick and the four-way junction at Saxa Vord Resort, three route options have been considered, and were assessed during the site visit. These route options are shown on drawing number 60617518-ACM-XX-00-DR-CE-0003, contained in Appendix A. A selection of photographs for each of the routes are included in Appendix H, with details of the locations of the photographs shown on drawing 60617518-ACM-XX-00-DR-CE-0015, contained in Appendix A.

3.2.1.1 Route option 1.

This route option is from the junction of A968 / B9086 / Beach Road, and runs northwest along the B9086, then turns northeast along an unclassified road past the Unst Heritage Centre, and onwards along the B9087 to the four-way junction at Saxa Vord Resort.

Generally, the road is 2.5m-3.5m wide, with passing places. Steep-sided drainage ditches run along both sides of the road, with some small diameter culverts passing under. The road surface is in generally good condition.

This route is considered to be a viable option, with only minimal localised widening / additional passing places likely to be required.

3.2.1.2 Route option 2.

The route option is from the junction of A968 / B9086 / Beach Road, and runs northeast along Beach Road, then turning left onto B9087, and onwards towards Route option 1 at the Unst Heritage Centre.

Generally, the road is 2.0m-2.5m wide, with very few passing places. The road surface is in generally poor condition. The junction with Beach Road is quite a tight turn and has poor visibility for oncoming traffic. Two tight 90° bends along the route would likely require some localised widening.

Due to the constraints noted above, this route is not considered a viable option.

3.2.1.3 Route option 3.

This route option is from the junction of A968 / B9086 / Beach Road, and runs northeast along Beach Road, following the coast, and onwards through Valsgarth to the four-way junction at Saxa Vord Resort.

Generally, the road is 2.5m-3.0m wide with passing places. The road surface is in generally good condition. Some steep-sided drainage ditches run alongside the road, and several small diameter culverts pass under it.

This route is considered to be a viable option, with only minimal localised widening / additional passing places likely to be required.

3.2.2 Saxa Vord Resort to Site

For the section between the four-way junction at Saxa Vord Resort and the Site entrance, three route options have been considered, and were assessed during the site visit. These route options are shown on drawing 60617516-ACM-XX-00-DR-CE-0003, contained in Appendix A.

3.2.2.1 Route option 4.

This route currently provides existing access to the site. From the four-way junction at Saxa Vord Resort, it runs northeast along the B9087 to Norwick, then turns onto an unclassified road (part of which is noted as Holsens Road), and onwards to the site entrance.

The section along B9087 is generally 3.0m-3.5m wide, with passing places. The road surface is generally good.

The section along the unclassified road is generally 2.0m-2.5m wide, with passing places. The road surface is generally good. One section of the road is particularly steep, with gradients of around 1:8. The road continues as generally 2.0m-2.5m wide with passing places and 4no. 3m wide cattle grids, before reaching the site entrance.

This route is considered a viable option, with only minimal localised widening / additional passing places likely to be required. A closer analysis of the steep gradients would be required.

3.2.2.2 Route option 5.

This route option is from the four-way junction at Saxa Vord Resort and runs northwest along an unclassified road (this road provides access to the Saxa Vord Radar Station), before turning northeast to Northdale.

The road is generally 2.0m-2.5m wide, with passing places.

From Northdale, a new section of road, approximately 450m long would require to be constructed, to connect to the existing road noted in option 4. This would generally follow an existing rough track but would require to overcome some steep gradients.

This route is considered a viable option, albeit requiring some new road construction. The existing road would require some localised widening and additional passing places.

3.2.2.3 Route option 6.

This route option is from the four-way junction at Saxa Vord Resort and runs northeast along the B9087 and through the settlement of Norwick. From here, it continues up the steep slope of a now-closed road historically referred to as 'the Floggie'. This road is generally 1.5m-2.0m wide and has been closed for a number of years as landslides and erosion have left the road in a state of disrepair. It is completely impassable for vehicles.

Due to the current condition of the road, and the likely cost involved in repairing, widening, and consolidating it, this route is not considered a viable option.

3.3 Baltasound Harbour

Baltasound Harbour, located approximately 9km south of the site, has been identified as a potential jetty for bringing in materials by sea. A visual inspection of the harbour was carried out during the site visit.

According to the Shetland Islands Council website, Baltasound Harbour has 160m of berthage, and 5m deep water.

The harbour appears to be in adequate condition, though it is noted that no crainage currently exists.

4. Conclusions

4.1 Lamba Ness Site

The drift and solid geology across the site comprises the following:

- Drift geology – the superficial deposits comprised topsoil/peat overlying a glacial till which is described as a poorly sorted sandy, silty clay with possible laminated sand layers and coarse granular material.
- Solid geology – bedrock comprises a medium-grained intrusive igneous rock (Porphyritic Microgranite – Skaw Intrusion) with several dyke intrusions.

The soil profile visible in quarry faces and at the edges of the sea cliffs confirms the above and indicates that there is only a shallow covering of superficial deposits of between approximately 0.5m and 1.0m depth over the rock.

Peat was also visible in drainage ditches cut through the flatter areas of the site. In some areas the peat extended to the base of the drainage ditches reaching a depth of approximately 1.0m. It is considered that deeper accumulations of peat are likely to occur across the site within these flat lying boggy areas.

As no intrusive investigation was possible due to the potential risk from UXO, the range of depths of peat and depth to rockhead was unable to be confirmed. This needs to be verified by a ground investigation targeted to the development needs.

Quarries have been developed at three locations within or immediately adjacent to the site. It is considered that the material won from the quarries would have been used as roadstone in the construction of the access track.

The sea cliffs that surround the peninsula vary in height up to a maximum of approximately 50m above sea level. The rocks exposed in the cliffs along the south western corner of the site are recorded as being a SSSI in terms of their Geological Importance.

The site is considered to be within a Radon Affected Area. As such, any buildings constructed on the site as part of the development may require Radon protection measures.

The Lamba Ness site was previously developed for use as a RAF Radar Station during WW2. Due to its previous use there are a number of potential hazards and constraints to development within the site. These are summarised below:

- The site is a Scheduled Monument
- There are numerous derelict buildings located across the site relating to the WW2 activities
- Other buildings/structures/areas of interest which pre-date the WW2 which are recorded by Canmore and are of archaeological interest.
- Made ground and buried foundations associated with the previous development at the site remain in place.
- The site was attacked on a number of occasions during WW2 with bombs dropped. Therefore, there remains a risk from UXO across the site.
- A magnetometer survey should be undertaken prior to excavation at each exploratory hole position as part of the ground investigation in order to clear the excavation for UXO.

4.2 Site Access Routes

As noted in Section 3.2 above, an initial visual assessment of the local road network was carried out, to establish viable options for construction traffic site access. It should be noted again however, that this was purely an initial overview, and did not target particular areas or specific road improvements.

As the project progresses, a more detailed appraisal and specific design proposal exercise will be carried out.

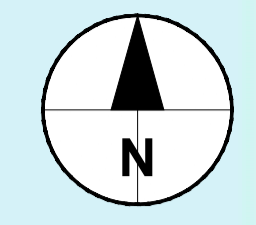
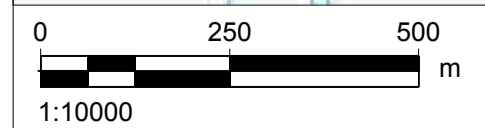
The assessment concluded that many of the options noted above are potentially viable, but it is noted that these options may be affected by such factors as cost, landowner agreements, environmental constraints, etc. Further discussion between Shetland Space Centre, Shetland Island Council, and local landowners will be required.

A development strategy considering short-term and long-term works, and a phased approach based on the preferred route should be adopted. As the project develops, scheme drawings showing layouts, alignments, typical widths, vertical geometry, localised widening, and additional passing places will be developed.

Appendix A Drawings



LOCATION PLAN (NOT TO SCALE)

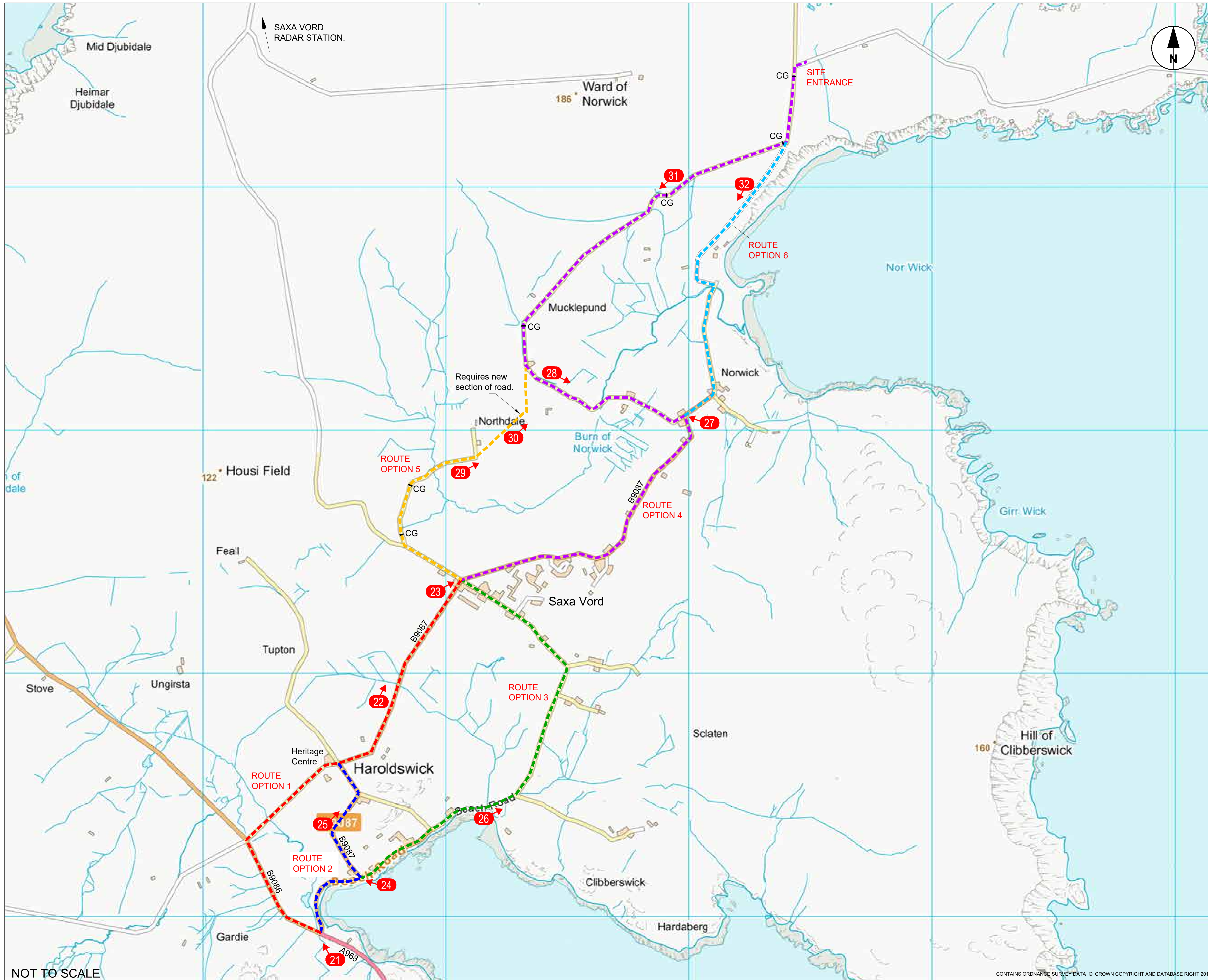


ISSUE/REVISION				
Rev	Date	Description	Dm/Chk/Appr	

Key Plan

Purpose Of Issue
FOR INFORMATION
Project Number
60617516
Sheet Title
SITE PLAN

Sheet Number
60617516-ACM-XX-00-DR-CE-0001
Scale: 1:10,000 **Rev:**



- Notes**
- ROUTE OPTION 1
 - ROUTE OPTION 2
 - ROUTE OPTION 3
 - ROUTE OPTION 4
 - ROUTE OPTION 5
 - ROUTE OPTION 6

21 PHOTOGRAPH LOCATION & DIRECTION
 REFER TO AECOM SITE APPRAISAL REPORT FOR PHOTOGRAPHS.

ISSUE/REVISION

Rev	Date	Description	Dwn/Chk/Appr

Key Plan

Purpose Of Issue
 FOR INFORMATION
Project Number
 60617516
Sheet Title
 SITE ACCESS OPTIONS -
 SAMPLE PHOTOGRAPH
 LOCATIONS
Sheet Number
 60617516-ACM-XX-00-DR-CE-0015
Scale: Not to scale **Rev:**

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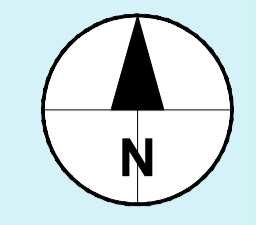
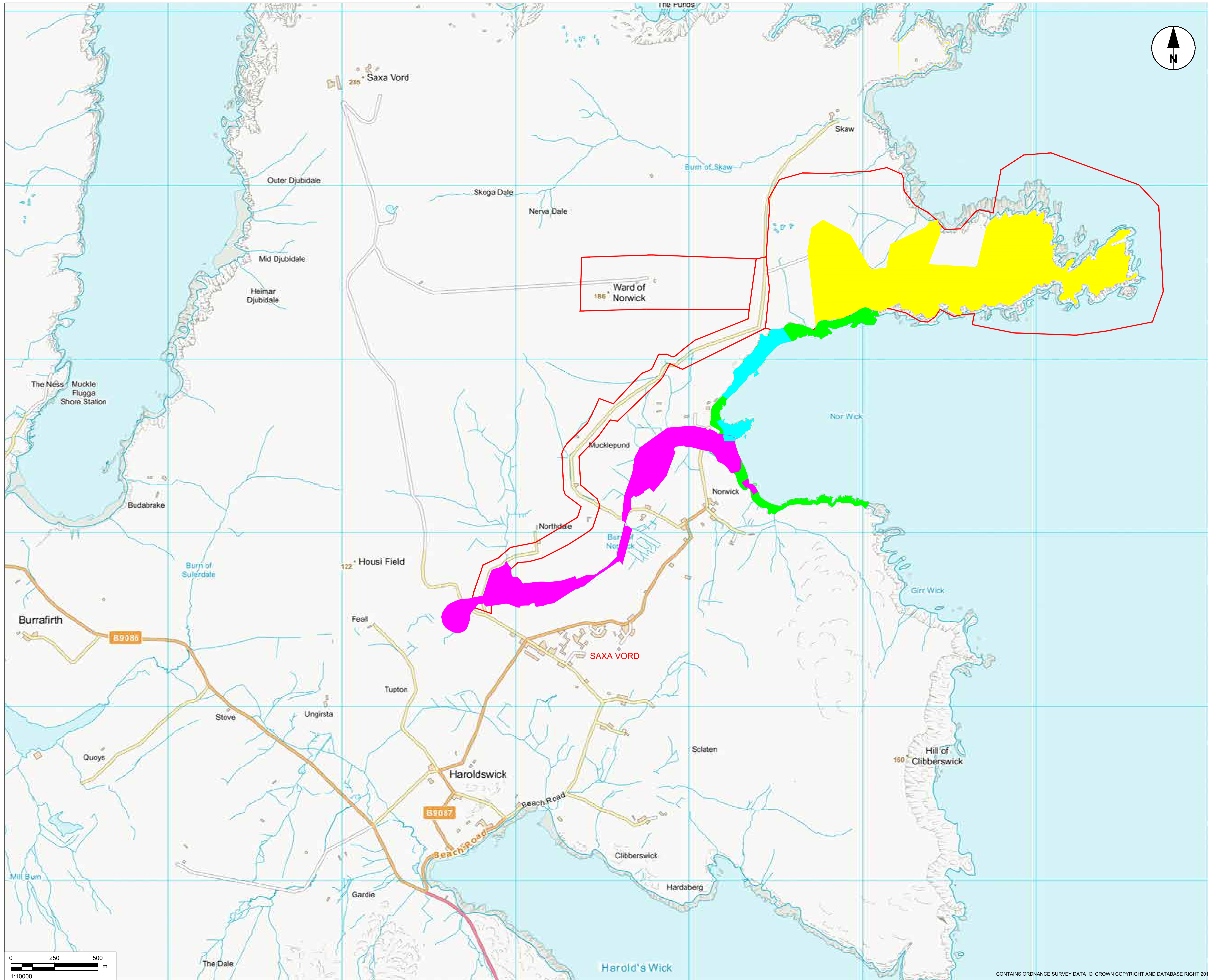


Notes

- 01** PHOTOGRAPH LOCATION & DIRECTION
 REFER TO AECOM SITE APPRAISAL REPORT
 FOR PHOTOGRAPHS

ISSUE/REVISION			
Rev	Date	Description	Rev/Change

Key Plan



Notes

- REDLINE APPLICATION BOUNDARY
- SCHEDULED MONUMENT SITE
- GEOLOGICAL CONSERVATION SITE
- NORWICK MEADOWS SSSI SITE
- NORWICK SSSI SITE

ISSUE/REVISION

Rev	Date	Description	Dn/Chk/Appr
A	05/12/19	FIRST ISSUE	BS/DR/CGY

Key Plan



Purpose Of Issue

FOR INFORMATION

Project Number

60617516

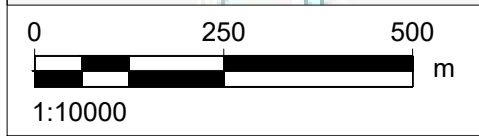
Sheet Title

CONSTRAINTS PLAN

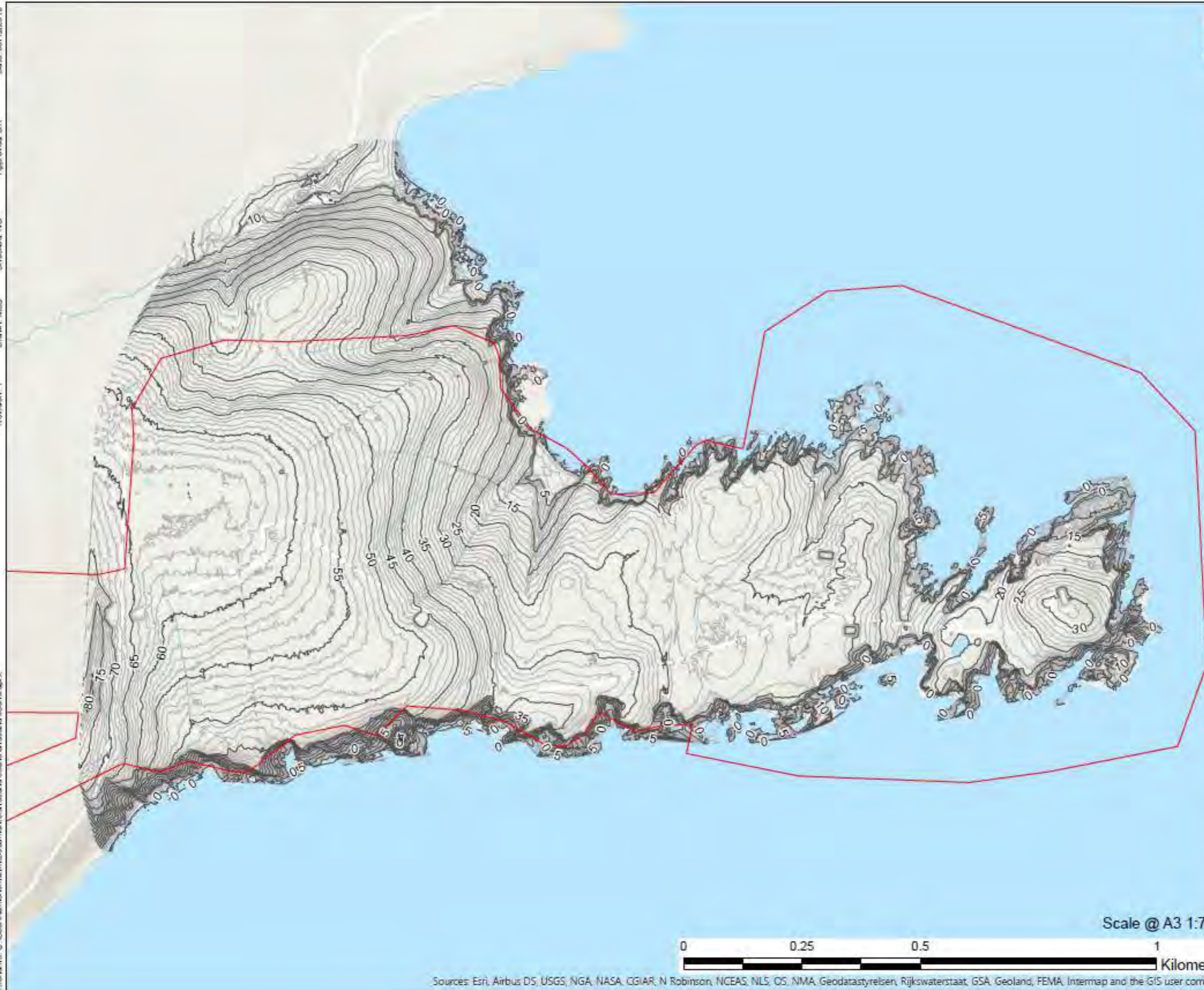
Sheet Number

60617516-ACM-XX-00-DR-CE-0012

Scale: 1:10,000 Rev: A



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NOTES

ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

60617516

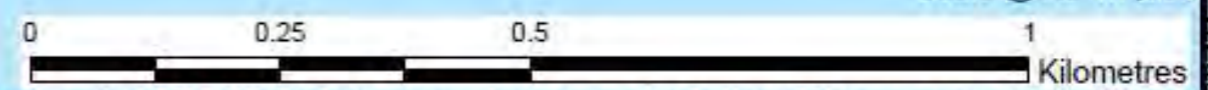
SHEET TITLE

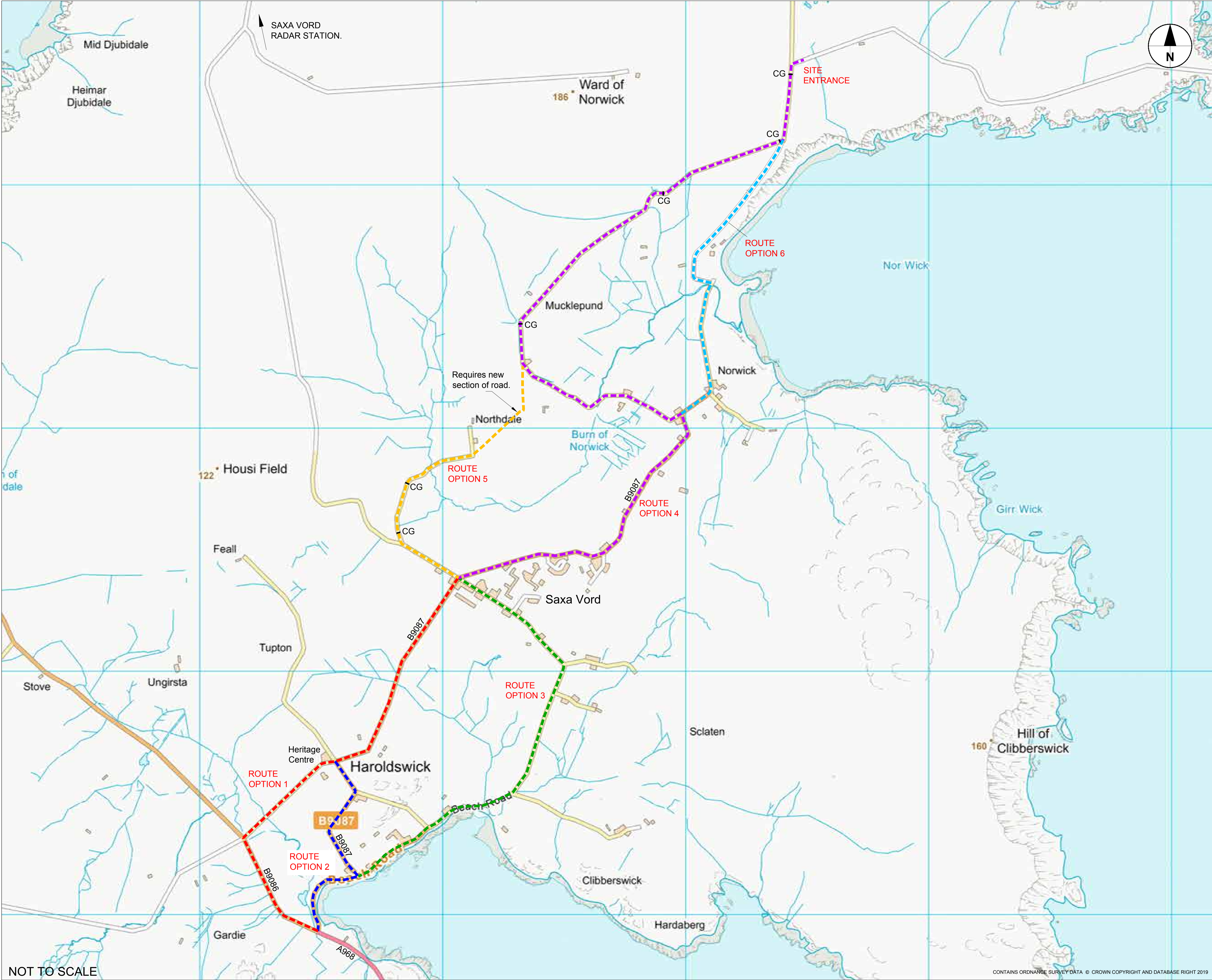
LiDar Contoured Plan

SHEET NUMBER

60617516-ACM-XX-00-DR-CE-0010

Scale @ A3 1:7,500





NOT TO SCALE

CONTAINS ORDNANCE SURVEY DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2019

- Notes**
- ROUTE OPTION 1
 - ROUTE OPTION 2
 - ROUTE OPTION 3
 - ROUTE OPTION 4
 - ROUTE OPTION 5
 - ROUTE OPTION 6

ISSUE/REVISION

Rev	Date	Description	Dwn/Chk/Appr

Key Plan

Purpose Of Issue
 FOR INFORMATION
Project Number
 60617516
Sheet Title
 SITE ACCESS - ROUTE OPTIONS
Sheet Number
 60617516-ACM-XX-00-DR-CE-0003
Scale: Not to scale **Rev:**

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LEGEND

- Redline Application Boundary
- Contours - 5m
- Slope Angle**
- Value**
- ≤ 2
- ≤ 4
- ≤ 6
- ≤ 8
- ≤ 11
- ≤ 14
- ≤ 17
- ≤ 21
- ≤ 30
- ≤ 45
- ≤ 90

NOTES

ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

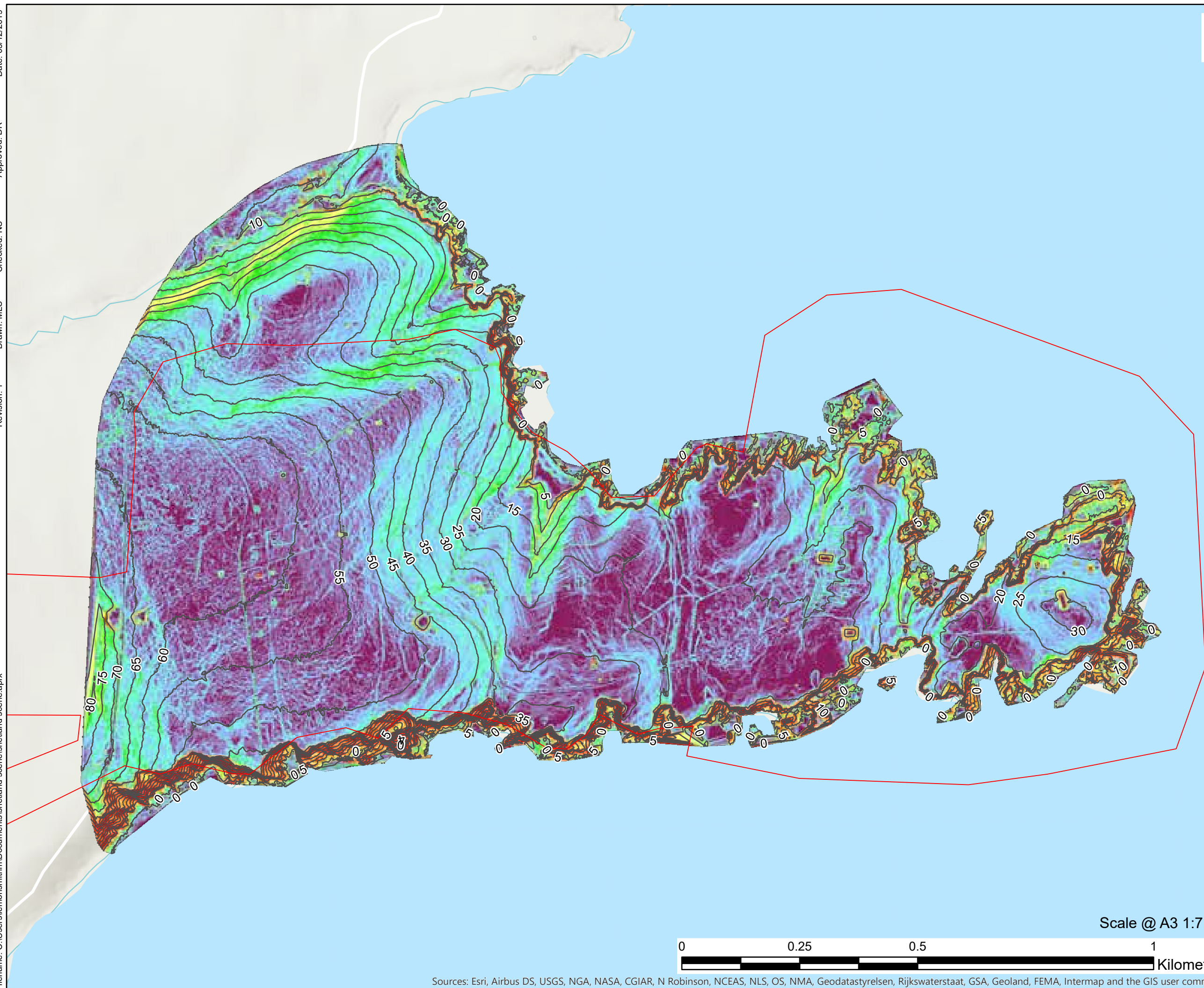
60617516

SHEET TITLE

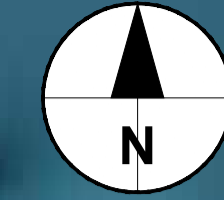
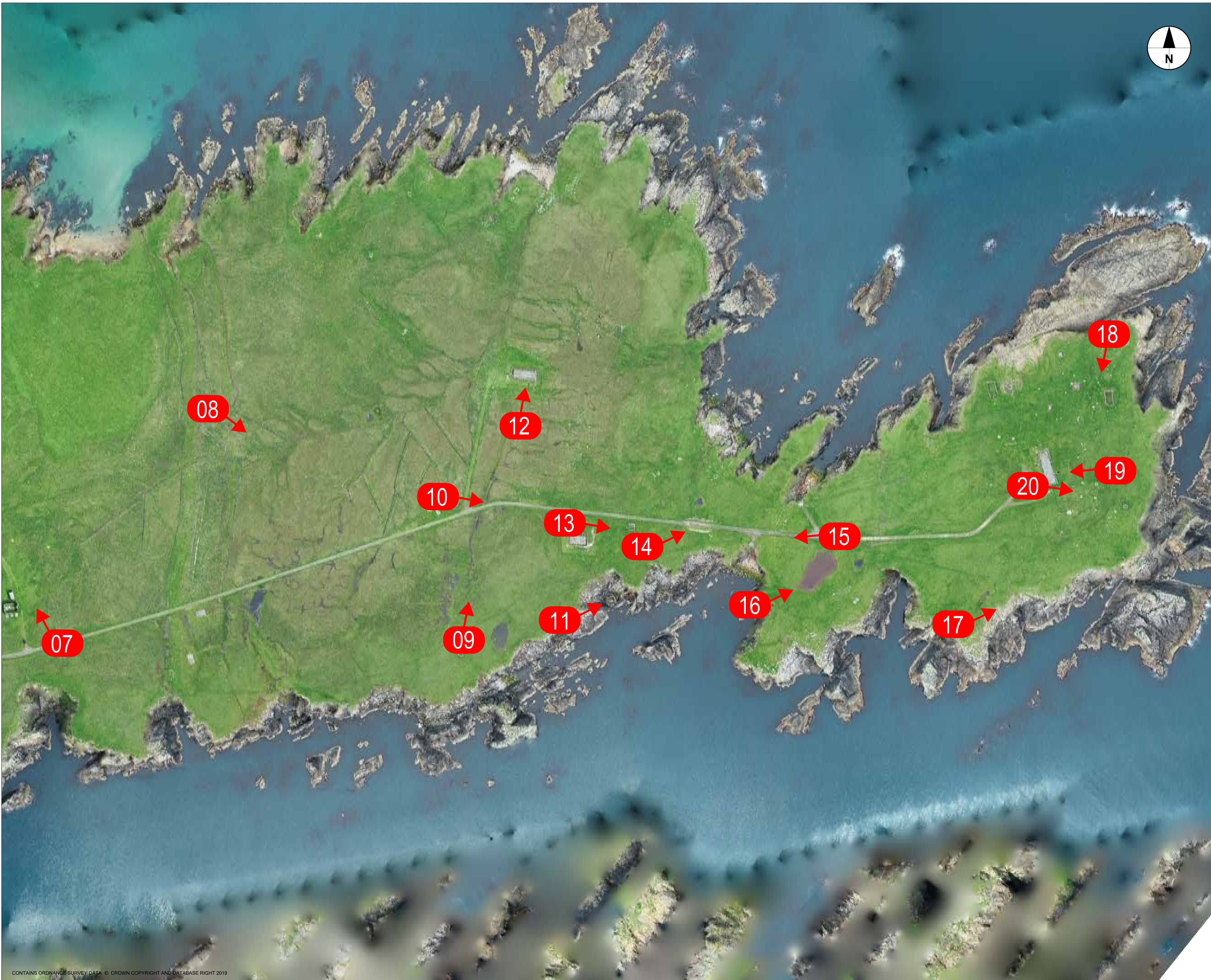
LiDar Slope Angles Plan

SHEET NUMBER

60617516-ACM-XX-00-DR-CE-0011



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Notes

01 PHOTOGRAPH LOCATION & DIRECTION

REFER TO AECOM SITE APPRAISAL REPORT FOR PHOTOGRAPHS.

ISSUE/REVISION			
Rev	Date	Description	Dwn/Chk/Appr

Key Plan

Purpose Of Issue
 FOR INFORMATION

Project Number
 60617516

Sheet Title
 SAMPLE SITE PHOTOGRAPHS
 LOCATION PLAN 2

Sheet Number
 60617516-ACM-XX-00-DR-CE-0014

Scale: Not to Scale **Rev:**

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Appendix B Site History

Anecdotal Information

Source

Description

https://en.wikipedia.org/wiki/Skaw,_Unst

During World War II, the Royal Air Force built the Chain Home Radar Station at Skaw. A combined Coastal Defence U-boat and Chain Home Low station was also built at Saxa Vord; after the war this became a ROTOR radar station. RAF Saxa Vord continued as a radar station after the end of the ROTOR programme.

http://ahistoryofrafsaxavord.blogspot.com/2018/04/a-history-of-raf-skaw-ames-no56-part-1.html?sm_au=iVV0NJ3F3fj340nHkM MGvK6FH3tTM

In November 1940 servicemen arrived on Unst to begin construction of the RAF "Radar" base at Skaw.

The Advance Chain Home (ACH) elements labelled were 3 brick built blast walls - each of the three would have protected a wooden hut, and the metal mountings for two 90' (27m) wooden towers.

one of the servicemen in the first batch to arrive, describes the accommodation thus: *The domestic site, which was about half a mile inland from the point, consisted of about 7 large nissen huts and one small one. Four of these were our billets, 2 were stores huts and the remaining one was two-thirds the dining hall and one-third canteen. The small one was the CO's Quarters.*

The equipment shipping list also included 105' guyed masts (number unspecified).

Any airman who thought that a posting to the remote island of Unst would be a "safe billet, away from enemy action" had a rude awakening quite early on. Another quote, this time from Freddie Flowers: *"We had been on site for 3 or 4 weeks, when one morning we were all indoors keeping warm when suddenly a Dornier appeared at about 500' machine gunning our living quarters. He circled us 2 or 3 times and you could clearly see the gunners shooting at us. At the first shots we ran outside with our rifles, which were the only defence we had, and I, like most of the others, took cover behind a tuft of grass and returned his fire. Our C.O. was rushing about firing his revolver into the air and shouting "take cover". Behind what I am not sure.*

The technical site, which was not yet operational, was not attacked. On checking the damage, we were amazed to find no one had been hurt. Our billets were full of holes and so were our clothes and equipment which were hanging on the walls. The worst was the dining hall, the tables were riddled with bullets. Bottles of sauce, glass and crockery were in pieces. If we had been eating at the time of the attack there would have been many casualties.

As a result of this attack, a detachment of Argyle and Sutherland Highlanders were sent to defend us and two or three machine gun posts were established. About a week after their arrival, one evening they broke into the storeroom and drank the entire stock of rum, The snow was about 3 feet deep and we had to search the area in the dark to get them all inside before they froze to death. We were not pleased but, I'm pleased to say, the rum was replaced".

<https://ahistoryofrafsaxavord.blogspot.com/2018/10/a-history-of-raf-skaw-ames-56-post-war.html>

With the discovery of North Sea Oil two new masts were erected for navigation/communication purposes. The first, and smaller of the two, was erected just to the south of the old CH Receiver Block. It was owned by Racal Survey Norway and operated as part of a system called Deltafix.

Also on site was a 300' guyed mast from Racal Survey

From the Mid 50's both the RAF and the Admiralty had personnel at Saxa. Unfortunately people generate rubbish and, in the days before the Council accepted responsibility for removing domestic waste from service establishments, much of it was disposed of at the site of RAF Skaw using 2 tipping points (use dependent upon wind direction and strength). It is possible that these two places were in use during WWII but I have no record of that. The first tipping point, to the south, was into an area called The Mooasunds.

<https://ahistoryofrafsaxavord.blogspot.com/2018/10/a-history-of-raf-skaw-ames-56-post-war.html>

Another activity in the 70's, which would be strongly discouraged nowadays, was the use of a structure built in 1940 as part of the RAF Skaw Advance Chain Home radar site, for fire practice.

http://ahistoryofrafsaxavord.blogspot.com/2018/05/a-history-of-raf-skaw-ames-56-part-2.html?sm_au=iVV0NJ3F3fj340nHkM MGvK6FH3tTM

Whilst the staff of the ACH were concentrating on their operational role they would have been very aware of the massive construction project taking place around them. A 240' receiver tower was being erected just 60 yards south of their transmitter hut and the large CH Receiver Bunker was being prepared just beyond the tower.

During Mar 41 German aircraft attacked the station twice. At about 17.00 on 26 Mar an unidentified intruder approached from the east at about 200'. It was snowing at the time and the visibility was poor. Four bombs were dropped into the sea close to the ACH Transmitter Hut near the point of Lamba Ness. The aircrafts wing clipped a top corner section of a 240' Receiver Tower, which was not yet operational. It is possible that the bombs had been jettisoned when the

Source

Description

pilot saw the tower suddenly looming into view through the falling snow. Luckily, the Riley and Neat workmen who had erected the tower, were still at Skaw and were able to repair the damage. The following morning at about 08.15 there was another attack and this time the enemy aircraft was identified - it was a JU88.

Two 250Kg bombs were dropped from around 400'. They hit the ground about 100 yards from the CH Transmitter block, which was still under construction, and about 600 yards west of the ACH Ops/Tech site.

The "standard" East Coast CH Transmitting Tower, which was used at the early sites was very different from the later towers used at what were known as the West Coast sites. The East Coast Tower was designed to be just under 360' high, with 3 cantilevers (the bits sticking out) at 50', 200' and 350'.

A pipe was then laid about a mile to the western side of the camp where tanks had been made to purify and contain the water, whilst still providing enough height to allow a sufficient gradient for the water to flow around the station as required. The distance from the water tank to the CH Receiver Block was roughly a mile and a half.

The ACH was fully functional but the CH Site was growing all around the operators & technicians as they performed their duties. By the first week in April 1941 the two 360' (109m) Transmitter Towers and one of the 240' (73m) Receiver Towers were in position, ready for fitting parties to arrive to assemble and start to fit the electrical components.

Four sites were selected and prepared before the first 2 guns, with crews, arrived in Jan '42.

On the following day, 5 Oct, RAF Skaw was subjected to an attack by a JU88. The aircraft appeared suddenly out of the mist, gave a short burst of machine-gun fire and dropped **4 bombs**. Three of these bombs exploded causing no casualties but they did cause a temporary disruption to communications on camp. A bomb disposal team was unable to find the fourth bomb, only managing to locate its tail fin - the rest may have ended up in the sea.

On the 15th at about 13.20 there was a hit and run attack on the main Domestic site by a JU88. The aircraft dropped a **single 500Kg bomb** to the NW of the site, it bounced over the accommodation buildings, bounced for a second time and then **exploded** harmlessly in a field. Bursts of machine gun fire caused hits on some of the huts but no one was injured.

Another hit and run attack by a JU88 happened on the 4th January 1942 during a severe snow storm. **Two bombs fell in the sea** and a burst of machine gun fire was ineffectual, with no casualties or damage caused.

<http://portal.historicenvironment.scot/designation/SM13097>

Over 100 aircraft observations were recorded in 1941 by radar at Skaw and the complementary Chain Home Low station at Saxa Vord. Some of these targets were not intercepted and, as a result, the bombing of various targets in Shetland was successful. Skaw itself bears the (surviving) scars of two such attacks.

This monument is of national importance because it has an inherent potential to make a significant addition to the understanding of the past, in particular the advance of radar technology and the development of an early warning system protecting the sea and airspace around the United Kingdom. It survives in good condition as a complete example of the technical, support and domestic buildings and structures necessary to provide an early warning reporting function. The loss of the monument would significantly diminish our future ability to appreciate and understand the scale of the efforts employed on the home front in the defence of Britain.

Appendix C Scheduled Monument



SCHEDULED MONUMENT

“The monument comprises the remains of a Second World War Chain Home radar station. The station is spread over two sites, a main and a reserve site, with over 50 buildings and structures reflecting its core early warning function and with supporting infrastructure and domestic blocks. The radar complex is the furthest north of its type in the United Kingdom. It is located on rough grazing land over two headlands (Lamba Ness and Blue Jibs) at the northeast corner of Unst.

This extensive complex includes a variety of concrete and brick buildings and structures, some of which are heavily protected with blast walls. The site includes four key elements: buildings and structures for signal receiving and transmitting; defensive structures built to protect the complex; supporting infrastructure to service the radar function; and domestic buildings to house the military personnel stationed here. The reserve site, to the north of the main complex, comprises the essential components for transmission, reception and defence only. The main complex covers an area of Lamba Ness approximately 1800m long by 450m wide. The reserve site has a more compact footprint covering an area approximately 200m long by 200m wide.

The area to be scheduled comprises two irregular-shaped polygons and includes the remains described above and an area around them within which evidence relating to the monument's construction, use and abandonment may survive, as shown in red on the accompanying map. Specifically excluded from the scheduled area are the above-ground elements of a modern transmission mast, its anchor points, cabling and cable channelling and associated maintenance cabin, the above-ground elements of an electricity transmission line and its anchor points, the above-ground elements of all modern farm buildings, the above-ground elements of a small building to the immediate north of the building known as 'the engine house', all modern boundary features not associated with the original function of the site, all cattle grids, the above-ground elements of interpretative signage and the uppermost surface of the metalled access track, to allow for their maintenance.

Cultural Significance

The monument's cultural significance can be expressed as follows:

Intrinsic characteristics

This is a remarkably well-preserved military complex dating to the early 1940s. Its function was to warn the military authorities of the position, course and speed of aircraft observed in the radar's transmission area. The eastern edge of the main site was where the technical buildings and structures were erected: the receiving and transmitting masts and buildings. The masts here were over 100m tall, while the processing rooms were heavily reinforced to survive direct hits from airborne ordnance. Only the metal anchor points and concrete plinths survive from the masts, but the transmission and receiving blocks are remarkably intact with several fixtures in situ and most of their structure intact. The support elements were positioned further inland and included the powerhouse, guardrooms and anti-aircraft positions, among other structures. These tend to survive in a ruined state, but with their individual footprints and lower structure clearly visible. The brickwork and brick manufacturer (ETNA and Edinburgh brickworks) are also clearly visible. Lastly, the domestic part of the site at its western edge includes all the elements necessary to sustain the RAF workforce. These include the accommodation blocks, ammunition stores, ablution units, cookhouse, decontamination building, air raid shelters, medical block, motor transport housing, a cinema and an outdoor boxing ring. They tend to survive as the low courses and foundations of individual buildings, or as simple concrete pads marking the building's outline. In many cases the anchor points used to secure the roof structure (against extreme weather conditions) also survive, and in one case, the decontamination block, the building is roofed and generally intact.

This is a very coherent monument which has survived as an intact complex. It had a short lifespan during World War Two and reflects the functional and technical nature of Britain's early warning radar network.

Contextual characteristics

The complex at Skaw is part of the wider network of early warning radar stations developed in the 1930s and laid out along the coastline of Britain. By the end of 1945 there were over 300 such sites across Britain providing early warning reports for the overall air and sea defence of the nation. Skaw was one of the first batch of stations to be built (known as Chain Home) and was operational in 1941. It was one of approximately 17 that were built in Scotland and it provided radar cover for approaching airborne targets up to 100 miles away. It could not, however, detect low-flying or seaborne targets. This was a later development (known as Chain Home Low and Coastal Defence Chain Home) and, together with ten other radar sites in Shetland, reports from these stations allowed the military authorities to observe and intercept enemy craft attempting to cross or penetrate territorial waters, airspace or the coastline.

Following the German invasion of Norway in 1940, this early warning ability was seen as crucial for the defence of the wider United Kingdom and the development of the network, including the complex at Skaw, was brought forward as the perceived threat of invasion from Norway increased. Construction at Skaw took twice as long as many mainland counterparts because of the extreme conditions and remoteness of the location. Over 15,000 tonnes of material were transported by sea and landed at nearby Haroldswick to build the complex, which was the northernmost site in the whole Chain Home network. It was an important strategic reporting station because of the position of Shetland between mainland Europe and the Atlantic to the west.

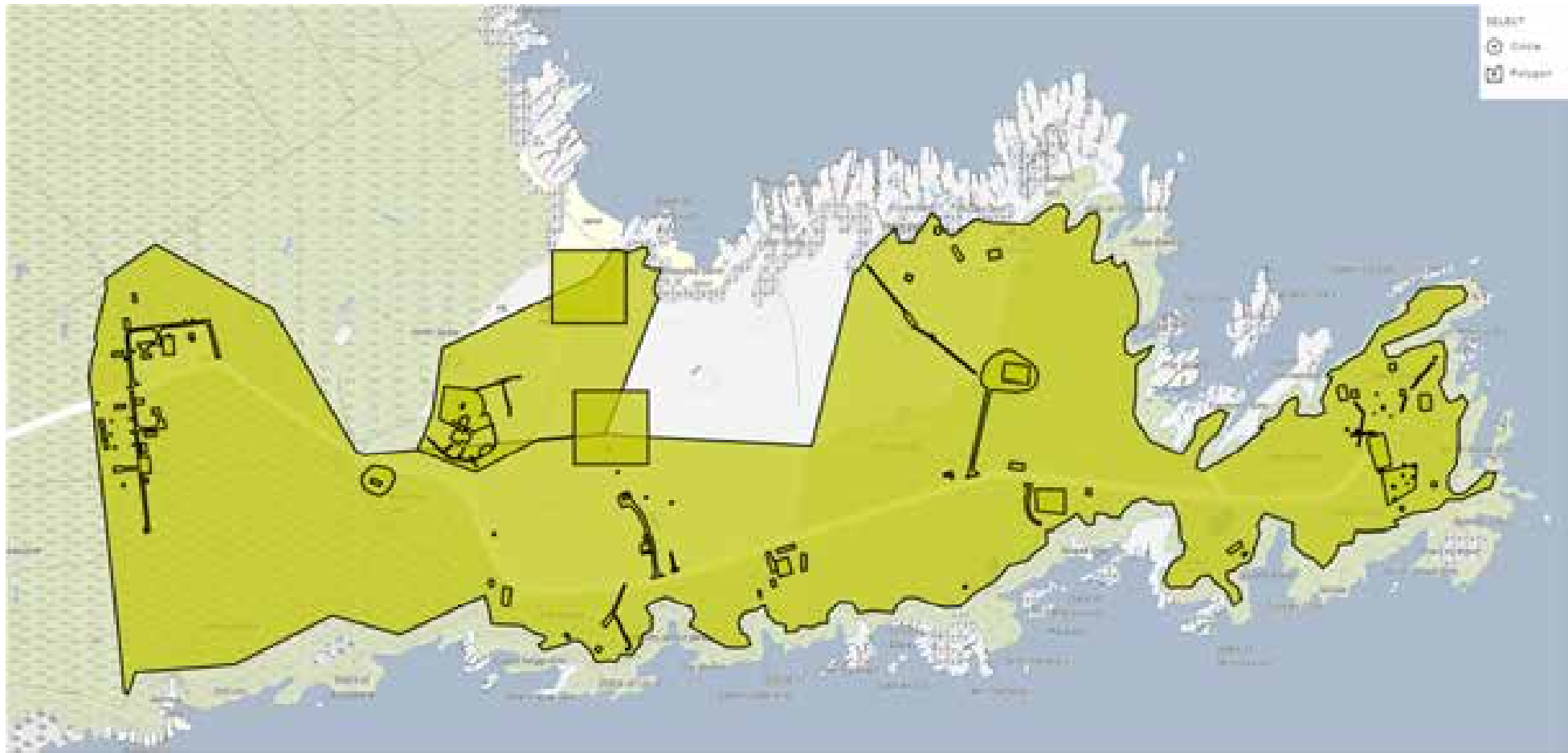
Over 100 aircraft observations were recorded in 1941 by radar at Skaw and the complementary Chain Home Low station at Saxa Vord. Some of these targets were not intercepted and, as a result, the bombing of various targets in Shetland was successful. Skaw itself bears the (surviving) scars of two such attacks.

The complex at Skaw has an important part to play in the story of the defence of the United Kingdom during World War Two. It is a good representative of its class and an important part of the mid 20th-century landscape of the Shetland Islands.

National Importance

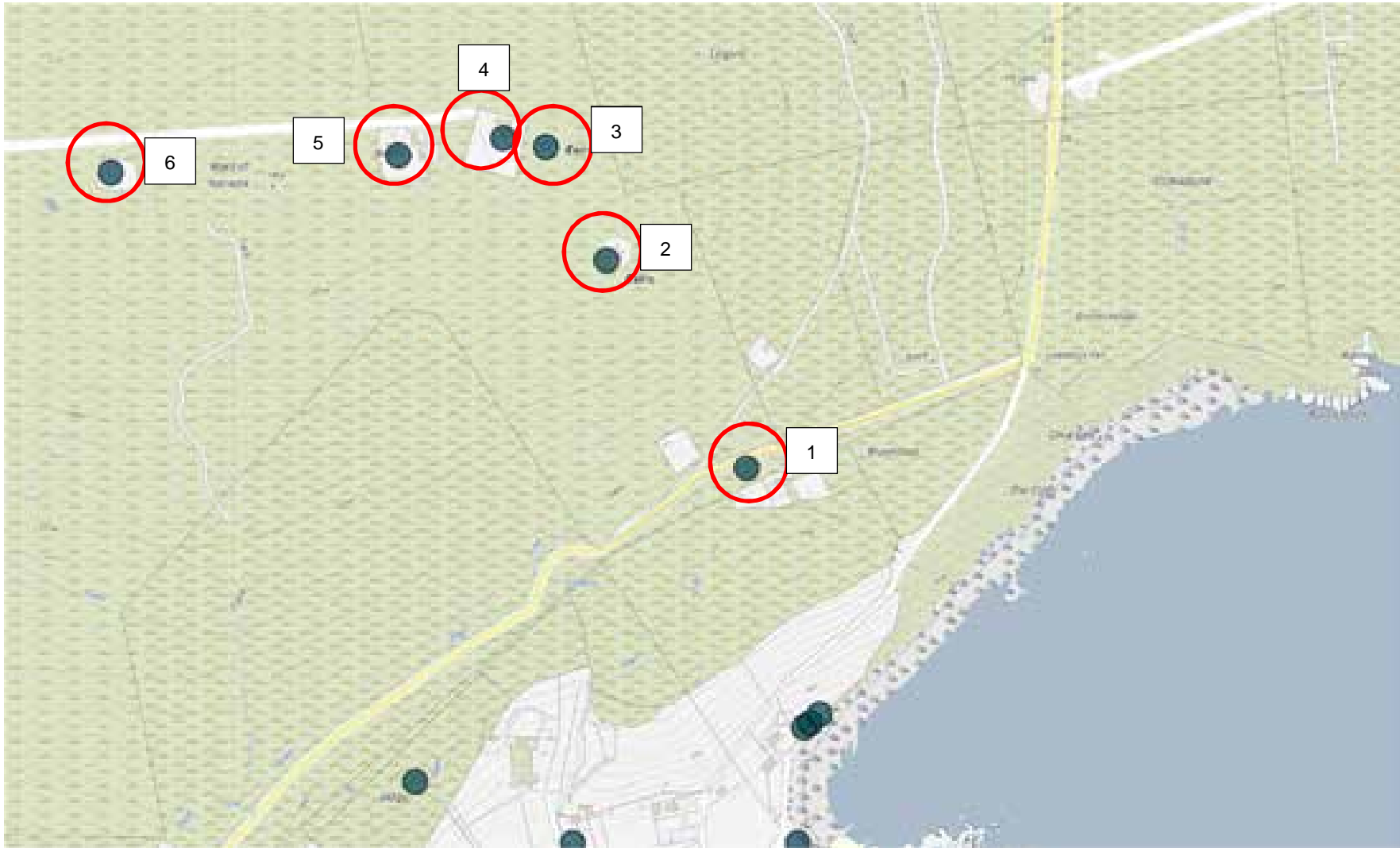
This monument is of national importance because it has an inherent potential to make a significant addition to the understanding of the past, in particular the advance of radar technology and the development of an early warning system protecting the sea and airspace around the United Kingdom. It survives in good condition as a complete example of the technical, support and domestic buildings and structures necessary to provide an early warning reporting function. The loss of the monument would significantly diminish our future ability to appreciate and understand the scale of the efforts employed on the home front in the defence of Britain."

Historic Environment Record

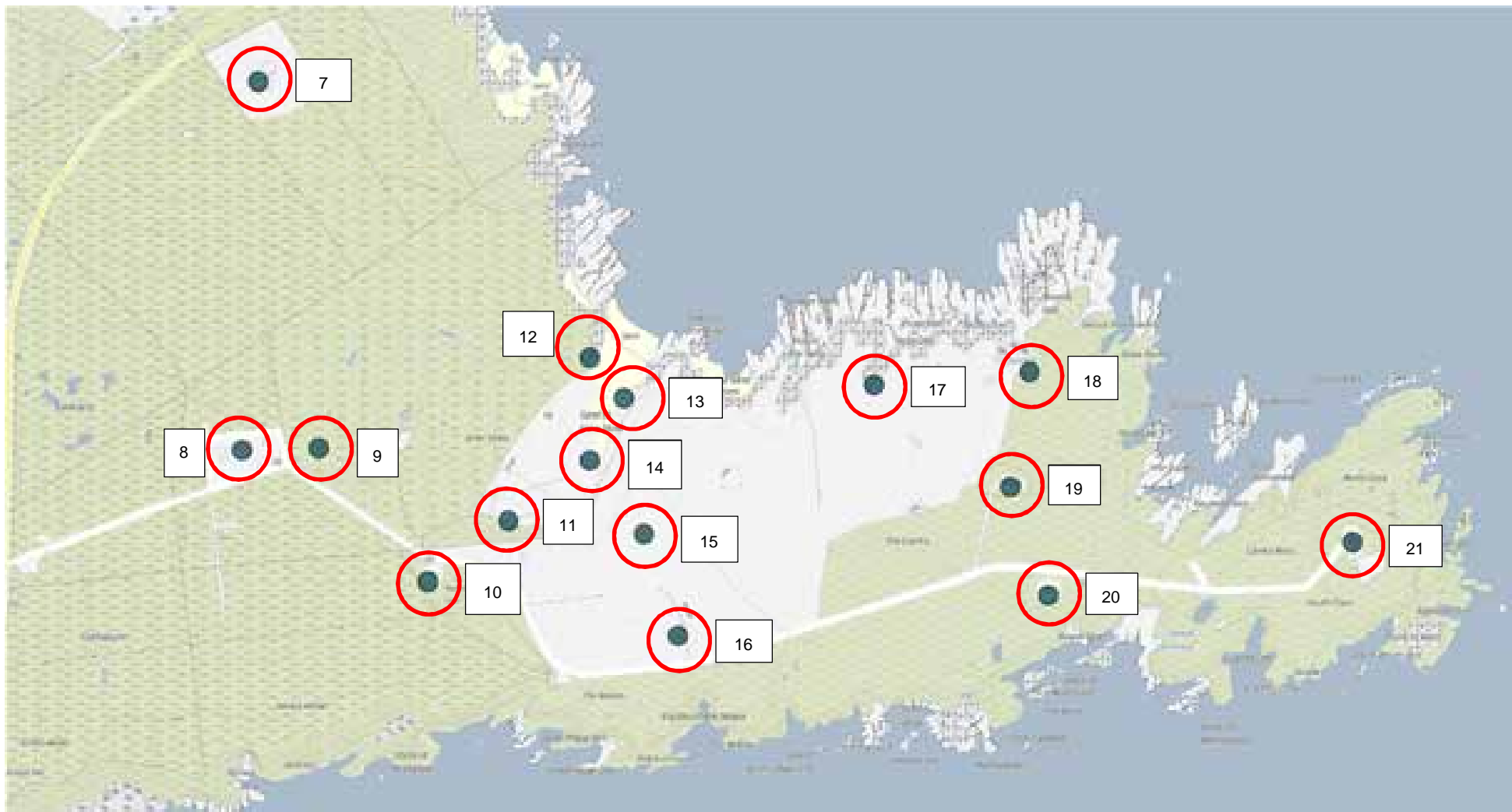


RAF Site layout is more apparent in the above, but no further information was available.

Appendix D Canmore



1. From a walkover survey in advance of refurbishment to the 11Kv hydro-electric line was undertaken in 1999, The following sites were identified: HP 6508 1506 Croft remains. Easting/Northing 465080, 1215059 and Latitude/Longitude 60° 48' 47" N 0° 48' 20" W.
2. From the OS 6" map, Shetland, 2nd ed., (1900). A possibly chambered cairn, at present about 55' in diameter, but greatly disturbed and robbed in the centre, while the encroaching growth of peat has obscured the edges. Near the centre there stands an upright stone 2'3" wide, 1' thick and 4'6" high. Another large stone lies at right angles, its east end 2'3" north of the north end of the former stones. These might be part of a chamber. Easting/Northing 464923, 1215303 Latitude/Longitude 60° 48' 55" N 0° 48' 30" W.
3. From the OS 6" map, Shetland, 2nd ed., (1900). A possibly chambered cairn which has apparently had a diameter of about 40', but seems to have spread beyond the original edge on the east side. There is a great quantity of stone in this spread and peat encroaches on the edge in the same way as over the rest of the cairn. Some recent howking has exposed a 10' length of curved outer wall-face looking to the SE. If continued the wall would enclose an area of about 25' diameter in the west or main part of the cairn. To the north of the wall-face and a little wide its presumed position is an upright stone facing east. At present there is no further sign of any structure but a modern beacon built over the centre of this part of the cairn may well overlie the chamber or cist. Easting/Northing 464846, 1215430 Latitude/Longitude 60° 48' 59" N 0° 48' 35" W.
4. Unst, Saxa Vord Classification: BUILDING (20TH CENTURY) Easting/Northing 464799, 1215438 Latitude/Longitude 60° 49' 00" N 0° 48' 38" W.
5. Unst, Saxa Vord Classification: BUILDING(S) (20TH CENTURY), RADIO MAST(S) (20TH CENTURY) Easting/Northing 464685, 1215421 Latitude/Longitude 60° 48' 59" N 0° 48' 46" W.
6. A series of four conjoined enclosures is depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1882, sheet ii). Two of the enclosures are shown on the current edition of the OS 1:10000 map (1972). Easting/Northing 464356, 1215404 Latitude/Longitude 60° 48' 59" N 0° 49' 08" W.

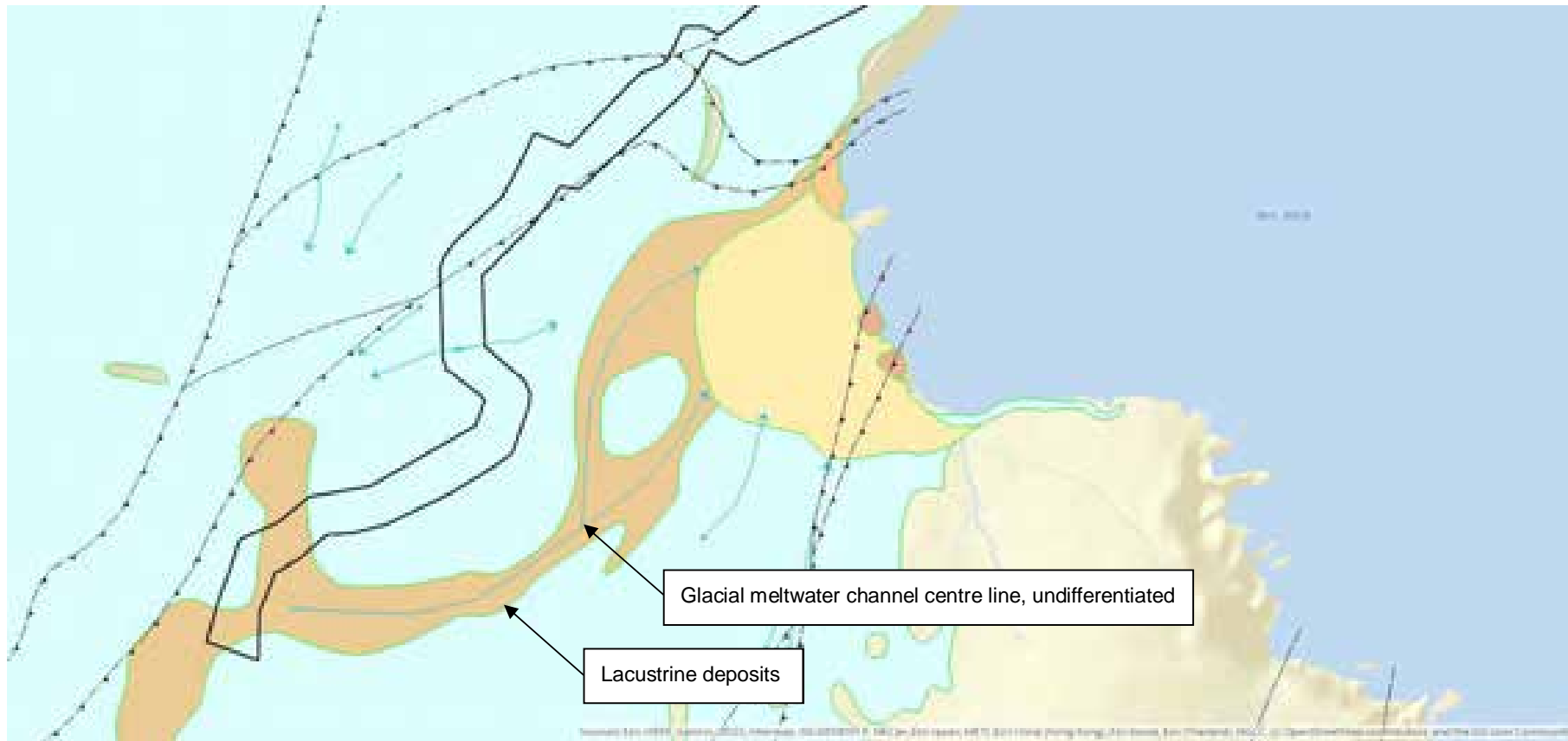


7. Skaw Classification: FARMSTEAD (PERIOD UNASSIGNED) Easting/Northing 465815, 1216210 Latitude/Longitude 60° 49' 24" N 0° 47' 30" W
8. The accommodation camp for the World War II military installations at Skaw are visible on vertical air photographs (106G/Scot/Uk 97, 3107-3108, flown 18 May 1946), in an area around Inner Skaw. At least nineteen huts are visible, most of the Nissen type, but there are two groups of four conjoined to form an E in plan. Several hut bases survive at the site and these are depicted on the current OS 1:2500 digital scale map. Easting/Northing 465786, 1215660 Latitude/Longitude 60° 49' 06" N 0° 47' 33" W

9. Inner Skaw Classification: FARMSTEAD (PERIOD UNASSIGNED) Easting/Northing 465902, 1215667 Latitude/Longitude 60° 49' 06" N 0° 47' 25" W.
10. Inner Skaw Classification: QUARRY (PERIOD UNASSIGNED) Easting/Northing 466057, 1215467 Latitude/Longitude 60° 49' 00" N 0° 47' 15" W.
11. A farmstead comprising one unroofed building of complex shape, two conjoined enclosures and one unroofed structure, three separate buildings, one of which is partially roofed (HP 6604 1552) and two are unroofed (HP 6590 1567 and HP 6602 1569), three enclosures, one unroofed structure (HP 6608 1571) and a field-system are depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1882, sheet iii). Two unroofed buildings, three enclosures, one unroofed structure and the fragmentary remains of the field-system are shown on the current edition of the OS 1:10000 map (1971). Easting/Northing 466180, 1215559 Latitude/Longitude 60° 49' 03" N 0° 47' 07" W.
12. Saddle quern: of rectangular beach-smoothed stone found at the head of the beach at the Sand of Inner Skaw. Easting/Northing 466301, 1215799 Latitude/Longitude 60° 49' 10" N 0° 46' 58" W.
13. Ashy midden material exposed to either side of a small burn leading into the sea. Numerous artefacts such as steatite vessel fragments, pottery, and stone tools have been recovered from the midden deposits. Easting/Northing 466351, 1215739 Latitude/Longitude 60° 49' 08" N 0° 46' 55" W.
14. Farmstead; Buildings; Enclosures; Structure; Field-system Easting/Northing 466300, 1215653 Latitude/Longitude 60° 49' 06" N 0° 46' 59" W.
15. Cairn (NR) (Site of). OS 6" map, Shetland, 2nd ed., (1900). An ancient cairn (Still extant). Easting/Northing 466383, 1215541 Latitude/Longitude 60° 49' 02" N 0° 46' 53" W.
16. Unst, Skaw, The Garths Classification: ENGINE HOUSE (20TH CENTURY) Easting/Northing 466431, 1215389 Latitude/Longitude 60° 48' 57" N 0° 46' 50" W.
17. One unroofed structure is depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1882, sheet iii), but it is not shown on the current edition of the OS 1:10000 map (1971). Easting/Northing 466722, 1215759 Latitude/Longitude 60° 49' 09" N 0° 46' 31" W.
18. Four unroofed structures are depicted on the 1st edition of the OS 6-inch map (Orkney and Shetland (Shetland) 1882, sheet iii). Two unroofed structures and an enclosure are shown on the current edition of the OS 1:10000 map (1971). Easting/Northing 466951, 1215783 Latitude/Longitude 60° 49' 09" N 0° 46' 15" W.
19. A Chain Home radar station situated on The Skaw, Unst. The installations and buildings cover a large area of The Skaw where the transmitter block, receiver block, engine houses, mast bases and light anti-aircraft emplacements are still to be seen. Easting/Northing 466921, 1215611 Latitude/Longitude 60° 49' 04" N 0° 46' 18" W.
20. Unst, Skaw, The Garths Classification: ENGINE HOUSE (20TH CENTURY) Easting/Northing 466977, 1215447 Latitude/Longitude 60° 48' 59" N 0° 46' 14" W.
21. Unst, Skaw, The Garths Classification: RADAR SITE (SECOND WORLD WAR) Easting/Northing 467428, 1215523 Latitude/Longitude 60° 49' 01" N 0° 45' 44" W.

Appendix E Geology

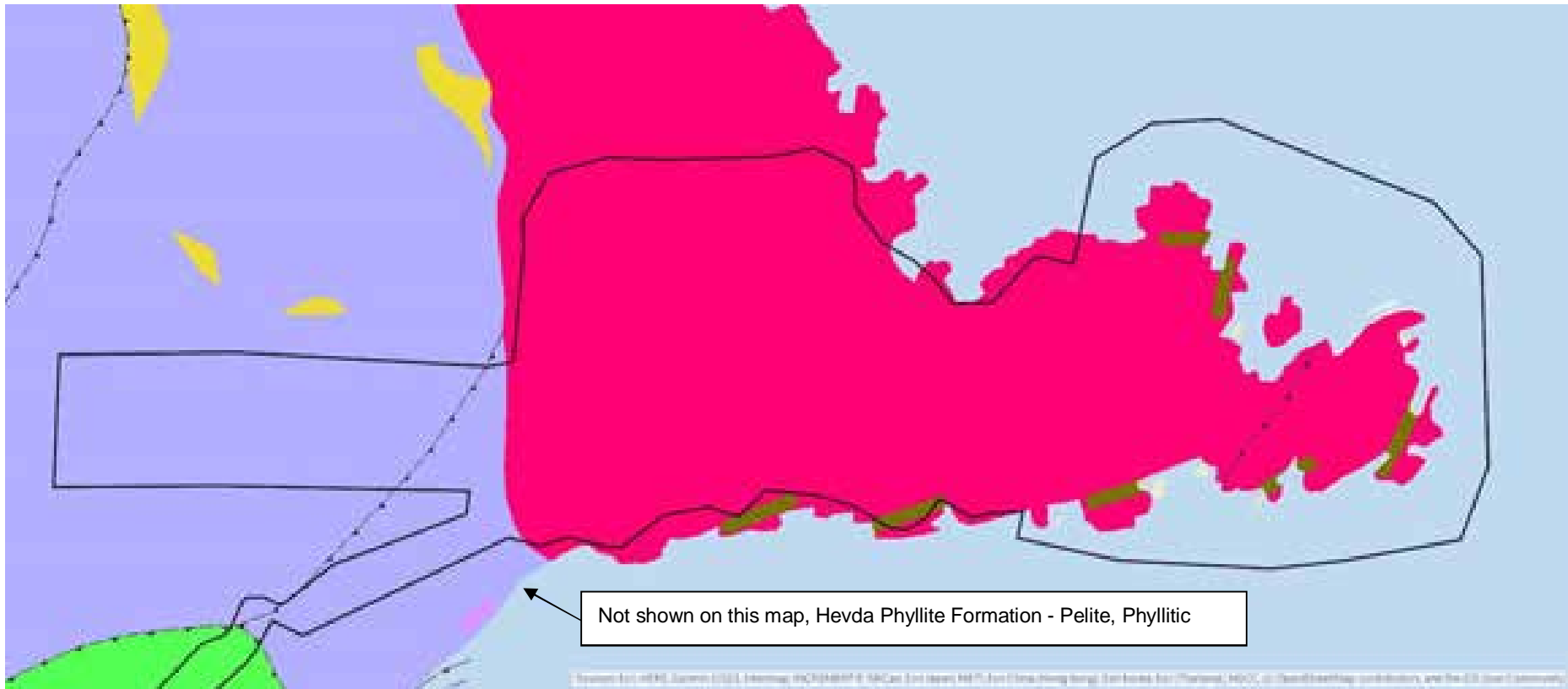
DRIFT GEOLOGY



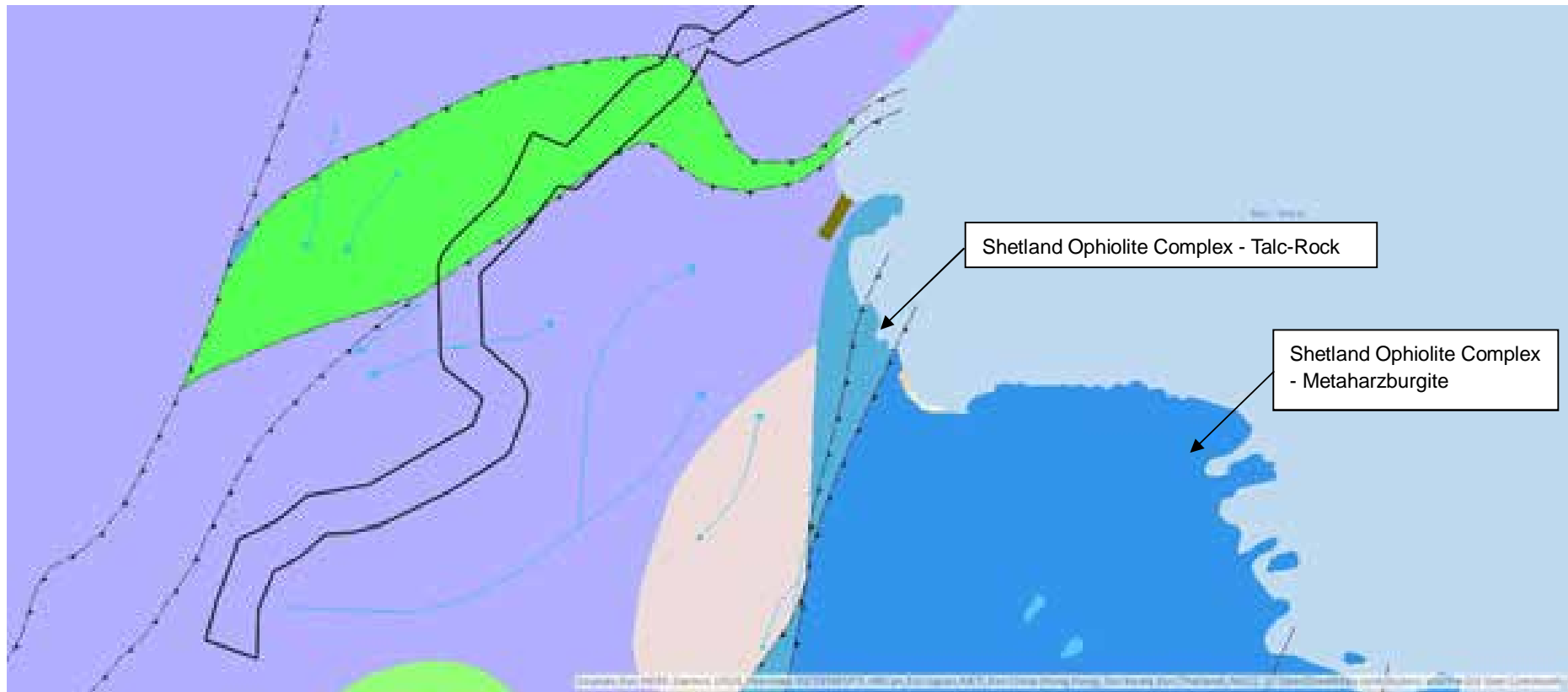
Legend

	No data, potentially shallow bedrock
	Till and Morainic Deposits (Undifferentiated) - Diamicton
	See plan
	Blown Sand - Sand

SOLID GEOLOGY



SOLID GEOLOGY



Legend

	SAXA VORD PELITE FORMATION - PELITE, PHYLLITIC (S) and HEVDA PHYLLITE FORMATION - PELITE, PHYLLITIC (H) and NORWICK PHYLLITE FORMATION - PELITE, PHYLLITIC (N)
	Norwick Graphitic Schist Formation - Phyllitic Semipelite And Quartzite
	Norwick Hornblending Schist Type 1 - Metabasalt, Phyllitic
	North Britain Siluro-Devonian Calc-Alkaline Dyke Suite - Lamprophyre
	Skaw Intrusion - Microgranite, Porphyritic
	Hevda Phyllite Formation - Quartzite

Appendix F Unexploded Ordnance

Pre-Desk Study Assessment

Site:	Skaw Site, Unst, Shetlands
Client:	AECOM
Contact:	Bruce Shearer
Date:	14 th November 2019
Pre-WWI Military Activity on or Affecting the Site	None identified.
WWI Military Activity on or Affecting the Site	None identified.
WWI Strategic Targets (within 5km of Site)	None identified.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	None identified.
WWII Military Activity on or Affecting the Site	In 1940, Royal Air Force (RAF) Skaw Chain Home radar station was established on the Site. Its function was to serve as an early warning system against enemy invasion and air raids over the north of Scotland. RAF Skaw was put into care and maintenance in 1945.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: <ul style="list-style-type: none"> ■ RAF Skaw. ■ Anti-Aircraft (AA) defences.
WWII Bombing Decoys (within 5km of Site)	None.
WWII Bombing	During WWII the Site was located in the Local Authority (LA) of Zetland, which officially recorded 72No. High Explosive (HE) bombs with a regional bombing density of 0.2 bombs per 405 hectares (ha). Readily available records have been found indicating that several HE bombs fell in close proximity to the Site.
Post-WWII Military Activity on or Affecting the Site	The radar station was officially closed in 1946 and some of the buildings and installations were demolished 1947.
Recommendation	It is recommended that a detailed desk study is commissioned to assess, and potentially zone, the Unexploded Ordnance (UXO) hazard level on the Site.

This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary.

It should be noted that where a potentially significant source of UXO hazard has been identified on the Site, the requirement for a detailed desk study and risk assessment has been confirmed and no further research will be undertaken at this stage. It is possible that further in-depth research as part of a detailed UXO desk study and risk assessment may identify other potential sources of UXO hazard on the Site.

Volume Reference	Intelligence Summary	Start Date	End Date	Time	Civil Defence Re Location	Country	Killed	Injured	Total Casualties	Additional Notes	Link to Page
HO 203/6	1143	27/03/1941	27/03/1941	Day	11: Scotland Skaw	Scotland	0	0	0		http://www.warstateandsociety.com/Content/wtss.ho203/000006/001/427
HO 203/9	1529	06/10/1941	06/10/1941	Day	11: Scotland Skaw	Scotland	0	1	1		http://www.warstateandsociety.com/Content/wtss.ho203/000009/001/098
HO 203/9	1626 + 1627	23/11/1941	24/11/1941	Night	11: Scotland Skaw	Scotland	0	3	3		http://www.warstateandsociety.com/Content/wtss.ho203/000009/001/225
HO 203/9	1671	16/12/1941	16/12/1941	Day	11: Scotland Skaw	Scotland	0	0	0		http://www.warstateandsociety.com/Content/wtss.ho203/000009/001/265
HO 203/10	1709 + 1710	04/01/1942	04/01/1942	Day	11: Scotland Skaw	Scotland	0	0	0		http://www.warstateandsociety.com/Content/wtss.ho203/000010/001/010

Appendix G Site Photographs



Photograph 01 – Site entrance



Photograph 02 – Existing building



Photograph 03 – Potential LM area



Photograph 04 – Cattle grid and small quarry



Photograph 05 – Site looking east



Photograph 06 – Overhead power line



Photograph 07 – Former power station building



Photograph 08 – Typical cut drainage ditch



Photograph 09 – Areas of ponding



Photograph 10 – Access track looking east



Photograph 11 – Typical steep sea cliffs



Photograph 12 – Former Transmitter Block



Photograph 13 – Site looking east



Photograph 14 – Built-up section of access track



Photograph 15 – Access track looking west



Photograph 16 – Loch of Lambaness



Photograph 17 – Typical exposed peat



Photograph 18 – Remains of operational buildings



Photograph 19 – Former Receiver Block



Photograph 20 – Tower foundations



Photograph 21
Route option 1 – Junction of A968 / Beach Road



Photograph 22
Route option 1 – B9087 looking east



Photograph 23
Route option 1 – Junction at Saxa Vord Resort



Photograph 24
Route option 2 – Junc. of Beach Road/B9087



Photograph 25
Route option 2 – B9087



Photograph 26
Route option 3 – Beach Road looking east



Photograph 27
Route option 4 – Junction of B9087 / Holsens Road



Photograph 28
Route option 4 – Steep section of road



Photograph 29
Route option 5 – Corner at Northdale



Photograph 30
Route option 5 – Existing farm track



Photograph 31
Route option 4 – Typical road leading to site



Photograph 32
Route option 6 – Section of damaged road

Appendix H Groundsure Report

Scottish Insight

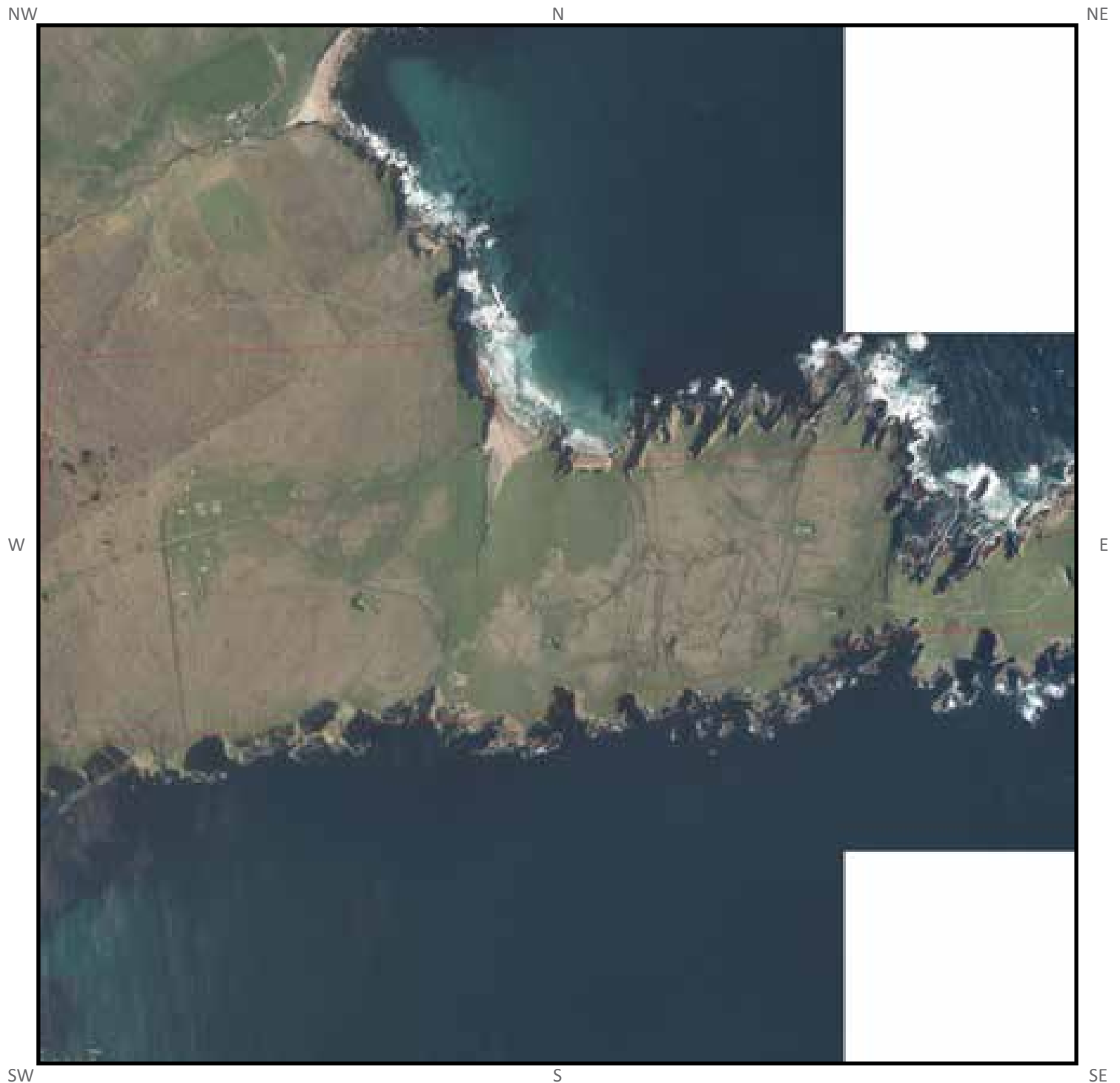
Insight Report

Date 11-11-2019	Groundsure Reference GS-6452860	Address FORMER RAF SITE, ZC600 FROM VALSGARTH ROAD (CROSSROADS) TO VALSGARTH RD (DERESTRICTION SIGN), HAROLDSWICK, UNST, ZE2 9EF
Grid Reference 465837 1215427	Your Reference Unst_Spaceport	

SITE MAP



Aerial Photograph



Aerial photography supplied by Getmapping PLC.
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Site Address: FORMER RAF SITE, ZC600 FROM VALSGARTH ROAD (CROSSROADS) TO VALSGARTH RD (DERESTRICTION SIGN),
HAROLD SWICK, UNST, ZE2 9EF
Grid Reference: 465837 1215427
Date of aerial image capture: 03-06-2016
Site Size: 105.15 ha

Overview of Findings

Report Section	Number of records found within (X) m of the study site boundary					
	On site	0-50	51-250	251-500	501-1000	1000-1500
1 Historical Industrial Sites						
1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping	0	0	2	0		
1.2 1:2,500 scale mapping – Historical Tank Database	N/A	N/A	N/A	N/A	N/A	N/A
1.3 1:2,500 scale mapping – Historical Energy Features Database	N/A	N/A	N/A	N/A	N/A	N/A
1.4 1:2,500 scale mapping – Historical Petrol and Fuel Site Database	N/A	N/A	N/A	N/A	N/A	N/A
1.5 1:2,500 scale mapping – Historical Garage and Motor Vehicle Repair Database	N/A	N/A	N/A	N/A	N/A	N/A
1.6 Potentially Infilled Land	3	0	3	0		
1.7 Historic Military and Ordnance sites	0	0	0	0		
2 Landfill and Other Waste Sites Findings						
2.1 Groundsure SEPA Landfill Sites Data	0	0	0	0	0	0
2.2 Groundsure Recorded Landfill Sites	0	0	0	0	0	0
2.3 Historic Waste Sites	0	0	0	0	-	-
2.4 Groundsure SEPA Waste Sites Data	0	0	0	0	-	-
3 Current Land Use						
3.1 Current Industrial Data	2	1	0	0		
3.2 Petrol and Fuel Sites	0	0	0	0		
3.3 Part A(1), IPPC and Historic IPC Authorisations	0	0	0	0		
3.4 Part B Authorisations	0	0	0	0		
3.5 National Grid High Pressure Gas Transmission Pipelines	0	0	0	0		
3.6 National Grid High Voltage Underground Electricity Transmission Cables	0	0	0	0		
3.7 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0		
4 Geology and Hydrogeology	Presence of Records					
4.1 Artificial Ground and Made Ground*	No					
4.2 Permability of Artificial Ground	No					
4.3 Superficial Ground and Drift Geology	No					
4.4 Permeability of Superficial Ground	Yes					
4.5 Bedrock and Solid Geology	Yes					
4.6 Permeability of Bedrock Ground	Yes					
4.7 Faults	Yes					
4.8 Landslip	No					
4.9 Landslip Permeability	No					
4.10 Groundwater Vulnerability and Soil Classification	Yes					
Source: Scale: 1:50,000 BGS Sheet						
* This includes an automatically generated 50m buffer zone around the site.						
5 Designated Environmentally Sensitive Sites						
5.1 Sites of Special Scientific Interest (SSSI)	0	1	0	0	9	0
5.2 Ramsar Sites	0	0	0	0	0	0
5.3 National Nature Reserves (NNR)	0	0	0	0	0	0
5.4 Special Areas of Conservation (SAC)	0	0	0	0	0	0
5.5 Special Protection Areas (SPA)	0	0	0	0	0	1
5.6 Local Nature Reserves (LNR)	0	0	0	0	0	0
5.7 World Heritage Sites	0	0	0	0	0	0
5.8 Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
5.9 National Parks	0	0	0	0	0	0
5.10 Green Belt	0	0	0	0	0	0
5.11 Designated Ancient Woodland	0	0	0	0	0	0

6 Flooding					
6.1 Highest risk of flooding from rivers on-site	Negligible				
6.2 Highest risk of coastal flooding on-site	1 in 75 years.				
6.3 Highest Risk of Pluvial Flooding on-site	Highly Significant				
6.4 Groundwater Flooding Susceptibility Areas	Potential for groundwater flooding at surface				
6.5 Groundwater Flooding Confidence Rating	High				
6.6 Presence of geological indicators of flooding within 250m	Yes				
6.7 Potential risk in event of a reservoir failure	No				
7 Mining					
	On site	0-50	51-250	251-500	501-1000
7.1 Historical Mining	0	0	0	0	0
7.2 Coal Mining	0	0	0	0	0
7.3 Johnson Poole and Bloomer	0	0	0	0	0
7.4 Non-Coal Mining	2	0	4	3	0
7.5 Non-Coal Mining Cavities	0	0	0	0	0
7.6 Natural Cavities	0	0	0	0	0
7.7 Brine Extraction	0	0	0	0	0
7.8 Gypsum Extraction	0	0	0	0	0
7.9 Tin Mining	0	0	0	0	0
7.10 Clay Mining	0	0	0	0	0
8 Natural Hazards Findings					
8.1 Shrink Swell	Very Low				
8.2 Landslides	Moderate				
8.3 Soluble Rocks	Negligible				
8.4 Compressible Ground	Negligible				
8.5 Collapsible Rocks	Very Low				
8.6 Running Sand	High				
8.7 Radon Potential	Between 1% and 3%				
8.8 Radon Protective Measures	Basic radon protective measures are necessary.				
9 Borehole Records					
	On site	0-50	51-250	251-500	501-1000
9.1 Borehole Records	0	0	0	0	0
10 Railways and Tunnels					
	On site	0-50	51-250	251-500	501-1000
10.1 Tunnels	0	0	0	0	0
10.2 Historical Railway and Tunnel Features	0	0	0	0	0
10.3 Historical Railways	0	0	0	0	0
10.4 Active Railways	0	0	0	0	0
10.5 Railway Projects	0	0	0	0	0
11 Soil Chemistry					
	On site	0-50	51-250	251-500	501-1000
11.1 Estimated Background Soil Chemistry	58	32	N/A	N/A	N/A
11.2 Estimated Urban Soil Chemistry	0	0	N/A	N/A	N/A
11.3 Measured Urban Soil Chemistry	0	0	0	0	0

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections,

1 Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2 Landfill and Other Waste Sites Findings

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

3 Current Land Use

Provides information on the current land use as taken from PointX data, petrol filling stations, and Part A(1), Part A(2), Part B, IPPC and IPC Authorisations and sites designated as Contaminated Land in proximity to the property.

4 Geology and Hydrogeology

Provides information on artificial and superficial deposits and bedrock beneath the study site and groundwater vulnerability and soil classification.

5 Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas and World Heritage Sites. These searches are conducted using radii of up to 2000m.

6 Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas, surface water flooding, geological indicators of flooding, reservoir failure and groundwater flood areas. This search is conducted using radii of up to 250m.

7 Mining

Provides information on areas of coal and non-coal mining.

8 Natural Hazards Findings

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence.

9 Borehole Records

Provides access to the National Geoscience Data Centre database of over a million scanned borehole, shaft and well records. This data is supplied to Groundsure by the British Geological Survey (BGS). The scanned records can be accessed by clicking on the weblinks within the data table.

10 Railways and Tunnels

Provides information on historic and current railways and tunnels, as well as data on some future rail projects.

11 Soil Chemistry

This section includes an estimation of the concentrations of selected potentially harmful elements (arsenic, cadmium, chromium, nickel and lead) in rural topsoils and of these chemical elements plus copper, tin and zinc in urban topsoils. The section also contains measurements made of urban topsoil. This data is provided by the British Geological Survey (BGS).

Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

Notes on Mapping

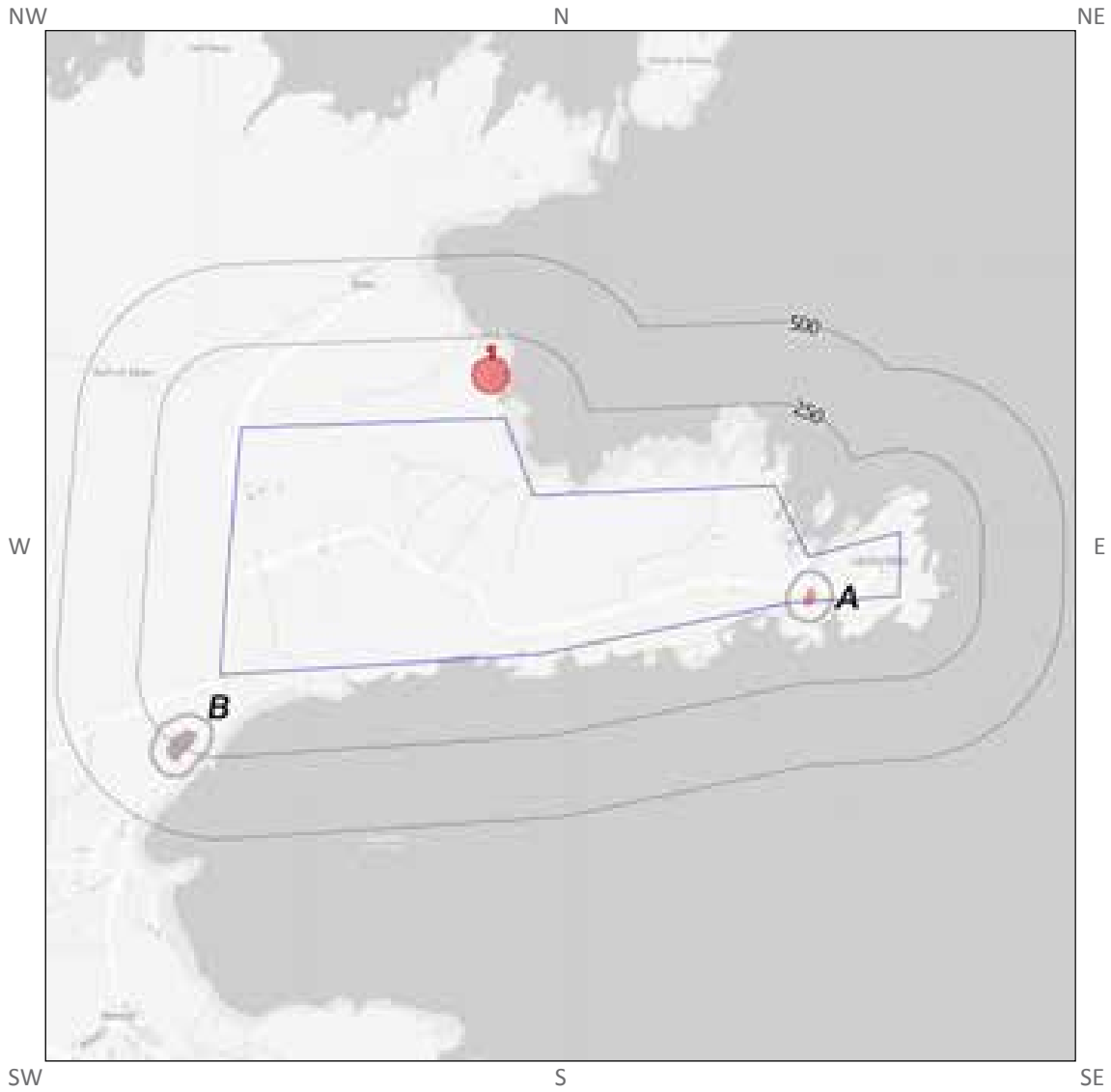
Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id, 1, Id, 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N, North, E, East, NE, North East from the nearest point of the study site boundary.

1 Historical Industrial Sites

Historical Land Use Map



Historical Land Use Map

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1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary:	2
---	---

ID	Distance (m)	Direction	Use	Date
B	191	SW	Unspecified Quarry	1900
B	191	SW	Unspecified Quarry	1878

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

No data available in this area.

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

No data available in this area.

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

No data available in this area.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

No data available in this area.

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site	6
--	---

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance	Direction	Use	Date
A	0	on site	Loch	1971
A	0	on site	Loch	1900

ID	Distance	Direction	Use	Date
A	0	on site	Loch	1878
1	76	N	Cave	1971
B	191	SW	Unspecified Quarry	1900
B	191	SW	Unspecified Quarry	1878

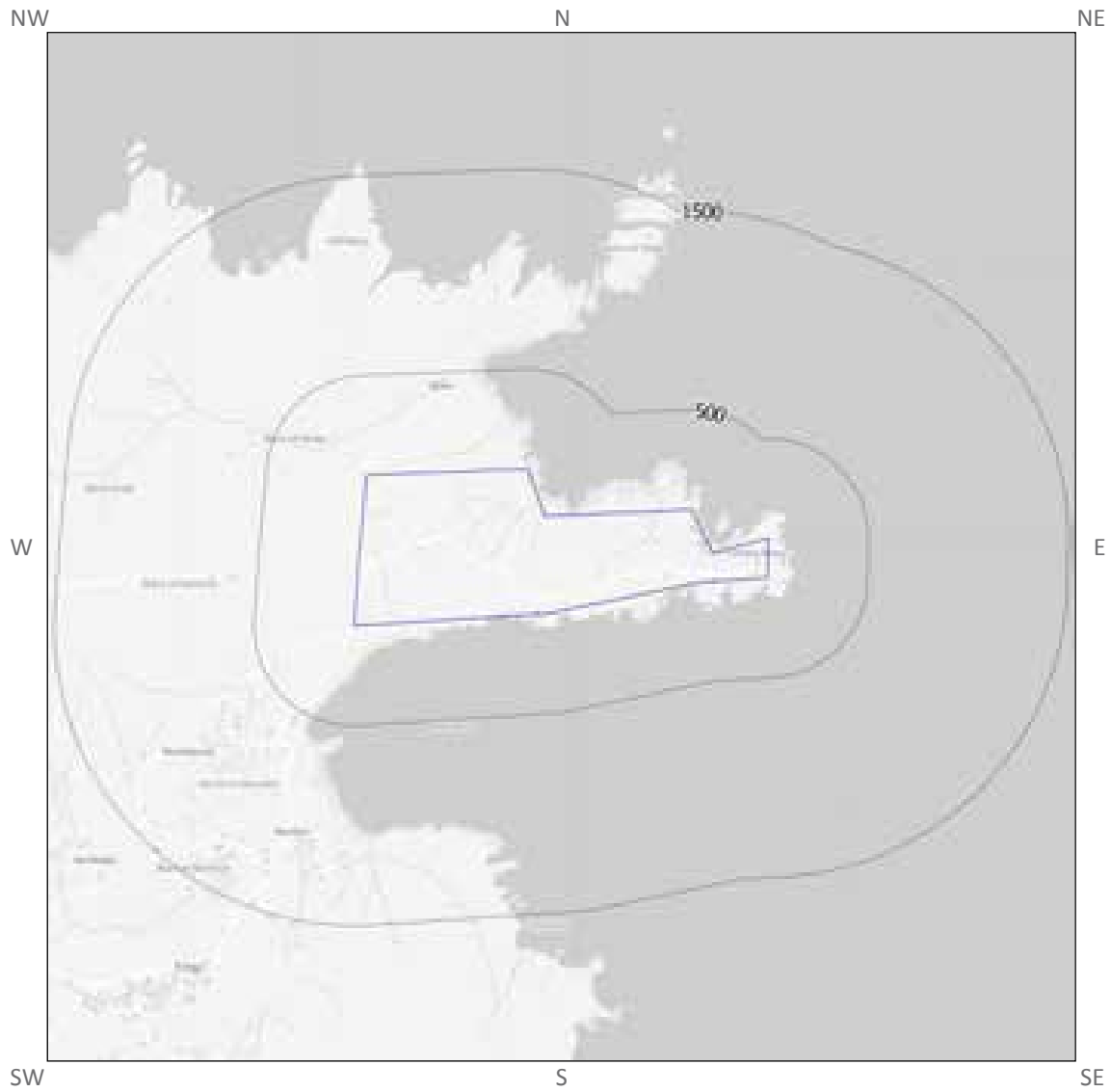
1.7 Historic Military and Ordnance sites

Database searched and no data found.

Certain military installations were not noted on historic mapping for security reasons. Whilst not all military land is necessarily of concern, Groundsure has researched and digitised a number of Ordnance Factories and other military industrial features (e.g. Ordnance Depots, Munitions Testing Grounds) which may be of contaminative concern. This research was drawn from a number of different sources, and should not be regarded as a definitive or exhaustive database of potentially contaminative military installations. The boundaries of sites within this database have been estimated from the best evidence available to Groundsure at the time of compilation.

2 Landfill and Other Waste Sites Findings

Landfill and Other Waste Sites Map



Landfill and Other Waste Sites Map

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2.1 Groundsure SEPA Landfill Sites Data

Records of SEPA landfill sites within 1500m of the study site	0
---	---

Database searched and no data found.

2.2 Groundsure Recorded Landfill Sites

Records of landfill sites and refuse tips within 1500m of the study site	0
--	---

Database searched and no data found.

2.3 Historic Waste Sites

Records of waste treatment, transfer or disposal sites within 500m of the study site	0
--	---

Database searched and no data found.

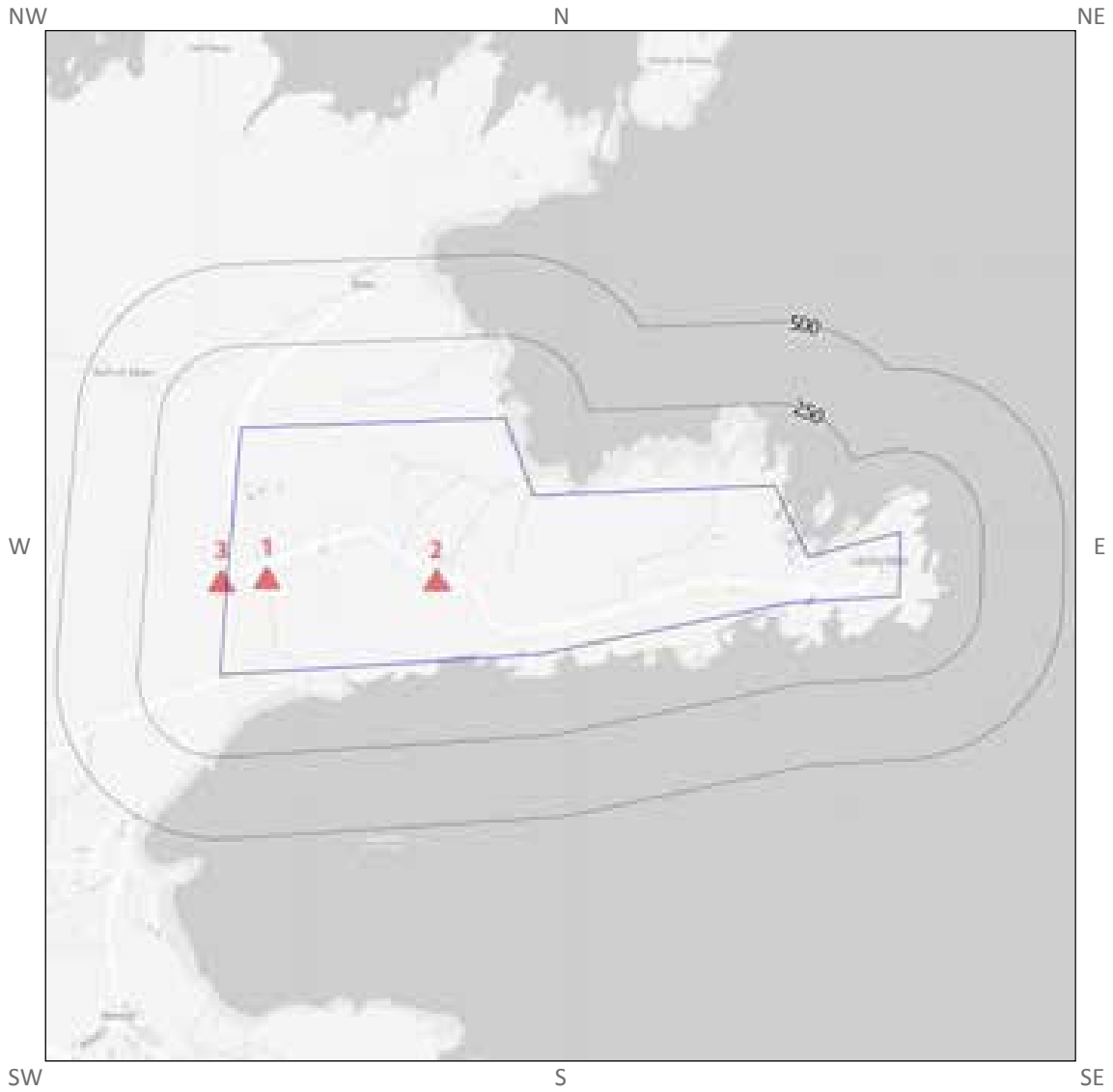
2.4 Groundsure SEPA Waste Sites Data

Records of SEPA waste sites within 500m of the study site	0
---	---

Database searched and no data found.

3 Current Land Use

Current Land Use Map



Current Land Use Map

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3.1 Current Industrial Data

Records of potentially contaminative industrial sites within 500m of the study site	3
---	---

The following records are represented as points on the Current Land Uses map.

ID	Distance	Direction	Company	Address	Description	Category
1	0	on site	Quarries (Disused)	Shetland, ZE2	Unspecified Quarries Or Mines	Extractive Industries
2	0	on site	Quarry (Disused)	Shetland, ZE2	Unspecified Quarries Or Mines	Extractive Industries
3	18	W	Quarry (Disused)	Shetland, ZE2	Unspecified Quarries Or Mines	Extractive Industries

3.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site	0
---	---

Database searched and no data found.

3.3 Part A(1), IPPC and Historic IPC Authorisations

Records of Part A(1), IPPC and historic IPC Authorisations within 1000m of the study site	0
---	---

Database searched and no data found.

3.4 Part B Authorisations

Records of Part B Authorised Processes within 500m of the study site	0
--	---

Database searched and no data found.

3.5 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site	0
---	---

Database searched and no data found.

3.6 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site	0
---	---

Database searched and no data found.

3.7 Sites Determined as Contaminated Land under Part 2A EPA 1990

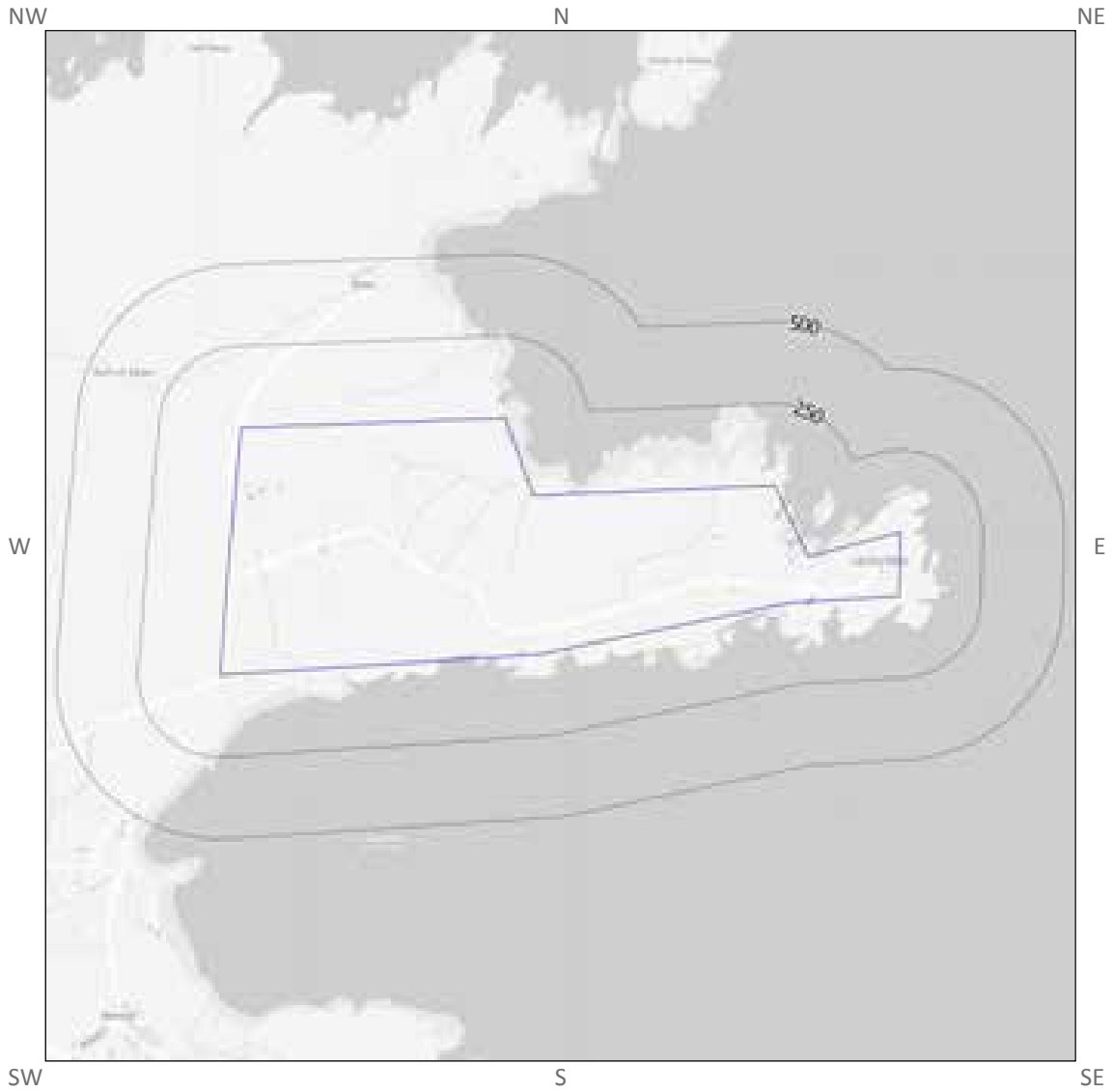
How many sites does the Local Authority hold information on under Section 78R of the Environmental Protection Act 1990 within 500m of the study site
--

0

Database searched and no data found.

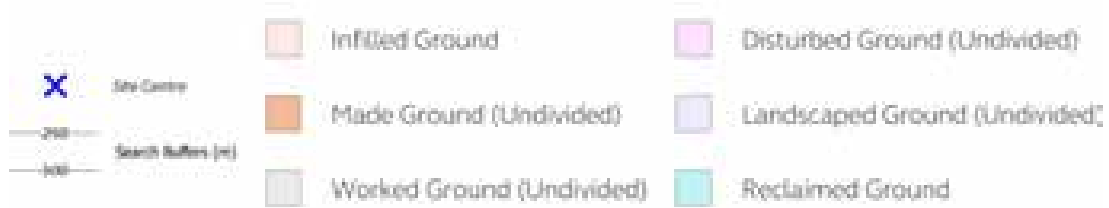
4 Geology and Hydrogeology

Artificial Ground Map

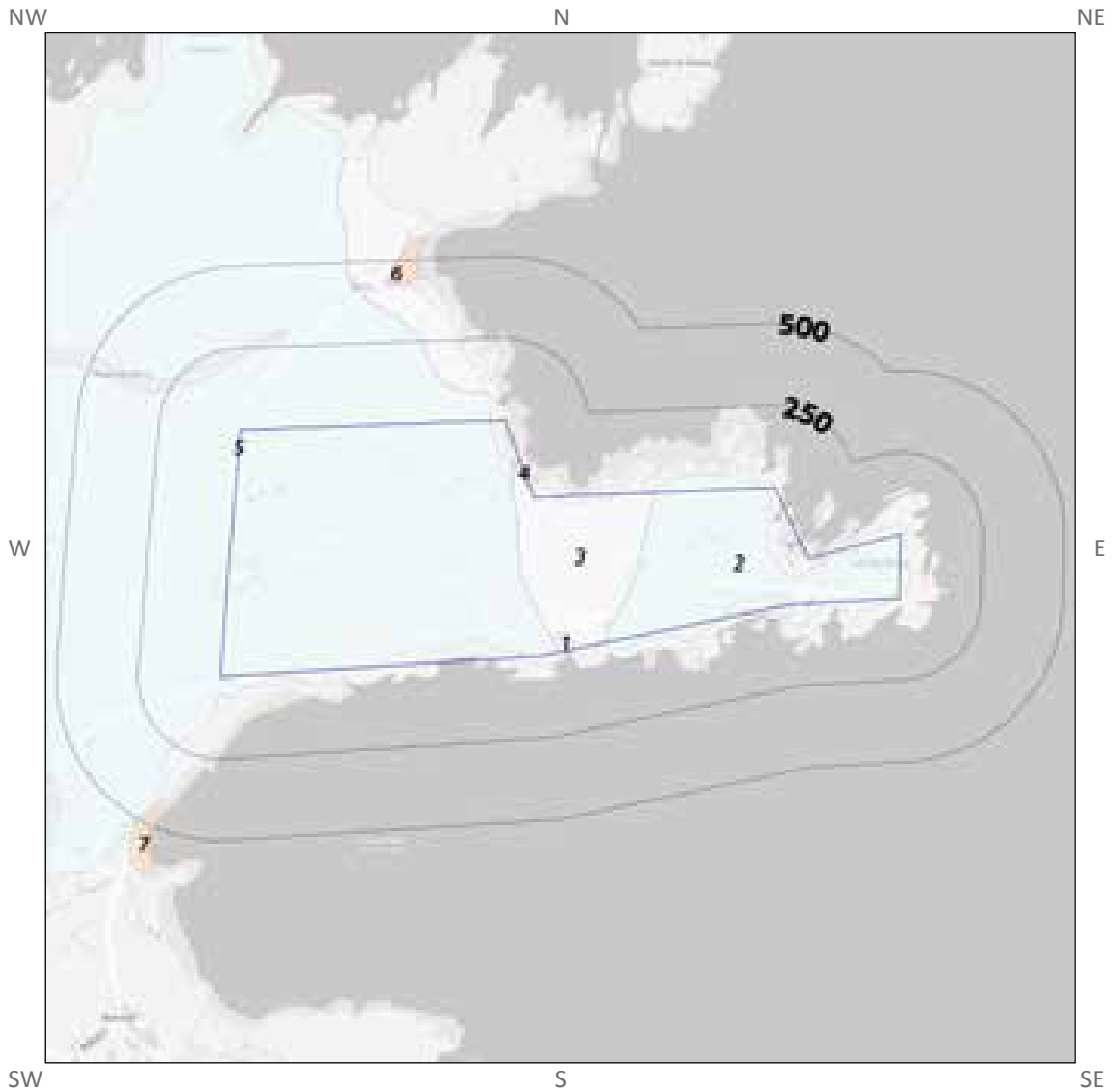


Artificial Ground Map

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Superficial Deposits Map

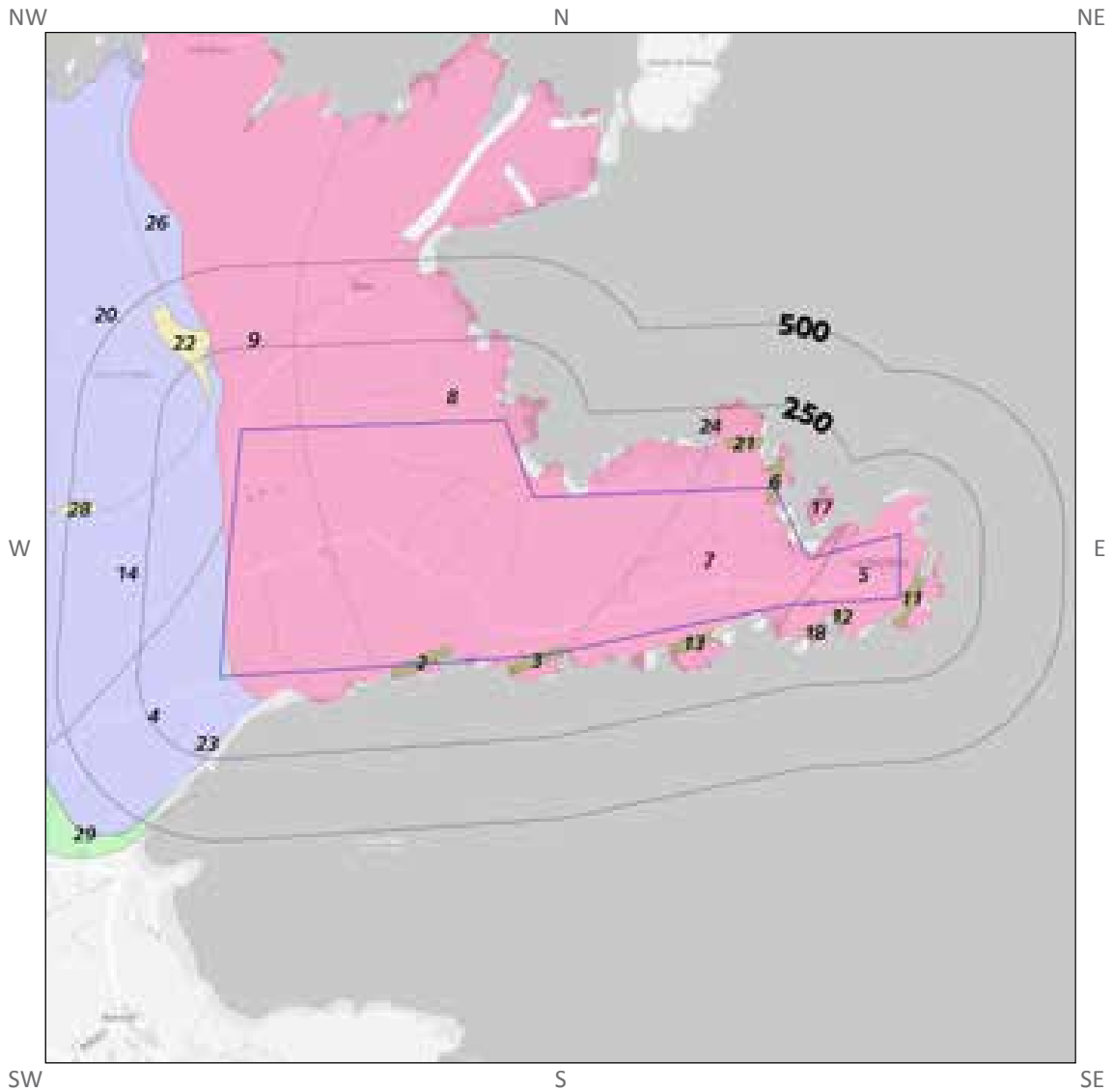


Superficial Deposits Map

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Bedrock and Faults Map



Bedrock and Faults Map

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4.1 Artificial Ground and Made Ground

Records of Artificial/Made Ground within 500m of the study site boundary	No
--	----

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping

4.2 Permeability of Artificial Ground

Records relating to permeability of artificial ground within 500m of the study site boundary	No
--	----

4.3 Superficial Ground and Drift Geology

Records of Superficial Deposits/ Drift Geology within 500m of the study site boundary	Yes
---	-----

ID	Distance (m)	Direction	Unit name	Rock Type	BGS Code	BGS Unit Classification Link	BGS Rock Classification Link	Previous Name
1	0	on site	TILL, DEVENSIAN	DIAMICTON	TILLD-DMTN	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=TILLD	http://www.bgs.ac.uk/data/maps/maps.cfm?method=listResults&m	-
2	0	on site	TILL, DEVENSIAN	DIAMICTON	TILLD-DMTN	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=TILLD	http://www.bgs.ac.uk/data/maps/maps.cfm?method=listResults&m	-
3	0	on site	BLOWN SAND	SAND	BSA-S	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=BSA	http://www.bgs.ac.uk/data/maps/maps.cfm?method=listResults&m	-
4	0	on site	MARINE BEACH DEPOSITS	SAND	MBD-S	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=MBD	http://www.bgs.ac.uk/data/maps/maps.cfm?method=listResults&m	-
5	0	on site	TILL AND MORAINIC DEPOSITS (UNDIFFERENTIATED)	DIAMICTON	TIMO-DMTN	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=TIMO	http://www.bgs.ac.uk/data/maps/maps.cfm?method=listResults&m	-

ID	Distance (m)	Direction	Unit name	Rock Type	BGS Code	BGS Unit Classification Link	BGS Rock Classification Link	Previous Name
6	85	N	BLOWN SAND	SAND	BSA-S	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=BSA	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
7	408	SW	STORM BEACH DEPOSITS	BOULDERS	STOB-B	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=STOB	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	STORM BEACH
8	423	N	MARINE BEACH DEPOSITS	SAND	MBD-S	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=MBD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-

4.4 Permeability of Superficial Ground

Records relating to permeability of superficial ground within 500m of the study site boundary	Yes
---	-----

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0	on site	Intergranular	High	High
0	on site	Intergranular	High	High
0	on site	Mixed	High	Low
0	on site	Mixed	High	Low
0	on site	Mixed	High	Low
85	N	Intergranular	High	High
236	SW	Mixed	High	Low
408	SW	Intergranular	Very High	Very High
408	W	Mixed	High	Low
423	N	Intergranular	High	High
455	SW	Mixed	High	Low

4.5 Bedrock and Solid Geology

Records of Bedrock/ Solid Geology within 500m of the study site boundary

ID	Distance (m)	Direction	Unit name	Rock Type	BGS Code	BGS Unit Classification Link	BGS Rock Classification Link	Previous Name
2	0	on site	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
3	0	on site	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
4	0	on site	HEVDA PHYLLITE FORMATION	PELITE, PHYLLITIC	HEVP-PEPH	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=HEVP	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
5	0	on site	SKAW INTRUSION	MICROGRANITE, PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE
6	0	on site	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
7	0	on site	SKAW INTRUSION	MICROGRANITE, PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE
8	0	on site	SKAW INTRUSION	MICROGRANITE, PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE

ID	Distance (m)	Direction	Unit name	Rock Type	BGS Code	BGS Unit Classification Link	BGS Rock Classification Link	Previous Name
9	0	on site	SKAW INTRUSION	MICROGRANITE , PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE
10	14	S	SKAW INTRUSION	MICROGRANITE , PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE
11	17	SE	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
12	23	S	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
13	28	S	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
14	30	W	SAXA VORD PELITE FORMATION	PELITE, PHYLLITIC	SVP-PEPH	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SVP	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
16	50	SE	SKAW INTRUSION	MICROGRANITE , PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE

ID	Distance (m)	Direction	Unit name	Rock Type	BGS Code	BGS Unit Classification Link	BGS Rock Classification Link	Previous Name
17	52	NE	SKAW INTRUSION	MICROGRANITE, PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE
18	52	S	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
19	95	S	SKAW INTRUSION	MICROGRANITE, PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE
20	113	W	HEVDA PHYLLITE FORMATION	PELITE, PHYLLITIC	HEVP-PEPH	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=HEVP	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
21	121	N	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	LAMPROPHYRES	SDCAD-LMPY	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
22	121	NW	HEVDA PHYLLITE FORMATION	QUARTZITE	HEVP-QZITE	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=HEVP	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
23	161	S	NORTH BRITAIN SILURO-DEVONIAN CALC-ALKALINE DYKE SUITE	DIORITE, HORNBLende	SDCAD-HBDI	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SDCAD	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-

ID	Distance (m)	Direction	Unit name	Rock Type	BGS Code	BGS Unit Classification Link	BGS Rock Classification Link	Previous Name
24	164	N	SKAW INTRUSION	MICROGRANITE, PORPHYRITIC	SKAW-MCGNP	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SKAW	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	SKAW GRANITE
26	317	N	SAXA VORD PELITE FORMATION	PELITE, PHYLLITIC	SVP-PEPH	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=SVP	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
28	397	W	HEVDA PHYLLITE FORMATION	QUARTZITE	HEVP-QZITE	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=HEVP	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-
29	412	SW	NORWICK HORNBLENDIC SCHIST TYPE 1	METABASALT, PHYLLITIC	NORH1-MBAPH	http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=NORH1	http://www.bgs.ac.uk/data/maps/maps.cfc?method=listResults&m	-

4.6 Permeability of Bedrock Ground

Records relating to permeability of bedrock ground within 500m of the study site boundary	Yes
---	-----

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0	on site	Fracture	Low	Low
0	on site	Fracture	Low	Low
0	on site	Fracture	Low	Low
0	on site	Fracture	Low	Low
0	on site	Fracture	Low	Low
14	SE	Fracture	Low	Low
17	E	Fracture	Low	Low
23	E	Fracture	Low	Low
28	SE	Fracture	Low	Low
30	W	Fracture	Low	Low

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
50	E	Fracture	Low	Low
52	E	Fracture	Low	Low
52	E	Fracture	Low	Low
95	E	Fracture	Low	Low
113	NW	Fracture	Low	Low
121	NE	Fracture	Low	Low
121	NW	Fracture	Low	Low
161	SW	Fracture	Low	Low
201	SW	Fracture	Low	Low
201	SW	Fracture	Low	Low
317	NW	Fracture	Low	Low
397	W	Fracture	Low	Low
408	W	Fracture	Low	Low
412	SW	Fracture	Low	Low
420	SW	Fracture	Low	Low
447	W	Fracture	Low	Low
450	NW	Fracture	Low	Low
455	SW	Fracture	Low	Low

This includes an automatically generated 50m buffer zone around the site

4.7 Faults

Records of Faults within 1000m of the study site boundary	Yes
---	-----

Distance	Direction	Category Description	Feature Description
0	on site	FAULT	Reverse or thrust fault, inferred
30	W	FAULT	Reverse or thrust fault, inferred
312	S	FAULT	Reverse or thrust fault, inferred
362	S	FAULT	Reverse or thrust fault, inferred

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale. This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

4.8 Landslip

Records of Landslip within 500m of the study site boundary?	No
---	----

Database searched and no data found.

4.9 Landslip Permeability

Records relating to permeability of landslips within 500m of the study site boundary	No
--	----

Database searched and no data found.

*This includes an automatically generated 50m buffer zone around the site

4.10 Groundwater Vulnerability and Soil Classification

Records of Groundwater Classification within 250m of the site	Yes
---	-----

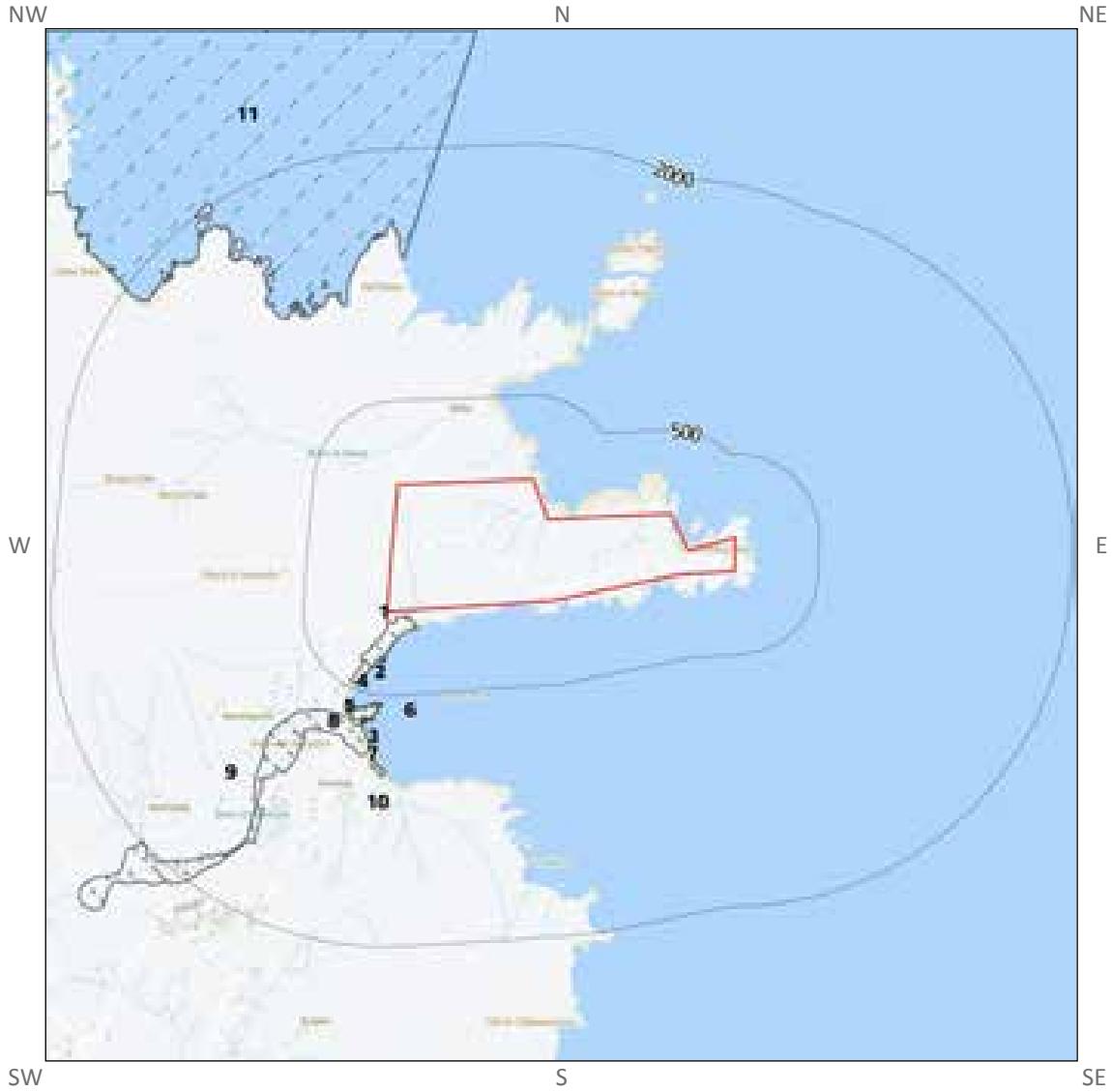
The following groundwater information is not represented on mapping:

Bedrock Geology

Distance (m)	Direction	Description	Type	Layer	Rock Description
0	on site	Concealed aquifers, aquifers of limited potential, regions without significant groundwater	Regions underlain by impermeable rocks, generally without groundwater except at shallow depth	SOLID	PreCambrian

5 Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites Map



Designated Environmentally Sensitive Sites Map

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Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?	Yes
--	-----

5.1 Sites of Special Scientific Interest (SSSI)

Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:	10
--	----

The following Sites of Special Scientific Interest (SSSI) records are provided by Natural England/Natural Resources Wales/Scottish Natural Heritage:

ID	Distance (m)	Direction	SSSI Name	Data Source
1	30	S	Norwick	Scottish Natural Heritage
2	545	S	Norwick	Scottish Natural Heritage
3	546	S	Norwick	Scottish Natural Heritage
4	552	S	Norwick	Scottish Natural Heritage
5	557	S	Norwick	Scottish Natural Heritage
6	581	S	Norwick	Scottish Natural Heritage
7	642	S	Norwick	Scottish Natural Heritage
8	657	S	Norwick	Scottish Natural Heritage
9	662	S	Norwick Meadows	Scottish Natural Heritage
10	890	S	Norwick	Scottish Natural Heritage

5.2 Ramsar Sites

Records of Ramsar sites within 2000m of the study site:	0
---	---

Database searched and no data found.

5.3 National Nature Reserves (NNR)

Records of National Nature Reserves (NNR) within 2000m of the study site:	0
---	---

Database searched and no data found.

5.4 Special Areas of Conservation (SAC)

Records of Special Areas of Conservation (SAC) within 2000m of the study site:	0
--	---

Database searched and no data found.

5.5 Special Protection Areas (SPA)

Records of Special Protection Areas (SPA) within 2000m of the study site:	1
---	---

The following Special Protection Areas (SPA) records are provided by Natural England/Natural Resources Wales/Scottish Natural Heritage:

ID	Distance (m)	Direction	SPA Name	Data Source
11	1112	N	Hermaness, Saxa Vord and Valla Field	Scottish Natural Heritage

5.6 Local Nature Reserves (LNR)

Records of Local Nature Reserves (LNR) within 2000m of the study site:	0
--	---

Database searched and no data found.

5.7 World Heritage Sites

Records of World Heritage Sites within 2000m of the study site:	0
---	---

Database searched and no data found.

5.8 Areas of Outstanding Natural Beauty (AONB)

Records of Areas of Outstanding Natural Beauty (AONB)/National Scenic Areas within 2000m of the study site:	0
---	---

Database searched and no data found.

5.9 National Parks

Records of National Parks within 2000m of the study site:	0
---	---

Database searched and no data found.

5.10 Green Belt

Records of Green Belt land within 2000m of the study site:	0
--	---

Database searched and no data found.

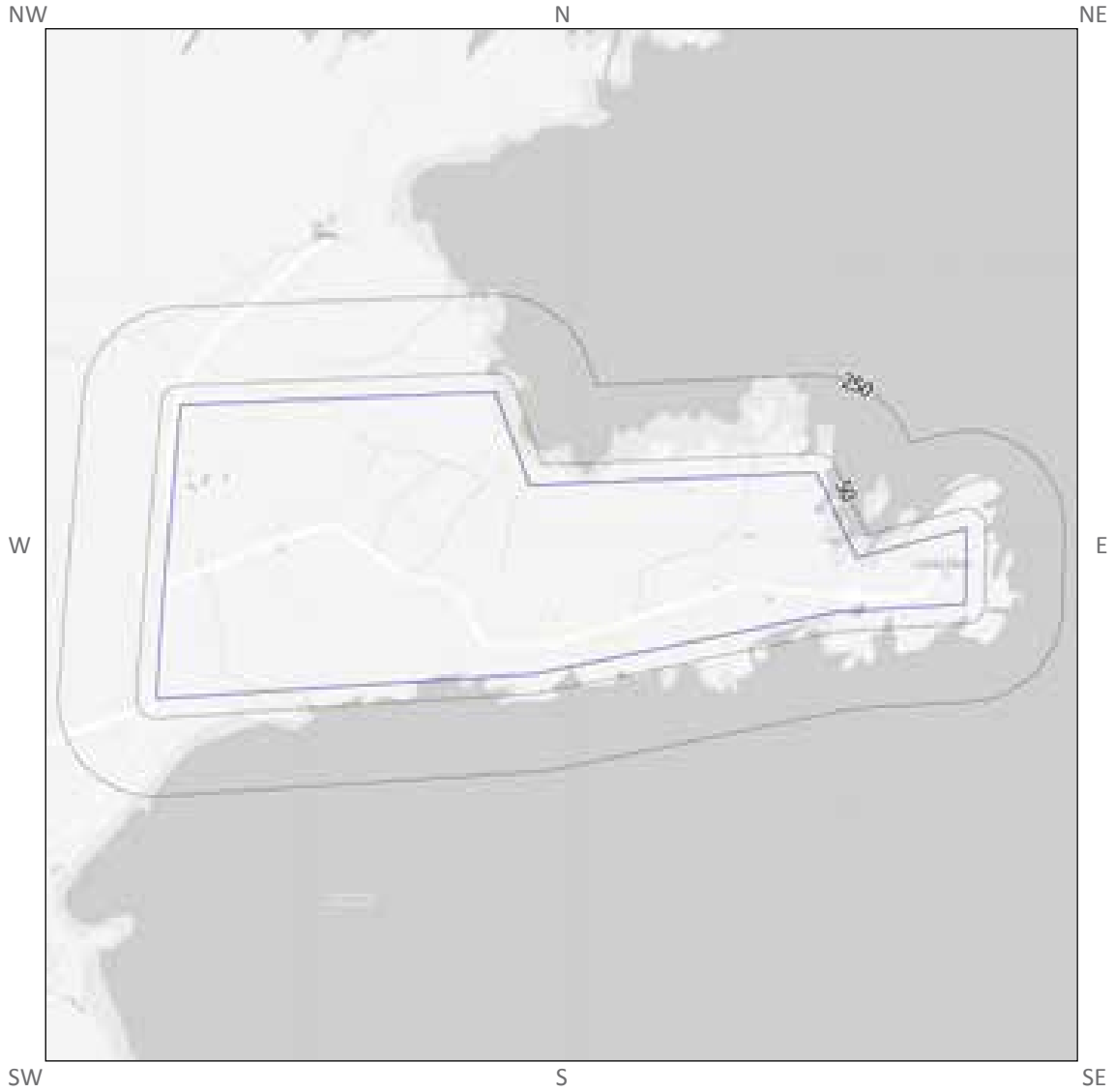
5.11 Designated Ancient Woodland

Records of Ancient Woodland within 2000m of the study site:	0
---	---

Database searched and no data found.

6 Flooding

River Flooding Map

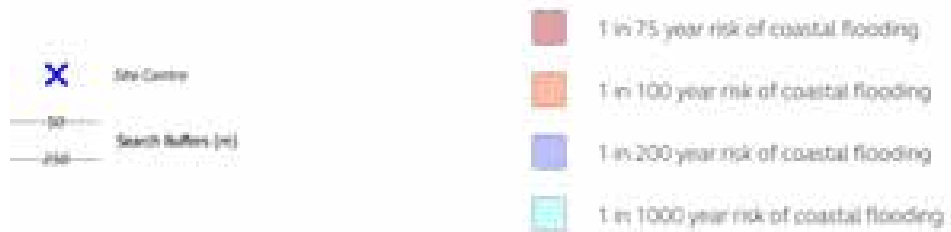


River Flooding Map

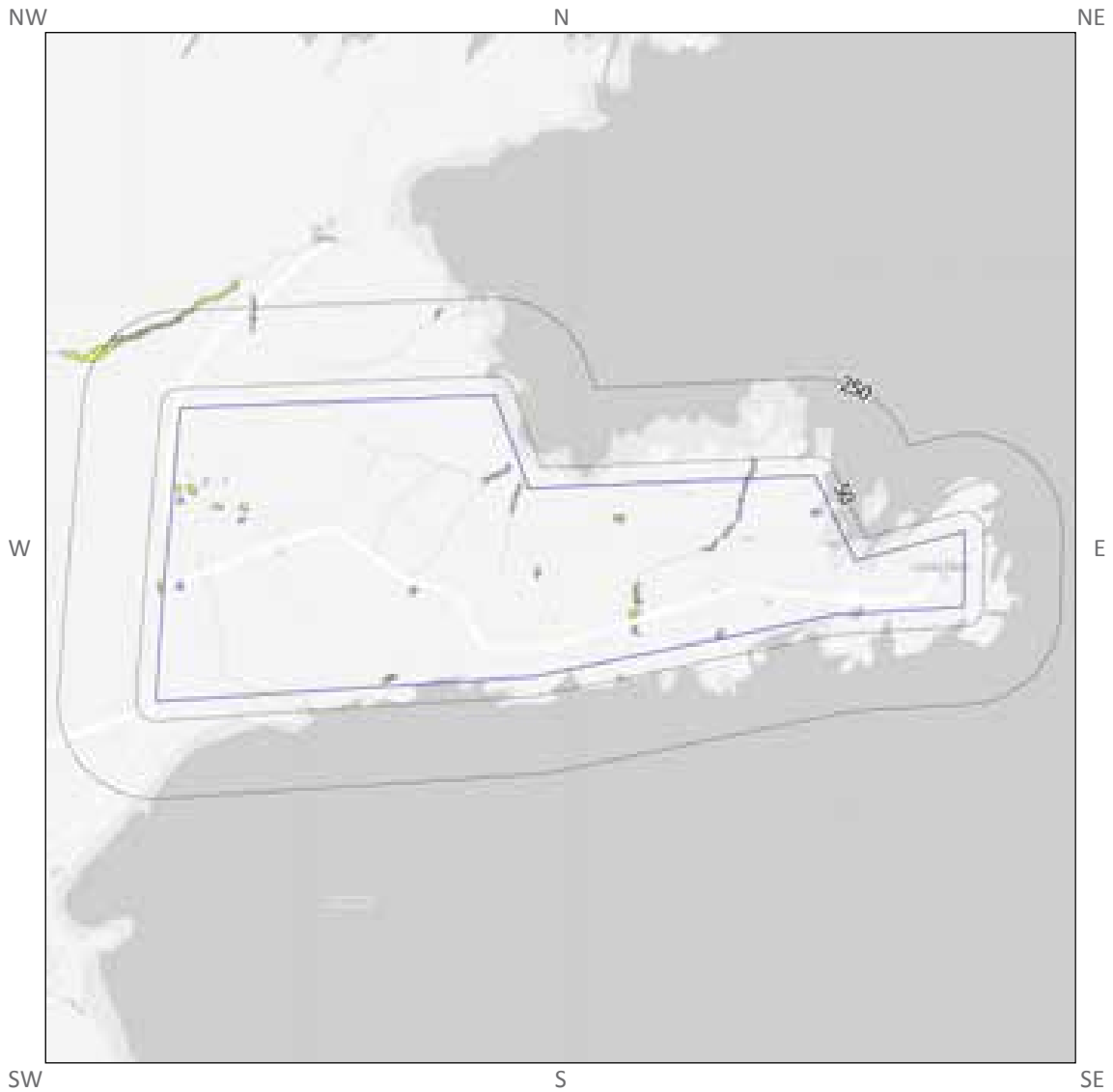
Flood data provided by JBA Risk Management, Copyright JBA Risk Management Limited. 2008 - 2019



Coastal Flooding Map



Surface Water (pluvial) Flooding



Surface Water (pluvial) Flooding

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6.1 River Flooding

Highest risk of river flooding.	Negligible
---------------------------------	------------

The data is provided by JBA Risk Management. This is modelled data on a national scale. Large-scale national flood maps provide a convenient and consistent approach to peril assessment; they are indicative and are not a substitute for detailed site level hydraulic modelling. Further study may be required to assess the level of flood hazard for a specific development.

6.2 Coastal Flooding

Highest risk of coastal flooding.	1 in 75 years.
-----------------------------------	----------------

The data is provided by JBA Risk Management. This is modelled data on a national scale. Large-scale national flood maps provide a convenient and consistent approach to peril assessment; they are indicative and are not a substitute for detailed site level hydraulic modelling. Further study may be required to assess the level of flood hazard for a specific development.

Distance	Direction	Risk
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 1000 year risk of river flooding
0	on site	1 in 100 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 200 year risk of river flooding
0	on site	1 in 75 year risk of river flooding
0	on site	1 in 75 year risk of river flooding
0	on site	1 in 75 year risk of river flooding
1	E	1 in 1000 year risk of river flooding
1	N	1 in 200 year risk of river flooding
14	S	1 in 1000 year risk of river flooding
24	S	1 in 200 year risk of river flooding

Distance	Direction	Risk
27	S	1 in 100 year risk of river flooding
28	NE	1 in 1000 year risk of river flooding
31	S	1 in 1000 year risk of river flooding
35	NE	1 in 1000 year risk of river flooding
36	N	1 in 1000 year risk of river flooding
43	N	1 in 200 year risk of river flooding
43	S	1 in 1000 year risk of river flooding
44	N	1 in 1000 year risk of river flooding
44	S	1 in 100 year risk of river flooding

6.3 JBA Surface (Pluvial) Water Flooding

Surface Water (pluvial) flooding is defined as flooding caused by rainfall-generated overland flow before the runoff enters a watercourse or sewer. In such events, sewerage and drainage systems and surface watercourses may be entirely overwhelmed.

Surface Water (pluvial) flooding will usually be a result of extreme rainfall events, though may also occur when lesser amounts of rain falls on land which has low permeability and/or is already saturated, frozen or developed. In such cases overland flow and 'ponding' in topographical depressions may occur.

What is the risk of pluvial flooding at the study site?

Highly Significant

Guidance: The site has been assessed to be at a Highly Significant Risk of surface water (pluvial) flooding. This indicates that this area would be expected to be affected by surface water flooding in a 1 in 75 year rainfall event to a depth of greater than 1m.

This data is provided by JBA Risk Management, © Jeremy Benn Associates Limited 2008-2019

The following pluvial (surface water) flood risk records within 50m of the study site are shown on the JBA Surface Water Flooding Map:

Distance	Direction	Risk
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	High
0	on site	Highly Significant
0	on site	Low to Moderate

Distance	Direction	Risk
0	on site	Low
0	on site	Low
0	on site	Low
0	on site	Low
0	on site	Low
0	on site	Low
0	on site	Low
0	on site	Low
0	on site	Low
0	on site	Moderate
0	on site	Significant
0	on site	Significant
0	on site	Significant
0	on site	Significant
0	on site	Significant
5	W	High
10	W	Significant

6.4 Groundwater Flooding Susceptibility Areas

Are there any British Geological Survey groundwater flooding susceptibility flood areas within 50m of the boundary of the study site?	Yes
What is the susceptibility to Groundwater Flooding in the search area based on the underlying geological conditions?	Potential for groundwater flooding at surface
Does this relate to Clearwater Flooding or Superficial Deposits Flooding?	Superficial Deposits Flooding

6.5 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result?	High
---	------

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

6.6 BGS Geological Indicators of Flooding

Are there any geological indicators of flooding within 250m of the study site?	Yes
--	-----

This dataset identifies the presence of superficial geological deposits which indicate that the site may be, or have been in the past, vulnerable to inland and/or coastal flooding. This assessment does not take account of any man-made factors such as flood protection schemes, and the data behind the report are purely geological.

Distance (m)	Direction	Description
0	on site	Higher flood potential from the sea: the first areas to experience the effects of coastal flooding.

6.7 JBA Reservoir Failure Impact Modelling

Is the property located in an area identified as being at potential risk in the event of a reservoir failure?	No
---	----

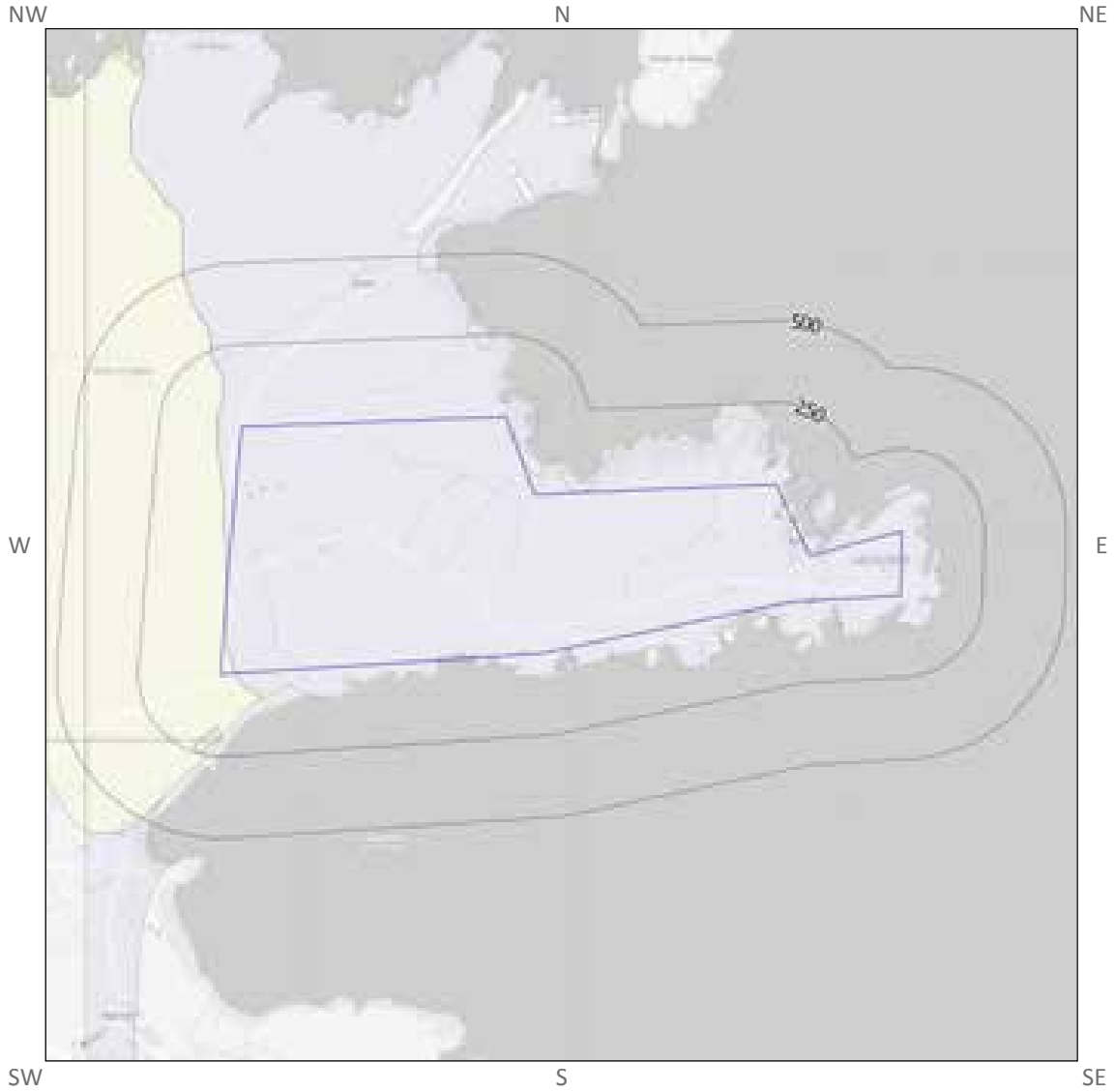
JBA Risk Management have modelled the flooding impact from 1,700 reservoirs in the UK, should there be a catastrophic failure of a reservoir wall or embankment.

Guidance: None required

This data is provided by JBA Risk Management, © Jeremy Benn Associates Limited 2008-2019

7 Mining

Mining, Extraction & Natural Cavities



Mining, Extraction & Natural Cavities

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7.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary?	No
--	----

Database searched and no data found.

7.2 Coal Mining

Database searched and no data found.

7.3 Johnson Poole and Bloomer

Are there any JPB Mining areas within 1000m of the study site boundary?	No
---	----

Database searched and no data found.

7.4 Non-Coal Mining

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Rating	Commodity	Assessment of likelihood
1	0	on site	Not available	Rare	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
2	0	on site	Not available	Highly Unlikely	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

ID	Distance (m)	Direction	Name	Rating	Commodity	Assessment of likelihood
3	52	NE	Not available	Highly Unlikely	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
4	161	S	Not available	Highly Unlikely	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
5	201	S	Not available	Rare	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
6	201	S	Not available	Highly Unlikely	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

ID	Distance (m)	Direction	Name	Rating	Commodity	Assessment of likelihood
7	408	W	Not available	Rare	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
8	412	SW	Not available	Highly Unlikely	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
9	455	SW	Not available	Rare	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

7.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary?	No
---	----

Database searched and no data found.

7.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary?	No
---	----

Database searched and no data found.

7.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary?	No
---	----

Database searched and no data found.

7.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary?	No
--	----

Database searched and no data found.

7.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level.

Are there any Tin Mining areas within 1000m of the study site boundary?	No
---	----

Database searched and no data found.

7.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary?	No
--	----

Database searched and no data found.

8 Natural Hazards Findings

Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m to account for the scale of mapping used to derive the information within this database (1:50,000 scale). The data is included in tabular format. The following information has been found:

8.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site?	Very Low
---	----------

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazards
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

8.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site?	Moderate
--	----------

The following natural subsidence information provided by the British Geological Survey is not represented on mapping.

Hazards
Significant potential for slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not undercut or place large amounts of material on slopes without technical advice. For new build – consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property – probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.

8.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site?	Negligible
--	------------

The following natural subsidence information provided by the British Geological Survey is not represented on mapping.

Hazards
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

8.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site?	Negligible
--	------------

The following natural subsidence information provided by the British Geological Survey is not represented on mapping

Hazards

Hazards

No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

8.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site?	Very Low
--	----------

The following natural subsidence information provided by the British Geological Survey is not represented on mapping.

Hazards

Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

8.6 Running Sand

What is the maximum Running Sand* hazard rating identified on the study site?	High
---	------

The following natural subsidence information provided by the British Geological Survey is not represented on mapping.

Hazards

Very significant potential for running sand problems. Avoid large amounts of water entering the ground, for example through pipe leakage or soak-always. Do not dig (deep) holes into saturated ground without technical advice. For new build – consider the consequences of soil and groundwater conditions during and after construction. Possible extra cost during construction. For existing property – possible increase in insurance risk from running sand, for instance ions due to water leakage, high rainfall events or flooding.

8.7 Radon Potential

Maximum radon potential at the study site	The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level
---	--

The Radon Potential Dataset is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland, created jointly by Public Health England (PHE) and the BGS using long-term radon measurements made in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland (without affecting householders' confidentiality), combined with geological map data. The findings of this dataset supercede any findings derived from the generalised Indicative Atlas of Radon.

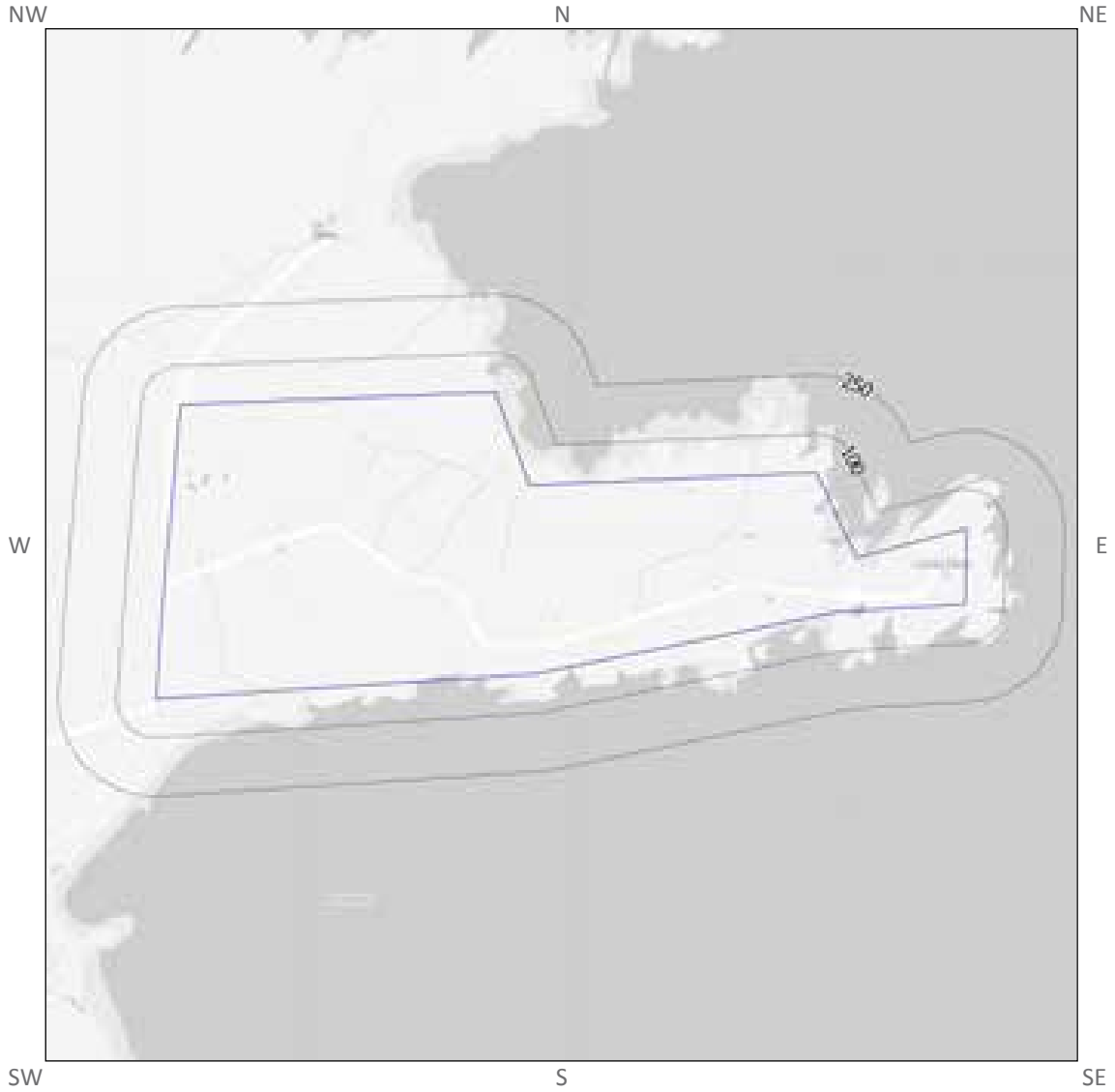
8.8 Radon Protective Measures

Radon protection measures required for new properties or extensions to existing properties	Basic radon protective measures are necessary.
--	--

The responses given on the level of radon protective measures required are based on a joint radon potential dataset from Public Health England (PHE) and the British Geological Survey (BGS). Basic radon protective measures need to be installed for new dwellings or extensions to existing dwellings in Scotland where more than 1% but less than 3% of homes are estimated to exceed the Action Level. The joint PHE-BGS radon potential data forms the basis for the Building Research Establishment guidance on radon protective measures for new dwellings (BR211 2015).

9 Borehole Records

Borehole Records Map



Borehole Records Map

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9.1 Borehole Records

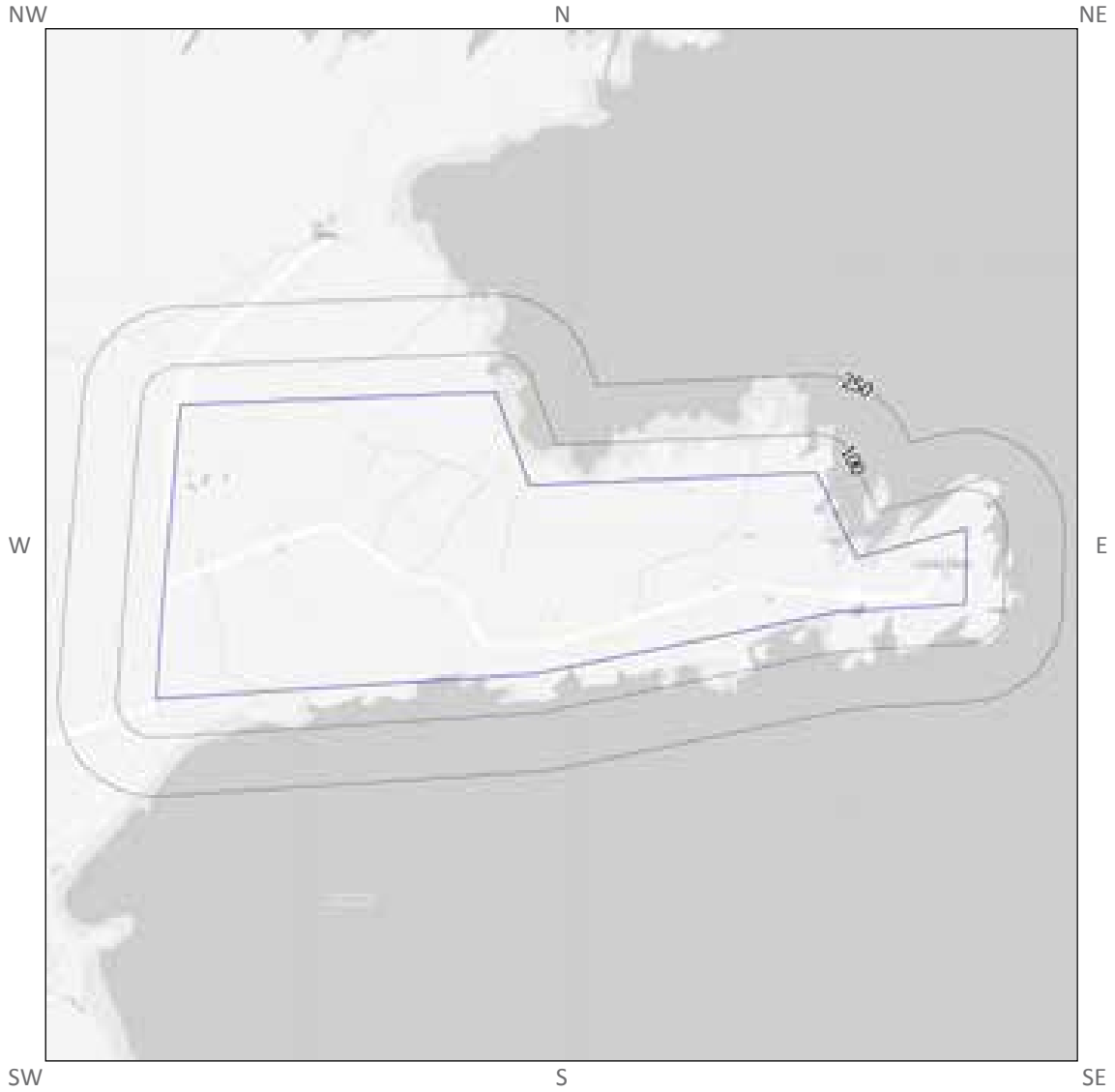
The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary	0
---	---

Database searched and no data found.

10 Railways and Tunnels

Railways and Tunnels Map



Railways and Tunnels Map

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10.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary?	No
Have any underground railway lines been identified within 250m of the study site boundary?	No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary?	No
Have any other railway tunnels been identified within 250m of the site boundary?	No

Any records that have been identified are represented on the Railways and Tunnels Map.

10.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary?	No
Have any historical railway or tunnel features been identified within 250m of the study site boundary?	No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

10.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary?	No
Have any historical railway lines been identified within 250m of the study site boundary?	No

Database searched and no data found.

Note: multiple sections of the same track may be listed in the detail above

Any records that have been identified are represented on the Railways and Tunnels Map.

10.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary?	No
Have any active railway lines been identified within 250m of the study site boundary?	No

Database searched and no data found.

10.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project?	No
Is the study site within 500m of the route of the Crossrail 1 rail project?	No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a [Groundsure HS2 and Crossrail 1 Report](#).

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

11 Soil Chemistry

11.1 Estimated Background Soil Chemistry

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Records of background estimated soil chemistry potentially within the study site boundary:	58
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The BGS Estimated Ambient Background Soil Chemistry dataset has been developed at a 1:50,000 scale, and hence any records found within 50m of the site are displayed within this table as potentially being present on site. Please note, if the search area is in an urban area, then As, Cd, Cr, Ni and Pb concentrations are likely to be significantly higher than indicated by the estimated ambient background concentrations.

Distance (m)	Direction	Sample Type	Arsenic (As) (mg/kg)	Cadmium (Cd) (mg/kg)	Chromium (Cr) (mg/kg)	Nickel (Ni) (mg/kg)	Lead (Pb) (mg/kg)	Bioaccessible lead (mg/kg)
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As) (mg/kg)	Cadmium (Cd) (mg/kg)	Chromium (Cr) (mg/kg)	Nickel (Ni) (mg/kg)	Lead (Pb) (mg/kg)	Bioaccessible lead (mg/kg)
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As) (mg/kg)	Cadmium (Cd) (mg/kg)	Chromium (Cr) (mg/kg)	Nickel (Ni) (mg/kg)	Lead (Pb) (mg/kg)	Bioaccessible lead (mg/kg)
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	45 - 60 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
3	SE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
5	SE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	45 - 60 mg/kg	<100 mg/kg	<60 mg/kg
4	W	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
1	W	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
1	SE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
19	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
17	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
21	SW	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
2	S	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
27	SE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
20	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
23	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
37	SE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
34	SW	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
20	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
16	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As) (mg/kg)	Cadmium (Cd) (mg/kg)	Chromium (Cr) (mg/kg)	Nickel (Ni) (mg/kg)	Lead (Pb) (mg/kg)	Bioaccessible lead (mg/kg)
14	SE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
8	W	Sediment	<15 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
25	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
28	SE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
17	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
44	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
50	E	Sediment	15 - 25 mg/kg	<1.8 mg/kg	>180 mg/kg	30 - 45 mg/kg	<100 mg/kg	<60 mg/kg
19	N	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
38	SW	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
48	NW	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
42	NE	Sediment	15 - 25 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
0	on site	Sediment	<15 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
28	N	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
30	W	Sediment	<15 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
17	N	Sediment	<15 mg/kg	<1.8 mg/kg	120 - 180 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
28	NW	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg
42	NW	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg	<60 mg/kg

11.2 Estimated Urban Soil Chemistry

Records of urban estimated soil chemistry potentially within the study site boundary.

0

Database searched and no data found.

11.3 Measured Urban Soil Chemistry

Records of urban measured soil chemistry within 500m of the study site boundary:	0
--	---

Database searched and no data found.

Contacts

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info@groundsure.com
08444 159 000



Local Authority

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<https://www.groundsure.com/terms-and-conditions-feb11-2019>



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