

XLINKS MOROCCO-UK POWER PROJECT

Preliminary Environmental Information Report

Volume 2, Appendix 4.1: Desk Top Study, Preliminary Risk Assessment and Site Reconnaissance



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Contents

1	DESK TOP STUDY, PRELIMINARY RISK ASSESSMENT AND SITE RECONNAISSANCE	1
1.1	Introduction	1
1.2	Site Description and Desk Study.....	3
1.3	Outline Conceptual Site Model: Areas 1, 2 and 3	29
1.4	Outline Conceptual Site Model: Areas 4 to 11	33
1.5	Preliminary Geotechnical Risk Register.....	37
1.6	Conclusions and Recommendations.....	41
1.7	References	42

Tables

Table 1.1:	Surrounding Area Land Uses (All Areas)	8
Table 1.2:	Historical Site Uses (All Areas)	10
Table 1.3:	Historical Neighbouring Site Uses (All Areas)	11
Table 1.4:	Descriptions of Geological Strata (Area 1)	12
Table 1.5:	Descriptions of Geological Strata (Area 2)	13
Table 1.6:	Descriptions of Geological Strata (Area 3)	13
Table 1.7:	Descriptions of Geological Strata (Area 4)	13
Table 1.8:	Descriptions of Geological Strata (Areas 5 and 6)	14
Table 1.9:	Descriptions of Geological Strata (Area 7, 8 and 9)	15
Table 1.10:	Descriptions of Geological Strata (Area 10 and 10A).....	15
Table 1.11:	Descriptions of Geological Strata (Area 11)	16
Table 1.12:	Aquifer Classification	16
Table 1.13:	Nearest Groundwater Bodies to the Onshore Infrastructure Area.....	17
Table 1.14:	Nearby Watercourses and Water Bodies to the Onshore Infrastructure Area	17
Table 1.15:	Licensed Surface Water Abstractions near the Onshore Infrastructure Area	20
Table 1.16:	Flood Risk of the Onshore Infrastructure Area.....	20
Table 1.17:	Ecologically Sensitive Sites within the Onshore Infrastructure Area	21
Table 1.18:	Radon Risk Category for the Areas within the Onshore Infrastructure Area	22
Table 1.19:	Mine Entries within 500 m of the Onshore Infrastructure Area.....	23
Table 1.20:	Non Coal Mining within the Onshore Infrastructure Area	24
Table 1.21:	British Geological Survey Ground Stability Hazard Ratings	24
Table 1.22:	Landfill/Waste Transfer/Waste Treatment Sites within the Onshore Infrastructure Area	27
Table 1.23:	Environmental Permits within the Onshore Infrastructure Area.....	27
Table 1.24:	Outline Conceptual Site Model (Areas 1 to 3)	32
Table 1.25:	Outline Conceptual Site Model (Areas 4 to 11)	36
Table 1.26:	Preliminary Geotechnical Risk Register (Areas 1 to 3)	38
Table 1.27:	Preliminary Geotechnical Risk Register (Areas 4 to 11)	39

Drawings

Drawing 1 : Site Location Plan with assessment areas

Annexes

Annex A : Onshore Infrastructure Area

Annex B : Coal Mining Report

Annex C : Site Photographs

Annex D : UXO Report

Annex E : PRA Methodology and General Notes

Glossary

Term	Meaning
Alverdiscott Substation	The existing National Grid Electricity Transmission substation at Alverdiscott, Devon, which comprises 400 kV and 132 kV electrical substation equipment.
Alverdiscott Substation Connection Development	The development required at the existing Alverdiscott Substation site, which is envisaged to include development of a new 400 kV substation, and other extension modification works to be confirmed by National Grid Electricity Transmission.
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Converter Site	The Converter Site is proposed to be located to the immediate west of the existing Alverdiscott Substation site in North Devon. The Converter Site would contain two converter stations (known as Bipole 1 and Bipole 2) and associated infrastructure, buildings and landscaping.
Converter station	Part of an electrical transmission and distribution system. Converter stations convert electricity from Direct Current (DC) to Alternating Current (AC), or vice versa.
Culm	Type of anthracitic coal
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Impact	Change that is caused by an action/Proposed Development, e.g., land clearing (action) during construction which results in habitat loss (impact).
Landfall	The proposed area in which the offshore cables make landfall in the United Kingdom (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Cornborough Range, Devon, between Mean Low Water Springs and the Transition Joint Bay inclusive of all construction works, including the offshore and onshore cable routes, and landfall compound(s).
Onshore HVDC Cable Corridor	The proposed corridor within which the onshore High Voltage Direct Current cables will be located.
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Proposed Development	The element of the Xlinks Morocco-UK Power Project within the UK, which includes the offshore cables (from the UK Exclusive Economic Zone to landfall), landfall site, onshore Direct Current and Alternating Current cables, converter stations, road upgrade works and, based on current assumptions, the Alverdiscott Substation Connection Development.
Secondary Aquifer	A locally important aquifer unit.

Acronyms

Acronym	Meaning
bgl	Below Ground Level
BGS	British Geological Survey
BS	British Standard
BT	British Telecoms
CIRIA	Construction Industry Research and Information Association
CSM	Conceptual site model
Defra	Department for Environment, Food and Rural Affairs
DTS	Desk Top Study
EA	Environment Agency
AOD	Above Ordnance Datum
OS	Ordnance Survey
PEIR	Preliminary Environmental Information Report
PRA	Preliminary Risk Assessment
PV	Photovoltaic
SPZ	Source Protection Zone
TFD	Tidal Flat Deposits
UXO	Unexploded Ordnance

Units

Units	Meaning
kV	Kilovolt
m	Metre
m ³	Cubic metre

1 DESK TOP STUDY, PRELIMINARY RISK ASSESSMENT AND SITE RECONNAISSANCE

1.1 Introduction

- 1.1.1 This document forms Volume 2, Appendix 4.1: Desk Top Study, Preliminary Risk Assessment and Site Reconnaissance of the Preliminary Environmental Information Report (PEIR) prepared for the UK elements of the Xlinks Morocco-UK Power Project (referred to hereafter as ‘the Proposed Development’). The PEIR presents the preliminary findings of the Environmental Impact Assessment process for the Proposed Development.
- 1.1.2 RPS Consulting Services Ltd (RPS) was commissioned by Xlinks 1 Limited (the ‘Applicant’) to undertake a Desk Top Study (DTS) and Preliminary Risk Assessment (PRA) of the onshore elements of the Proposed Development, which includes the linear corridor for the HVDC Cables, extending east to west from a proposed Converter Site and substation south west of Alverdiscott to the coastline, north west of Bideford, North Devon as shown on the plan in **Annex A**. A representative postcode for the site is EX39 4QH. It is understood the works are required to provide information in support of the site promotion, proposed ground investigation and the subsequent Development Consent Order for the Proposed Development as detailed below.
- 1.1.3 This document provides the findings of the DTS undertaken, a targeted site inspection and a PRA together with a Conceptual Site Model (CSM) identifying potential contamination sources, pathways, and receptors (i.e. potential pollutant linkages) on site post development.

Objectives

- 1.1.4 The principal objectives of this assessment were as follows:
- to assess potential sources of contamination at the site, associated with historical and current land uses both on site and in the surrounding area;
 - to review the environmental setting to assess the sensitivity of the surrounding area to contamination/pollution;
 - to produce an outline CSM detailing how any contamination may impact on the identified receptors via pollutant linkages;
 - to conclude on the likely requirement for further assessment and investigation to support site promotion and outline planning application;
 - to present a preliminary geotechnical appraisal; and
 - identify likely significant ground related development constraints for future intrusive investigation.

Legislation and Guidance

- 1.1.5 This assessment has been undertaken in general accordance with British Standard BS EN ISO 21365:2020 and is considered suitable to meet the initial requirements of planning as outlined within the National Planning Policy Framework (2023). The assessment also reflects the recommendations of Environment Agency guidance, Land Contamination: Risk Management, (LCRM 2023).

Assessment Area

- 1.1.6 The onshore elements of the Proposed Development considered within this assessment is shown on the Onshore Infrastructure Area plan included as **Annex A**.
- 1.1.7 To allow the geological, hydrogeological, and environmental setting to be adequately assessed for determination of a suitable CSM, data searches undertaken have initially included a buffer of up to 500 m from the Onshore Infrastructure Area (excluding the Abnormal Indivisible Load routes). In cases of large numbers of results, this buffer has been decreased to 250 m.
- 1.1.8 The proposed Onshore HVDC Cable Corridor has been subdivided into 13 areas based on locations of compounds as shown on Drawing 1. They are referred throughout the report as Areas 1 to 11. The assessment area between these designated areas have been referred to as land between the areas closest to them, allowing easier clarification of descriptions.
- 1.1.9 The preferred location options for the proposed converter station are understood to comprise three fields at the north east limit of the route corridor. These are identified in the following assessment as Areas 1, 2 and 3. Sequentially the remaining compound areas have been identified from east to west as Areas 4 to 11.

Proposed Development

- 1.1.10 The Proposed Development comprises two converter stations to the immediate west of the existing Alverdiscott Substation, the Alverdiscott Substation Connection Development, with associated underground HVDC cables to Cornborough Range (Landfall), North Devon, and offshore cable infrastructure within the UK Exclusive Economic Zone (EEZ). It also includes highway improvements to facilitate construction and operation of the Proposed Development and temporary construction compounds and haul roads. There is the potential for relocation of some of the electricity pylons within Area 2, currently linked to the substation.

Limitations of Assessment

- 1.1.11 Due to the size of the Proposed Development, the site walkover undertaken has been targeted to the areas identified as potential contamination sources from

review of historical mapping obtained from Groundsure¹ and the main areas of proposed construction in the north east (converter station). A full site walkover of the entire Onshore HVDC Cable Corridor has not been undertaken.

- 1.1.12 The eastern end of the Proposed Development forming Area 2 is covered by Groundsure Report Reference GS-9288583 (2023) however later extension of the Onshore Infrastructure Area following sourcing of the Groundsure report means that there is no 500 m buffer zone for data searches for this area. Reference to absence of data within 500 m of the Onshore Infrastructure Area later in this report excludes any buffer zone around Area 2.
- 1.1.13 Details of the limitations of this type of assessment are described in the general notes in **Annex E**.

1.2 Site Description and Desk Study

Introduction

- 1.2.1 This section sets out details of the location, topography and general current layout of the Proposed Development and immediate surrounding area.

Topography

- 1.2.2 An initial appraisal of the topography of the areas of land forming the Proposed Development has been made from contours on the Ordnance Survey (OS) maps obtained as part of the Groundsure reports.

Area 1

- 1.2.3 Area 1 generally slopes to the north, with elevations ranging from approximately 117 m Above Ordnance Datum (m AOD) in the north to 130 m AOD in the south.

Area 2

- 1.2.4 Area 2 has an overall range in topography from approximately 132 m AOD in the west to 88 m AOD on the northern boundary, with a general slope pattern towards north and the south east corner of Area 2.

Area 3

- 1.2.5 Area 3 has an approximate topography peaking in elevation in the west and centre of the Area sloping to the north from 143 m AOD to 137 m AOD and south as well from the centre of Area 3, from 143 m AOD to approximately 131 m AOD. The area also slopes to the east from approximately 143 m AOD to 132 m AOD.

¹ Groundsure reports and mapping can be made available on request.

Area 4

- 1.2.6 Area 4 has a peak elevation of approximately 112 m AOD in the south falling to 84 m AOD in the north and sloping to the north west.

Area 5

- 1.2.7 Area 5 has an overall topography that slopes from north to south towards the River Torridge elevations ranging from approximately 76 m AOD to approximately 5 m AOD on the banks of the river.

Area 6

- 1.2.8 Area 6 slopes to the north east towards the River Torridge, with a peak elevation of approximately 91 m AOD in the south west dropping to approximately 17 m AOD in the north east.

Area 7

- 1.2.9 Area 7 peaks in elevation at approximately 80 m AOD in the north of the Proposed Development, sloping to the south west to approximately 52 m AOD. The south of Area 7 slopes to the north from approximately 69 m AOD to 55 m AOD.

Area 8

- 1.2.10 Area 8 has an overall topography ranging from 100 m AOD in the south, approximately 95 m AOD in the north. An embankment is present in the approximate centre of Area 8, peaking at 111 m AOD.

Area 9

- 1.2.11 Area 9 slopes from approximately 130 m AOD to the north east to approximately 113 m AOD.

Area 10/10A

- 1.2.12 Area 10 has an approximate topography peaking in the centre of the two compounds at approximately 103 m AOD, sloping north to 95 m AOD and south to 88 m AOD.
- 1.2.13 Area 10A is located on a north facing hill side sloping from approximately 70 m AOD to 65 m AOD.

Area 11

- 1.2.14 Area 11 has an approximate topography sloping westwards towards the coast. The east of Area 11 has an approximate peak elevation of 34 m AOD, sloping to approximately 15 m AOD in the north west.

Site Description

- 1.2.15 The general location of the Proposed Development is to the south of Bideford extending from Alverdiscott in the east to the coastline in the west. The descriptions of Areas 1 to 3 are supplemented by review of utility/service plans obtained to assist with design of potential future ground investigation.
- 1.2.16 From aerial photographic review, the areas are understood to comprise the following at the time of report compilation. Each area is addressed below.

Area 1

- 1.2.17 Area 1 is approximately rectangular in shape and comprises undeveloped grassed agricultural land, with an Electricity Pylon running north through the centre of Area 1. The boundary to the south runs parallel with an unnamed road, which ends at Alverdiscott Substation. The north west corner of Area 1 includes a gas valve compound connected to the unnamed road. Nearby features include Alverdiscott Substation, farm/residential properties and their associated infrastructure.
- 1.2.18 Utility maps show a medium pressure gas pipeline that intersects Area 1 in the south running east to west and an intermediate pressure gas pipeline that also runs approximately east to west along the south boundary of Area 1.
- 1.2.19 South West Water company has provided plans that indicate two high pressure water pipelines that run south through the east of Area 1, with a distribution pipe present in the south.
- 1.2.20 British Telecoms (BT) Cable maps, provided by Openreach, indicate fibreoptic cables to be present along the road to the west of the Area 1 boundary, and intersecting along the south of the boundary, following the approximate route of the unnamed road leading to Alverdiscott Substation.

Area 2

- 1.2.21 Area 2 is approximately square in shape and is comprised of undeveloped grassed fields, surrounded by mature hedgerow and trees. Small areas of woodland are present in the north east (Longland Copse) and central area. In the south is Alverdiscott Substation with a minor access road leading from Area 3. The southern boundary is defined by an easterly flowing stream. This is fed by another small stream flowing southwards from the central area of woodland. In the north west is a pond feature and in the north-east a minor watercourse originating from Longland Copse. Nearby features include Cleave Solar Farm approximately 45 m south, farm/residential properties and their associated infrastructure to the north, including Webbery House and grounds, and tracks and minor roads.
- 1.2.22 Utility maps show an intermediate pressure gas pipeline crossing the centre of Area 2 on an east-west alignment.
- 1.2.23 High Voltage (132 kV) overhead Electricity Transmission Lines are present running approximately north west to south east and south west to north east across the west of Area 2, linking with the substation. There are also overhead cables linking to the east of the substation. which cross the east of Area 2 from the north and south east.

- 1.2.24 BT Cable maps, provided by Openreach, indicate fibre-optic cables to be present along the access road leading to Alverdiscott Substation.

Area 3

- 1.2.25 Area 3 also consists of undeveloped grassed agricultural land. Mature hedgerows intersect on an eastward alignment in the south of the area, with mature woodland being present to the east. The north of Area 3 borders an unnamed track that leads towards Alverdiscott Substation, with a gas valve compound present on the north east boundary.
- 1.2.26 Utility maps show a medium pressure gas pipeline that runs from the gas valve compound located to the north east alongside the west boundary.
- 1.2.27 South West Water has provided plans that indicate two high pressure water pipelines aligned north to south through the east of the area. An abandoned pipeline is present running parallel to the high-pressure pipelines.
- 1.2.28 BT Cable maps, provided by Openreach, indicate cables present along the access road to Alverdiscott Substation.

Area 4

- 1.2.29 Area 4 generally comprises agricultural land. Nearby features include Gammaton Road that runs to the north east along the Proposed Development boundary, and Tennacott Lane that runs south. The Proposed Development between Areas 3 and 4 is generally agricultural land, with Gammaton Road running along the north area boundary in some places.

Area 5

- 1.2.30 Area 5 comprises agricultural land in the north, with mature woodland (Lodge Plantation) in the west and mature hedgerow extending from north west to south east. Parallel to the hedgerow is a disused railway track (forming the Tarka Trail) running to the south east towards a bridge in the south. The River Torridge flows along the south of Area 5. The A386 runs parallel with the south boundary of Area 5. Other nearby features include isolated residential/farmland properties, mature woodland and agricultural land.

Area 6

- 1.2.31 Area 6 comprises agricultural land, with sporadic mature trees in the north and centre of the Area. An unnamed roadway intersects the Area in the centre towards the south east. Nearby features include the River Torridge, residential properties, a small area of mature woodland and an industrial aggregate stockpile compound.

Area 7

- 1.2.32 Area 7 comprises agricultural land, with mature trees aligned to the south west through the centre of the Onshore Infrastructure Area. Nearby features include West Ashridge Farm and associated infrastructure, and a reservoir located approximately 193 m to the west. The Proposed Development between Areas 6

and 7 is typically agricultural land and hedgerow. A possible tyre stockpile and unidentified structures border the boundary to the north.

Area 8

- 1.2.33 Area 8 comprises agricultural fields and woodland that intersect the north boundary of the Proposed Development. Buckland Road runs from north to south through the west of Area 8. Nearby features include farm/residential properties and their associated infrastructure to the north and east of the Proposed Development. The Proposed Development between Areas 7 and 8 is generally agricultural land.

Area 9

- 1.2.34 Area 9 comprises agricultural land and an unnamed road aligned north to south through the centre of the area. Nearby features include mature woodland to the south of the boundary and an unnamed road that runs parallel to the north boundary. The Proposed Development between Area 8 and 9 is generally agricultural land with an unnamed road running along the majority of the boundary to the south.

Area 10/10A

- 1.2.35 Area 10 comprises agricultural land and the A39 which defines the south Onshore Infrastructure Area. Gypsy Road runs along the west boundary, with nearby features including farm/residential buildings and their associated infrastructure and a roundabout on the A39 to the east. The Proposed Development between area 9 and 10 is mainly agricultural land with an unnamed road and multiple hedgerows crossing the Proposed Development.
- 1.2.36 Area 10A comprises part of a field immediately north of a minor road leading from Abbotsham to the east.

Area 11

- 1.2.37 Area 11 generally comprises agricultural land in the east before terminating at a cliff face and coastal waters to the west. Nearby, to the south east is a farm/residential building and to the north east is a small derelict building and a suspected small waterbody. The Proposed Development between Areas 10 and 11 is generally composed of agricultural land crossed by several roads, with Abbotsham to the east. A suspected sewage treatment facility and its associated infrastructure is located close to the north of the Proposed Development.

Targeted Site Walkover Survey

- 1.2.38 A targeted site walkover survey was undertaken on the Proposed Development on the 24 January 2023 following review of the desk study data. The walkover targeted potential converter station locations Areas 1, 2 and 3 and an anomaly identified from aerial photographs located in Area 9. Unrestricted access was made available for inspection of Areas 1 to 3, the inspection of Area 9 was restricted to the nearest available vantage point on public land. A selection of photographs taken during the site walkover are presented in **Annex C**.

- 1.2.39 The site walkover identified numerous access points to the fields forming Areas 1 to 3.
- 1.2.40 Gated access to Area 1 is shown in Plates 4 and 17, with a drainage ditch identified on the south boundary shown in Plates 14 and 15. The general slope of the field is apparent in Plate 16.
- 1.2.41 Access to Area 2 is shown in Plates 5 and 10. Ground conditions in Area 2 were noted to be locally muddy and rutted with standing water present (Plates 6 - 10).
- 1.2.42 Gated access to Area 3 from the adjoining roads is shown in Plates 11 and 19. The variation in topography across this area is apparent in Plates 12, 13 and 21. It was noted in Area 3 that there had recently been a tipping of manure/silage in the west (Plate 20).
- 1.2.43 The site walkover confirmed the presence of a gas valve compound located on the road dividing the three areas. A slight gas smell was noted in the north of Area 1, with a pipeline indicator identified next to the access road. (Plates 2, 3 and 18 respectively).
- 1.2.44 The site walkover identified a small group of structures of timber construction in the south of Area 3, with concrete hardstanding extending from the buildings. It was assumed that these were possible stables or shelter for livestock. (Plates 22 to 25).
- 1.2.45 The site walkover confirmed that an anomaly identified on aerial photos in Area 9 was a wood stockpile (Plate 26).

The Surrounding Area

- 1.2.46 Generally, the Proposed Development is located within agricultural land and localised farm settlements. Due to the size of the Proposed Development, a targeted site inspection has taken place, with June 2022 map records supplementing neighbouring land use information from the site inspection. The following evaluations of land use within 250 m in **Table 1.1** are understood to be accurate.

Table 1.1: Surrounding Area Land Uses (All Areas)

Direction	Description
Area 1	
North	Undeveloped agricultural land, farm/residential properties, and associated infrastructure.
East	Undeveloped agricultural land, mature hedgerow and electricity pylons forming Area 2.
South	Undeveloped agricultural land forming Area 3
West	Undeveloped agricultural land, unnamed roads.
Area 2	
North	Agricultural land, Solar panels, farm/residential properties (including Rice Mill Cottage, Webbery House) and associated infrastructure, unnamed roads.
East	Undeveloped agricultural land, mature hedgerow/woodland, tracks.
South	Undeveloped agricultural land, Cleave Solar Farm, electricity pylons, woodland.
West	Undeveloped agricultural land forming Areas 1 and 3.
Area 3	
North	Undeveloped agricultural land, mature hedgerow forming Area 1.

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Direction	Description
East	Alverdiscott Substation, mature woodland and hedgerow, undeveloped agricultural land forming Area 2.
South	Undeveloped agricultural land, mature hedgerow, residential/farm property, and associated infrastructure, Cleave Solar Farm .
West	Unnamed road, undeveloped agricultural land, farmland property and associated infrastructure.
Area 4	
North	Agricultural land, residential properties, transport depot station.
East	Undeveloped agricultural land, Gammaton Reservoirs, Electricity Pylons.
South	Undeveloped agricultural land.
West	Undeveloped agricultural land.
Area 5	
North	Undeveloped agricultural land, mature hedgerow, East Bideford.
East	Undeveloped agricultural land, isolated farmland/residential properties, mature woodland, Tarka Trail.
South	Undeveloped agricultural land, farmland and residential properties, River Torridge and River Yeo.
West	The River Torridge, undeveloped agricultural land, mature woodland, isolated residential properties.
Area 6	
North	The River Torridge, agricultural land, mature trees.
East	Mature woodland, residential properties, agricultural land, A386
South	Commercial and Residential buildings, mature woodland, agricultural land, A386.
West	Undeveloped agricultural land, mature woodland, unnamed tracks and roadways.
Area 7	
North	Undeveloped agricultural land, Jennets' Reservoir, mature trees.
East	West Ashridge Farm, undeveloped agricultural land.
South	Undeveloped agricultural land.
West	Undeveloped agricultural land, mature trees, residential buildings.
Area 8	
North	Residential properties, undeveloped agricultural land, mature woodland.
East	Residential properties, undeveloped agricultural land.
South	Archery Range, undeveloped agricultural land.
West	Mature trees, undeveloped agricultural land.
Area 9	
North	Undeveloped agricultural land.
East	Undeveloped agricultural land, mature trees.
South	Mature woodland, undeveloped agricultural land.
West	Undeveloped agricultural land.
Area 10	
North	Abbotsham Village, unnamed road, undeveloped agricultural land.
East	Bowood Farm and associated buildings, A39 road, Abbotsham Cross Roundabout, woodland, undeveloped agricultural land.

Direction	Description
South	Unnamed road, residential properties and associated infrastructure, undeveloped agricultural land.
West	A39 road, undeveloped agricultural land.
Area 10A	
North	Undeveloped agricultural land.
East	Abbotsham Village.
South	Unnamed road, residential properties and associated infrastructure, undeveloped agricultural land.
West	Undeveloped agricultural land.
Area 11	
North	Undeveloped agricultural land, unnamed track.
East	Unnamed road, undeveloped agricultural land.
South	Farm/Residential property, mature hedgerow, undeveloped agricultural land.
West	Abbotsham Cliffs, coastline, coastal waters.

Site History

Historical Map Review

1.2.47 The following review (see **Table 1.2** and **Table 1.3**) is based on past editions of readily available Ordnance Survey maps. These include scales of 1:1,250, 1:2,500, 1:10,560 and 1:10,000 dated 1886 to 2022 provided by Groundsure. Copies of these maps can be made available on request. Unless specified otherwise below, the route alignment between construction compounds comprises farmland or crosses minor roads at various points.

Table 1.2: Historical Site Uses (All Areas)

Areas	On-site Land Use and Features	Approximate Dates
1	Undeveloped agricultural land .	1886 to Current
1	Minor road aligned east towards Alverdiscott Substation.	1988 to Current
1	Electricity pylons linking to Alverdiscott Substation from the north.	1987 to Current
2	Undeveloped agricultural land in the west and mixed woodland and rough grassland in the east and south (Rough grassland no longer present post 1956). Minor watercourses, springs and ponds also present.	1888 to Current
2	Alverdiscott Substation in the south.	1988 to Current
3	Generally undeveloped agricultural land, with an unnamed road along the west side of Area 3, orientated north.	1887 to Current
4	Undeveloped land comprising rough grassland and fields.	1886 to Current
4	Tennacott Lane aligned north to south in the south west.	1886 to Current
4	Unnamed road/track trending north east to south west in the south east.	1886 to 2001
4	Generally undeveloped agricultural land on the east bank of the River Torridge.	1886 to Current
5-6	In the south of Area 5, the Proposed Development crosses the River Torridge, the banks of which include marshland and mudflats. On the	1886 to Current

Areas	On-site Land Use and Features	Approximate Dates
	north bank of the river is a railway line on embankment (dismantled by 1995).	
5	Old Lime Kiln in the south east.	1886 to 1904
5-6	Old Pottery buildings.	1886 to 1904
6	Generally undeveloped agricultural land.	1886 to Current
7	Generally, fields and woodland crossed by a north west to south east aligned road. Culverted water course/issues from below ground.	1886 to Current
7-8	Quarry.	1887 to 1904
8	Generally undeveloped grassland with woodland in the north east.	1886 to Current
8	Intersecting roads in the west aligned north to south.	1886 to Current
9	Undeveloped agricultural land with intersecting road in the west of the Proposed Development.	1886 to Current
10	Generally undeveloped agricultural land, on the west side of a crossroads.	1886 to Current
10A	Generally undeveloped agricultural land.	1886 to Current
11	Generally undeveloped land/tidal coastline including rock ledges.	1866 to Current
11	Skebbeartown Lime Kiln (Disused).	1884 to 1887
11	Two small streams/rivers running west towards the coast, partially culverted/underground. Small pond in the middle of the area from 1963 to 1975.	1904 to Current
11	Rifle Range across Area 11 with targets located on site in the north east.	1904 to 1905

Table 1.3: Historical Neighbouring Site Uses (All Areas)

Area	Surrounding Land Uses (250 m radius)	Orientation	Approximate Distance (m)	Dates	
				From	To
1, 2 and 3	Smithy.	south west	100	1886	1904
3 to 4	Gammaton Reservoirs.	north	250	1905	Current
5	Tank.	north east	201	1957	1970
5	Quarry/Old Quarry (disused by 1886).	north	73	1886	1904
7 to 8	Tank on side of building.	south	190	1957	1995
10	Quarry.	north	6	1886	1938
10	Quarry.	north	14	1886	1904
10	Quarries/Old Quarries (disused by 1904).	north	150	1886	1932
11	Disused Lime Kiln.	north west	12	1884	1885
11	Railway.	north	30	1904	1932
11	Quarry/old quarry.	south	63	1886	1994+

Site Planning History

1.2.48 Review of available planning records from Torridge District Council, indicates that planning applications have been limited across the Proposed Development as a

whole. Those considered relevant are discussed below in accordance with the respective Areas:

Areas 1 to 3

- Application Reference 1/0279/2019/SCR: Installation of a Solar Photovoltaic (PV) farm with ancillary infrastructure. Application received in March 2019. The proposed PV Farm site boundary is located to the west, north and east of the already existing PV Farm and Alverdiscott Substation, and borders Area 2, in the north, east and west (Status: Ongoing).
- Application Reference 1/1395/1998: The erection of an Overhead Electricity Line. Application received in August 1998 (Status: Withdrawn).

Areas 5 to 6

- Application Reference 1/0743/2023/FUL: Change of land use to equine, and erection of stables and manage. Application received in July 2023. The Proposed Development is located directly to the south of Area 6 (Status: Approved).

Site Geology

1.2.49 Based on British Geological Survey (BGS) mapping (1:50,000 and 1:10,000 scale) and the online BGS GeoIndex, the stratigraphic sequence beneath the Proposed Development is indicated to be as follows:

Table 1.4: Descriptions of Geological Strata (Area 1)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Bedrock		
Bude Formation – sandstone – (located along S boundary)	Grey thick-bedded, argillaceous and silty sandstones, in laterally discontinuous internally massive beds 1 to 5 m thick and commonly amalgamated into units up to 10 m thick.	1290 m
Bude Formation (mudstone and siltstone)	At the base of the formation there are approximately 100 m of grey mudstones and siltstones with two thin anthracitic coals (culm) above the cross-bedded thick-bedded Cornborough Sandstone that caps the top of the underlying Bideford Formation.	100 m

Table 1.5: Descriptions of Geological Strata (Area 2)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Bedrock		
Bude Formation – sandstone (located along N boundary)	Grey thick-bedded, argillaceous and silty sandstones, in laterally discontinuous internally massive beds 1 to 5 m thick and commonly amalgamated into units up to 10 m thick.	1290 m
Bude Formation (mudstone and siltstone)	At the base of the formation there are approximately 100 m of grey mudstones and siltstones with two thin anthracitic coals (culm) above the cross-bedded thick-bedded Cornborough Sandstone that caps the top of the underlying Bideford Formation.	100 m
Bideford Formation (sandstone) outcropping on northern boundary	Thick bedded sandstones.	1220 m +

1.2.50 There are 44 borehole records held by BGS for the location of the Alverdiscott Substation Site, however these were confidential and not available for review as part of this assessment.

Table 1.6: Descriptions of Geological Strata (Area 3)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Bedrock		
Bude Formation (mudstone and siltstone)	At the base of the formation there are approximately 100 m of grey mudstones and siltstones with two thin anthracitic coals (culm) above the cross-bedded thick-bedded Cornborough Sandstone that caps the top of the underlying Bideford Formation.	100 m

Table 1.7: Descriptions of Geological Strata (Area 4)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Bedrock		
Bude Formation (located across all of Area 4)	Bude Formation (mudstone and siltstone). At the base of formation there are approximately 100 m of grey mudstones and siltstones with two thin anthracitic coals (culm) above the cross-bedded	100 m

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
	thick-bedded Cornborough Sandstone that caps the top of the underlying Bideford Formation. BGS Borehole record ref. SS42SE/8 approximately 260 m south of Area 4, indicates the Bude Formation reaches in excess of 33.50 m depth. No evidence of coal seams is recorded.	

Table 1.8: Descriptions of Geological Strata (Areas 5 and 6)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Superficial		
Alluvium (located on either side of River Torridge, in south of Area 5 and immediate south of Area 6 along the River Yeo)	Clay, silt, sand, and gravel associated with areas flanked, or once flanked by the River Torridge.	Unknown
River Torridge Terrace Deposits (overlain by Alluvium)	Predominantly silty clay with scattered rounded sandstone clasts.	Unknown
Tidal Flat Deposits (located on either side of River Torridge)	Typically, unconsolidated clay, silt, and sand deposits.	Unknown
Bedrock		
Bude Formation – sandstone (majority of Area 6)	Grey thick-bedded, argillaceous and silty sandstones, in laterally discontinuous internally massive beds 1 to 5 m thick and commonly amalgamated into units up to 10 m thick.	1290 m
Crackington Formation (encompasses north east of Area 6, and south of Area 5)	Bedded dark blue-grey mudstones and grey siltstones.	250 m
Bude Formation – Mudstone and Siltstone (encompasses north of Area 5)	Grey thick-bedded silty sandstones in laterally discontinuous internally massive beds 1 to 5 m thick, commonly amalgamated into units up to 10 m thick.	1290 m

1.2.51 There is one Borehole Record (ref. SS42SE/10) located close to the north of Area 6. This indicates the Crackington Formation to be present up to a recorded depth of 22.50 m below ground level (bgl). Groundwater was encountered during drilling at 14.80 m bgl.

Table 1.9: Descriptions of Geological Strata (Area 7, 8 and 9)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Bedrock		
Bude Formation – sandstone (encompasses majority of Areas 7, 8 and 9)	Grey thick-bedded, argillaceous and silty sandstones, in laterally discontinuous internally massive beds 1 to 5 m thick and commonly amalgamated into units up to 10 m thick.	1290 m
Bude Formation (frequent bands from midway between Area 6 and 7, and west of Area 9)	At the base of formation there are approximately 100 m of grey mudstones and siltstones with two thin anthracitic coals (culm) above the cross-bedded thick-bedded Cornborough Sandstone that caps the top of the underlying Bideford Formation. BGS borehole record ref. SS42NW/53, located between Areas 9 and 10, indicates clay and predominantly siltstone underlying a bed of weathered, fractured siltstone to a depth of approximately 4.00 m underlain by more mudstone and siltstone, up to a recorded depth of 8.00 m below ground level.	100 m

Table 1.10: Descriptions of Geological Strata (Area 10 and 10A)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Bedrock		
Bude Formation (Area 10A)	At the base of formation there are approximately 100 m of grey mudstones and siltstones with two thin anthracitic coals (culm) above the cross-bedded thick-bedded Cornborough Sandstone that caps the underlying Bideford Formation.	100 m
Bude Formation – sandstone (encompasses south of Area10)	Grey thick-bedded, argillaceous and silty sandstones, in laterally discontinuous internally massive beds 1 to 5 m thick and commonly amalgamated into units up to 10 m thick.	1290 m
Crackington Formation (encompasses north of Area 10)	Dark blue-grey mudstones and grey siltstones.	250 m

Table 1.11: Descriptions of Geological Strata (Area 11)

Strata	Description	Approximate Thickness (m) based upon BGS Lexicon
Bedrock		
Bideford Formation (sandstone)	Thick bedded sandstones.	1220 m +
Bideford Formation (mudstone and siltstone)	Mudstones with thin/medium bedded sandstones and siltstones with thick bedded sandstone.	1220 m +

1.2.52 Bedrock faulting is inferred across much of the Proposed Development, with unknown displacement. The general geological sequence in the vicinity of the Proposed Development comprises a complex series of anticlinal and synclinal bedrock strata, generally dipping steeply to the south. The bedrock sequence has been locally fluvially eroded by the River Torridge resulting in deposition of superficial fluvial deposits of Alluvium and River Terrace Deposits over estuarine alluvium or Tidal Flat Deposits (TFD).

Site Hydrogeology

1.2.53 Environment Agency (EA) data including Groundwater Vulnerability mapping (1:100,000-scale) indicates the following aquifer classifications for areas of the Proposed Development as follows:

Table 1.12: Aquifer Classification

Area(s)	Aquifer Classification	Description
5 (On Site in south of Area)	Secondary A – Alluvium Deposits and River (Torridge) Terrace Deposits	These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.
5 (On Site in south of Area)	Secondary Undifferentiated – Tidal Flat Deposits	Assigned where it is not possible to attribute either category A or B to a rock type. These layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
All Areas	Secondary A – Bedrock strata	Assigned where it is not possible to attribute either category A or B to a rock type. These layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

1.2.54 The superficial aquifers are described as having high or medium groundwater vulnerability.

- High – Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium – Intermediate between high and low vulnerability.

1.2.55 All areas have bedrock designated as a Secondary A Aquifer.

- Secondary A: These are rock layers with the ability to easily transmit pollution, characterised by high permeability soils. The aquifers across the majority of the Proposed Development have a high vulnerability, with medium vulnerability in and around Area 10.

- 1.2.56 According to EA data², the Proposed Development is not located in a groundwater Source Protection Zone (SPZ).
- 1.2.57 Information provided by the EA indicates that there are no records of active licensed groundwater abstractions within 500 m of the Proposed Development.
- 1.2.58 Information provided by the EA indicates that there is one record of a Water Framework Directive Groundwater body within 250 m of the Proposed Development as shown in **Table 1.13**.

Table 1.13: Nearest Groundwater Bodies to the Onshore Infrastructure Area

Area(s) and Approx. Distance from Proposed Development (m)	Groundwater Body	Water body ID	Quality Classification
3 – On Site Bordering Area 6	Torridge and Hartland Streams	GB40802G800600	Overall – Poor (2019) Chemical – Poor (2019) Quantitative – Good (2019)

Surface Water

- 1.2.59 There are multiple watercourses located within 500 m of the Onshore Infrastructure Area which are classified within a River Basin Management Plan published by the EA under the European Water Framework Directive (2000). Unclassified surface water bodies are also listed on and within 250 m and are summarised below in **Table 1.14**.

Table 1.14: Nearby Watercourses and Water Bodies to the Onshore Infrastructure Area

Area(s) and Approx. Distance from Proposed Development (m)	Watercourse/Body	Quality Classification
Area 2 – On Site (in north east – Longland Copse)	Inland River – unnamed stream narrower than 5 m	N/A
Area 2 – On Site (in north west)	Inland River – unnamed stream narrower than 5 m	N/A
Area 2 – On Site (in south east)	Inland River – unnamed stream narrower than 5 m	N/A
Area 2 – On Site (southern boundary)	Inland River – unnamed stream narrower than 5 m	N/A
Area 3 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 3 – 16 m east	Inland River – unnamed stream narrower than 5 m	N/A

² MAGIC maps. [online] Available at: <https://magic.defra.gov.uk/> [Accessed 13th November 2022].

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Area(s) and Approx. Distance from Proposed Development (m)	Watercourse/Body	Quality Classification
Area 3 – 201 m west	Horwood Stream	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)
Area 3/4 – 31 m south west	Inland River – unnamed stream narrower than 5 m	N/A
Area 3/4 – 37 m south west	Inland River – unnamed stream narrower than 5 m	N/A
Area 3/4 – 200 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 3/4 – 206 m north west	Gammaton Upper Reservoir	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)
Area 4 – 249 m north west	Gammaton Lower Reservoir	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)
Area 4 – 293 m north west	Horwood Stream	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)
Area 4 – 66 m north west	Inland River – unnamed stream narrower than 5 m	N/A
Area 4 – 82 m north west	Inland River – unnamed stream narrower than 5 m	N/A
Area 4 – 130 m north west	Inland River – unnamed stream narrower than 5 m	N/A
Area 4 – 165 m north west	Inland River – unnamed stream narrower than 5 m	N/A
Area 4 – 200 m north west	Inland River – unnamed stream narrower than 5 m	N/A
Area 4 – 228 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 5 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 5 – On Site	Tidal river or stream	N/A
Area 5 – 187 m north east	Inland River – unnamed stream narrower than 5 m	N/A
Areas 5 – On Site	River Torridge	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)
Area 6 – 200 m south	Inland River – unnamed stream narrower than 5 m	N/A
Area 6 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 6 – 83 m east	Inland River – unnamed stream narrower than 5 m	N/A
Area 6/7 – 47 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 6/7 – 209 m south east	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 193 m west	Jennets' Reservoir	Overall – Poor (2019) Chemical – Fail (2019)

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Area(s) and Approx. Distance from Proposed Development (m)	Watercourse/Body	Quality Classification
		Ecological – Poor (2019)
Area 7 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 141 m south west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 152 m south west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 152 m south west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 163 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 174 m south west	Lake, loch, or reservoir wider than 5 m	N/A
Area 7 – 178 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 185 m north west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 186 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 206 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 212 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 7 – 246 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 8 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 8 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 8 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 8 – 62 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 8 – 134 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 8 – 197 m west	Inland River – unnamed stream narrower than 5 m	N/A
Area 9 – 100 m south	Inland River – unnamed stream narrower than 5 m	N/A
Area 9 – 90 m south	Inland River – unnamed stream narrower than 5 m	N/A
Area 9 – 112 m south	Inland River – unnamed stream narrower than 5 m	N/A
Area 9 – 133 m south east	Inland River – unnamed stream narrower than 5 m	N/A
Area 9 – 214 m south	Inland River – unnamed stream narrower than 5 m	N/A
Area 9 – 234 m south	Inland River – unnamed stream narrower than 5 m	N/A
Area 10 – On Site	Kenwith Stream	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)
Area 10 – On Site	Inland River – unnamed stream narrower than 5 m	N/A
Area 10 – 17 m south east	Inland River – unnamed stream narrower than 5 m	N/A
Area 10 – 94 m south	Inland River – unnamed stream narrower than 5 m	N/A
Area 10 – 162 m north	Inland River – unnamed stream narrower than 5 m	N/A
Area 10 182 m north	Inland River – unnamed stream narrower than 5 m	N/A
Area 11 – On Site	Barnstaple Bay	Overall – Moderate (2019) Chemical – Fail (2019)

Area(s) and Approx. Distance from Proposed Development (m)	Watercourse/Body	Quality Classification
		Ecological – Good (2019)
Area 11 – On Site west	Inland River – unnamed stream narrower than 5 m	N/A
Area 11 – On Site east	Inland River – unnamed stream narrower than 5 m	N/A
Area 11 – 150 m north west	Inland River – unnamed stream narrower than 5 m	N/A

1.2.60 A coastal catchment is present along the west of Area 11, as classified by the EA.

1.2.61 Information provided by the EA indicates that there is one record of an active licensed surface water abstraction within 500 m of the Proposed Development. The details of this are as follows:

Table 1.15: Licensed Surface Water Abstractions near the Onshore Infrastructure Area

Area	License Holder	Approx. Distance and Direction from Proposed Development	Source	Use
7	A C Withecombe & Son (Licence no. SW/050/0007/024)	179 m south	Surface Water, Fresh – Unnamed Pond at Bideford	General Farming & Domestic

River and Coastal Flooding

1.2.62 The risk to the Proposed Development from flooding from river or coastal catchments has been calculated considering flood defences and their condition. This risk has been detailed in the table below.

Table 1.16: Flood Risk of the Onshore Infrastructure Area

Area(s) and Distance from Proposed Development	Description	Flood Risk Category
5 and 6 – On Site	River Catchment – River Torridge	High
5 and 6 - On Site to 50 m	River Catchment – River Yeo	High
10/11 – On Site	River Catchment – Kenwith Stream	High
11 – On Site	Coastal Catchment	High

1.2.63 One historical flood event has been recorded related to the River Torridge within Area 5. The channel capacity was exceeded twice in December 1965.

1.2.64 There are two records of flood defences within 250 m of Areas 5 and 6.

Ecologically Sensitive Sites

1.2.65 The Groundsure report data indicates that there are multiple ecologically sensitive sites, which constitute environmental receptors as defined within Table 1 of the Department for Environment, Food and Rural Affairs (Defra) Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance (2012), located within a 500 m radius of the Proposed Development. These are listed in the table below.

Table 1.17: Ecologically Sensitive Sites within the Onshore Infrastructure Area

Sensitive Site	Area(s) Approx. Distance and Direction from Proposed Development	Details
Designated Ancient Woodland		
Pixey Copse	Areas 5– 215 m east	Ancient and Semi-Natural Woodland Data Source: Natural England
Upcott Wood	Area 6 – 269 m north west	Ancient and Semi-Natural Woodland Data Source: Natural England
Local Nature Reserves		
Kynoch's Foreshore	Areas 5 – On Site	Sites managed for nature conservation, education, and research. Data Source: Natural England
Nitrate Vulnerable Zones		
Gammaton Lower Reservoir Eutrophic Lake NVZ	Areas 1, 2, 3, 4 – On Site	Type: Eutrophic Water Status: Existing Data Source: Natural England
Jennets' Reservoir Eutrophic Lake NVZ	Areas 5, 6, 7, 8, 9, 10, 10A, 11 – On Site	Type Eutrophic Water Status: Existing Data Source: Natural England
Biosphere Reserves		
North Devon	All Areas – On Site	Status: Declared Data Source: Natural England
Sites of Special Scientific Interest – SSSI		
Mermaids Pool to Rowden Gut	Area 11 – On Site (Landfall)	Data Source: Natural England

Radon

1.2.66 The Indicative Atlas of Radon in England and Wales published by the Health Protection Agency (part of Public Health England) and the BGS, shows low radon risk levels across the Proposed Development. The Interactive Atlas is based upon Radon Potential Data and classifies areas based upon the likelihood of a property having a radon action level at or above the Action Level of 200 Bq m³ based upon a dataset of over 500,000 records provided by the UK Health Security Agency and geology provided by the BGS. The Radon Potential is calculated from statistics (geometric mean and geometric standard deviation) of indoor radon measurements collected over each geological unit. The radon potential for the assessment areas are summarised in the table below;

Table 1.18: Radon Risk Category for the Areas within the Onshore Infrastructure Area

Area(s)	Radon Risk Category
Area 1	Max. Potential 1 to 3%
Area 2	Max. Potential 1 to 3%
Area 3	Max. Potential 1 to 3%
Area 4	Max. Potential 1 to 3%
Area 5	Max. Potential 5 to 10% - Relating to superficial deposits associated with River Torridge
Area 6	Max. Potential 1 to 3%
Area 7	Max. Potential 1 to 3%
Area 8	Max. Potential 1 to 3%
Area 9	Max. Potential 1 to 3%
Area 10/10A	Max. Potential <1%
Area 11	Max. Potential <1%

1.2.67 It is indicated that no radon protective measures would be required in the construction of new structures over the majority of the Proposed Development, including Areas 1 to 3 for the proposed converter station.

Coal (Culm) Mining

1.2.68 The Map Viewer on the Coal Authority website indicates Areas 1, 2, 3, 4, 5 and 11 to fall within Coal Mining Reporting Areas, however only in Areas 1, 2 and 3 is there shown an area of development high risk linked to the conjectured outcrop of a seam. A CON29M Official Coal Mining Search has been obtained for Areas 1, 2 and 3 to assess whether there is a risk presented by historical coal mining activities to the proposed converter station construction activities. The area later added to Area 2 as part of the Onshore Infrastructure Area, falls outside of the CON29M Coal Mining report, however an assessment based upon the Coal Authority Interactive Map data is included. It is recommended that an additional mining report is obtained for Area 2 for confirmation. The remainder of the route is considered unlikely to be impacted by any historical mining activity comprising either temporary surface founded structures (compounds) or shallow trench excavations for the proposed cable routes given the information presented on the Coal Authority website. It is also apparent that there is no historical map evidence of any mining activity across the onshore HVDC Cable Corridor.

1.2.69 Reference to the BGS Sheet Memoir ‘Geology of Bideford and Lundy Island. Memoir for 1:50 000 sheets 292, with 275, 276, 291 and part of 308’ by Edmonds *et al.*, (1979) indicates that near the base of the Bude Formation are two ‘culm’ seams, one of soft anthracite, about 1 m above the Cornborough Sandstone and identified at outcrop on the coast, the other, the ‘paint’ seam to the south of this and approximately 100 m higher in the succession. They are recorded as ‘carbonaceous material’ rather than coal and have been sporadically worked since the Middle Ages for burning of lime or collection of pigment. The seams are recorded as being steeply dipping and worked in a similar way to metalliferous mining.

1.2.70 Further assessment of online information sourced from a presentation made to the Open University Geological Society on Coal Mining in Devon (2015) indicates that two east - west aligned seams were identified near Bideford. The seam to the

north was termed the ‘coal seam’ and is present as a series of sporadic coal lenses, it is understood that this is locally termed ‘Bideford Black’. The seam to the south was named the ‘paint seam’ and is a carbonaceous shale also called carbargillite used as camouflage paint, pencils, car tyre filler and mascara. It is noted that working of these two seams has been limited by their sporadic nature and main areas of working were restricted to horizontal shafts at East-the-Water near Bideford into the Bideford Black and on the coast at Greencliff where the two exposed seams were worked from adits which intersected both seams.

- 1.2.71 The presentation concluded that there has been no commercial past for coal mining in Devon and there is unlikely to be any commercial future for mining.
- 1.2.72 The Coal Mining Report (CON29M) Report, included in **Annex B**, indicates the conjectured position of an east – west aligned seam at outcrop across the north of Area 1 and extending through the centre of Area 2. The outcrop is identified by the Coal Authority as a Development High Risk Area, assumed to be from the potential for historical unrecorded opencast/shallow workings of the outcropping seam.
- 1.2.73 The aforementioned area does not fall within the potential zone of influence of any recorded underground coal workings, although given the conjectured outcrop it is stated that the possibility of unrecorded mine workings cannot be discounted. The Coal Authority Interactive Map There are no current underground coal workings within influencing distance of the Proposed Development and it is not within an area designated for any future workings.
- 1.2.74 Areas 1 to 3 are not within the boundaries of any former opencast workings, not within 200 m of any present opencast workings and are not within 800 m of any proposed opencast workings.
- 1.2.75 For the full extent of Area 2 within the Onshore Infrastructure Area, the interactive map indicates no evidence of past recorded or probable shallow coal mine workings, surface mining or mine entries.
- 1.2.76 There are no recorded coal mine entries on or within 20 m of Areas 1 to 3. Listed below are mine entries recorded by the Coal Authority within 500 m of the Proposed Development:

Table 1.19: Mine Entries within 500 m of the Onshore Infrastructure Area

Mine Entry Reference	Name	Area(s) and Approx. Distance from Proposed Development	Dimensions	Treatment
Shaft – 249126-004	Bideford	Area 1 – 280 m north	Diameter – 2.5 m	Unknown
Adit – 250125-001	Bideford	Area 2 – 470 m north east	Diameter – 3 m	Unknown
Shaft – 250125-003	Bideford	Area 2 – 472 m north east	Diameter – 2.5 m	Unknown
Shaft – 250125-002	Bideford	Area 2 – 460 m north east	Diameter – 2.5 m	Unknown

Non-Coal Mining

- 1.2.77 It is stated within the Groundsure Reports, that sections of the Proposed Development are within an area where historical non-coal mining may have occurred.
- 1.2.78 Data sourced from the BGS, identifying the risk potential for historical non-coal mining within 500 m of the Proposed Development is summarised in the table below. It should be noted that there is no evidence on historical maps of former non-coal mining activity in these areas.

Table 1.20: Non Coal Mining within the Onshore Infrastructure Area

Area(s) and Approx. Distance from Proposed Development	Name	Commodity	Class	Likelihood
Area 1 – On Site (north)	N/A	Bideford Black	A	Potential restricted sporadic mining – Underground conditions are not likely to be difficult.
Area 2 – On Site (north)	N/A	Bideford Black	A	Potential restricted sporadic mining – Underground conditions are not likely to be difficult.
Area 3 – On Site (south)	N/A	Vein Mineral	A	Potential restricted sporadic mining – Underground conditions are not likely to be difficult.
Area 4 – 384 m (west)	N/A	Vein Mineral	A	Potential restricted sporadic mining – Underground conditions are not likely to be difficult.
Area 5 and 6 – On Site	N/A	Vein Mineral	A	Potential restricted sporadic mining – Underground conditions are not likely to be difficult.
Area 10 – On Site	N/A	Bideford Black	A	Potential restricted sporadic mining – Underground conditions are not likely to be difficult.
Area 10/10A/11	N/A	Bideford Black	B	Potential localised small-scale mining – Underground conditions are unlikely to be difficult or localised.

- 1.2.79 The Bideford Black is also the ‘Culm’ referred to in section 2.1.70.

British Geological Survey, Ground Stability

- 1.2.80 BGS Ground Stability Hazard ratings for the Proposed Development are summarised as follows:

Table 1.21: British Geological Survey Ground Stability Hazard Ratings

Ground Stability Hazard	BGS Risk Rating
Area 1	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible

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Ground Stability Hazard	BGS Risk Rating
Landslide	Very Low/Low
Running Sand	Negligible
Shrinking or Swelling Clay	Very Low/Negligible
Area 2	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Very Low/Low
Running Sand	Negligible
Shrinking or Swelling Clay	Negligible/Very Low
Area 3	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Low
Running Sand	Negligible
Shrinking or Swelling Clay	Very Low
Area 4	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Low
Running Sand	Negligible
Shrinking or Swelling Clay	Very Low
Area 5	
Collapsible Ground	Negligible/Very Low
Compressible Ground	Negligible/Moderate - (Moderate – Alluvium/TFD)
Ground Dissolution	Negligible
Landslide	Low/Very Low/Moderate (Moderate on river valley sides)
Running Sand	Negligible/Very Low/Low/Moderate – (Moderate - TFD)
Shrinking or Swelling Clay	Very Low
Area 6	
Collapsible Ground	Negligible/Very Low
Compressible Ground	Negligible/Moderate - (Moderate – Alluvium/TFD)
Ground Dissolution	Negligible
Landslide	Very Low/Low/Moderate (Moderate on river valley sides)
Running Sand	Negligible/Moderate (Moderate - TFD)
Shrinking or Swelling Clay	Negligible/Very Low
Area 7	
Collapsible Ground	Very Low

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Ground Stability Hazard	BGS Risk Rating
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Very Low
Running Sand	Negligible
Shrinking or Swelling Clay	Negligible
Area 8	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Very Low
Running Sand	Negligible
Shrinking or Swelling Clay	Negligible
Area 9	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Very Low
Running Sand	Negligible
Shrinking or Swelling Clay	Negligible
Area 10	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Very Low/Low
Running Sand	Negligible
Shrinking or Swelling Clay	Negligible/Very Low
Area 10A	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Low
Running Sand	Negligible
Shrinking or Swelling Clay	Very Low
Area 11	
Collapsible Ground	Very Low
Compressible Ground	Negligible
Ground Dissolution	Negligible
Landslide	Very Low/Low
Running Sand	Negligible
Shrinking or Swelling Clay	Negligible/Very Low

Landfills and Waste Sites

1.2.81 Information provided by a number of sources and referenced in the Groundsure reports shows that there are no recorded licensed or known historical landfill sites, recorded within the Onshore Infrastructure Area. There are four historical landfills recorded within a 500 m buffer of the Onshore Infrastructure Area.

Table 1.22: Landfill/Waste Transfer/Waste Treatment Sites within the Onshore Infrastructure Area

License Holder	Area(s) and Approx. Distance and Direction (m)	License Details	Waste Type and Details
Historical Landfills			
Mr and Mrs Evan	Area 5 – 425 m north west	Reference L/2/68/84 06/07/1984	Inert, Industrial 01/08/1984 to 04/03/1986
Bideford Borough Council	Area 6 – 202 m west	None Provided	Commercial, Household 31/01/1971 to 31/12/1972
Devon County Council	Area 6– 85 m west	None Provided	Inert, Industrial, Commercial, Household
Jury Paul	Area 11 – 439 m east	Reference JUR100	AO6 – Landfill taking other wastes Status: Closure

1.2.82 There are identified locations of waste exemptions immediately to the north west of Area 2, relating to disposing or treatment of agricultural waste at Webbery Barton, Bideford including dredgings, waste wood by shredding/chipping/cutting etc, spreading of waste and incineration.

Environmental Permits

1.2.83 EA and Local Authority data indicates that there are two processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2016) within 250 m of the Onshore Infrastructure Area. These are outlined in the **Table 1.23** below:

Table 1.23: Environmental Permits within the Onshore Infrastructure Area

License Holder	Area(s) and Approx. Distance and Direction from Proposed Development	Permitted Activity
Q Plant & Haulage (Notts Contractors)	Area 11 – 9 m east	Historical Use of Bulk Cement
Evans Transport Ltd	Area 5 – 182 m north west	Use of Bulk Cement

Control of Major Accident Hazards/Notifications of Installations Handling Hazardous Substances Sites

- 1.2.84 There are no records of any operations under the Control of Major Accident Hazards Regulations, 1999 or the Notifications of Installations Handling Hazardous Substances, 1982 (amended 2002), located within 500 m of the Onshore Infrastructure Area.

List 2 Dangerous Substances

- 1.2.85 There are two records for discharge of substances identified on List II of European Directive E 2006/11/EC within 500 m of the Onshore Infrastructure Area, both relating to a location 130 m north of Area 11, Typo Electronics, authorised to discharge chromium, copper, cyanide, lead, nickel, and zinc, and Bideford (Cornborough) STW, authorised to discharge chromium, copper, iron, lead, nickel, and zinc, both have active status, with the latter discharging into the tidal River Torridge.

Pollution Incidents

- 1.2.86 EA data indicates that there no records of ‘major’ or ‘significant’ pollution incidents to water or land within 500 m of the Onshore Infrastructure Area.

Unexploded Ordnance

- 1.2.87 Construction Industry Research and Information Association (CIRIA) Report C681 (Stone *et al*, (2009)) outlines recommendations for dealing with the potential risk associated with the legacy of Unexploded Ordnance Risk, largely relating to WWII bombing and military sites.
- 1.2.88 Reference to the Zetica³ Unexploded Bomb Risk mapping indicates that the Proposed Development is in an area of low potential risk from Unexploded Bombs. As the Onshore Infrastructure Area is not within an area of known military history, in general accordance with the CIRIA Report, no further consideration of Unexploded Ordnance (UXO) relating to wartime bombing is considered necessary, although given the historical presence of a rifle range on the route alignment in Area 11, the potential cannot be discounted entirely from the Zetica mapping.
- 1.2.89 RPS have also undertaken a UXO detailed desk study for the Proposed Development (Ref. EES1428 R-01-00 UXO Desk Study Xlinks North Devon Interconnector 01/11/2022). The scope of this report covers all Areas, with the exception of the north of Area 5. A brief summary of the conclusions have been included below and the full report is provided in **Annex D** and should be read in conjunction with this report.
- 1.2.90 A negligible risk was identified for Anti-Aircraft Artillery, Explosive Storage Areas, Military Airfield, Bombing Decoy Sites, Munitions Production, WWI Bombing and

³ <https://zeticauxo.com/downloads-and-resources/risk-maps/>

WWII Bombing. A low risk was identified for Defensive Positions and Military Training/Presence.

- 1.2.91 Recommendations for all areas include explosives safety and awareness briefings and site safety guidelines in support of works taking place for the Proposed Development.

1.3 Outline Conceptual Site Model: Areas 1, 2 and 3

Background

- 1.3.1 An outline CSM consists of an appraisal of the source-pathway-receptor 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.
- Source referring to the source of contamination (Hazard).
 - Pathway for the contaminant to move/migrate to receptor(s).
 - Receptor (Target) that could be affected by the contaminant(s).
- 1.3.2 Receptors include human beings, controlled waters, and buildings/structures. The National Planning Policy Framework, used to address contaminated land through the planning process, follows the same principles as those set out under Part 2A.
- 1.3.3 As part of the assessment the potential risks to receptors for potential source is given one of the following classifications:
- Low risk – it is considered unlikely that issues within the category will give rise to significant harm to identified receptors;
 - Moderate risk – it is possible, but not certain that issues within the category will give rise to significant harm to receptors; or
 - High risk – there is a high potential that issues within the category will give rise to significant harm to identified receptors.
- 1.3.4 The risk assessment considers the development proposals set out within **section 1.1.10**.

Potential Pollutant Linkages

- 1.3.5 Each stage of the potential pollutant linkage sequence has been assessed individually on the basis of information obtained during the site reconnaissance and desk study exercise and are discussed in the following section.

Potential Contamination Sources

On-Site – Current

- 1.3.6 No current on site potentially contaminative land uses have been identified. The existing pylons, farm buildings, Alverdiscott Substation and access road within

Areas 1 to 3 are not significant sources although there may be localised Made Ground associated with their construction.

On-Site – Historical

- 1.3.7 No historical on site potentially contaminative land uses have been identified from the map research although given the long period of agricultural site usage the possibility of localised contamination from former use of agrochemicals (possibly degrading to heavy metals over time) or other agricultural activities cannot be discounted.

Off-Site – Current

- 1.3.8 Based on the site inspection and aerial photo review no potential current off-site potential contamination sources have been identified.

Off-Site – Historical

- 1.3.9 Historical maps indicate the following potential off-site historical sources:
- Smithy, located downgradient of Areas 1 to 3; and
 - Former use of agrochemicals or other agricultural activities.
- 1.3.10 No potential sources of ground gases have been identified and this section of the development is not within a high-risk radon area, therefore ground gases have been discounted as a potential concern.

Potential Pathways

- 1.3.11 The risks to future on site human health receptors in Areas 1 to 3 via the pathways of inhalation, dermal contact and ingestion will be mitigated by use of clean inert material to infill service trenches. Given the absence of recorded sources of Made Ground there is not considered to be a major risk to human health posed by exposure of future site staff in soft landscaping areas where Made Ground is likely to be absent or minimal in thickness. Occupational exposure to agrochemicals is of a higher concern for people working with pesticides who may be exposed to higher doses more frequently than the general public, with exposure usually occurring through the skin or inhalation.
- 1.3.12 The site is indicated to be underlain by mainly low permeability mudstone and siltstone dominated strata, which will likely restrict the downward or lateral migration via groundwater of any contaminants of concern that might be present in shallow soils or originate from off-site sources.

Potential Receptors

Controlled Waters

- 1.3.13 A number of surface watercourses are located on and in the vicinity of Areas 1 to 3, including Gammaton Reservoirs to the west considered to be the most sensitive surface water receptors for this part of the route.

- 1.3.14 The shallow bedrock comprises Secondary A Aquifers which represent a potential significant receptor, however the absence of identified abstractions and SPZs would indicate low sensitivity.

Human Health

- 1.3.15 Potential post development human health receptors include future site users and off-site residents. It is feasible that there will be regular occupation of the converter station post development, however Areas 1 to 3 are located in an area of generally low density nearby occupation therefore off-site receptors have been discounted as a receptor requiring further assessment.
- 1.3.16 The preliminary masterplan indicates construction workers will be temporarily based in construction compounds along the route and closed to public access. This assessment does not consider the risk to construction workers during redevelopment. These risks will be managed through appropriate Health and Safety legislation including the Health and Safety at Work Act and CDM regulations.
- 1.3.17 Human health is discounted as being a significant receptor based upon the site setting and Desk Study findings.

Outline Conceptual Site Model (Areas 1 to 3)

- 1.3.18 An outline CSM has been developed on the basis of the site reconnaissance and desk study. The CSM is used to identify potential sources, pathways, and receptors (i.e. potential pollutant linkages) on site post development and is summarised in the table below. Should the development layout plan vary from that reviewed and included as a part of this PRA or should occupied structures be proposed then the Conceptual Site Model and derived risk ratings should be reviewed accordingly.

Table 1.24: Outline Conceptual Site Model (Areas 1 to 3)

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors	Qualitative Risk Rating	Notes	
On site – current/historical: Farmland, natural strata	Agrochemicals, metals	Soil	Direct contact/ingestion	✓	Future site users	Low	No confirmed sources of contamination have been identified in Areas 1 to 3. Risk presented by former use of agrochemicals is low given the nature of proposed land use and low exposure potential.	
			Inhalation of volatiles	✓				
			Leaching of mobile contaminants	✗	Groundwater and Surface Water	-		No confirmed sources of contamination have been identified in Areas 1 to 3.
		Groundwater	Direct contact/ingestion	✗	Future site users	-		No confirmed sources of potential volatile contamination have been identified in Areas 1 to 3.
			Inhalation of Volatiles	✗	Future Site users	-		No confirmed sources of potential volatile contamination have been identified in Areas 1 to 3.
			Vertical and lateral migration in permeable strata	✗ ✗	Secondary A aquifer Surface waters	-		The bedrock has the ability to easily transmit pollution., however no confirmed sources of contamination have been identified.
Off-site – historical: Smithy, farmland	Agrochemicals, metals	Groundwater	Direct contact/ingestion/inhalation	✗	Future site users	-	Smithy downgradient of Areas 1 to 3, unlikely to be a viable pathway. Agrochemical exposure via groundwater unlikely post development on converter station site comprising primarily buildings, hardstanding and roads.	
On and off-site: Sources of ground gas	Methane/carbon dioxide/radon	Soil	Inhalation of ground gas/explosive risks	✗ ✗	Future site users Future and off-site buildings	- - -	No significant ground gas sources have been identified within 250 m. No radon precautions required.	

Note ✗ The Qualitative Risk Rating does not consider the potential for the pathway to be active. In the event that a Moderate or High Qualitative Risk Rating is identified further assessment is recommended.

1.3.19 Based on the identified potential sources and the site setting, there is not considered to be a significant risk to ecological receptors, crops/vegetation, or archaeological receptors

1.4 Outline Conceptual Site Model: Areas 4 to 11

Potential Pollutant Linkages

- 1.4.1 Each stage of the potential pollutant linkage sequence has been assessed individually on the basis of information obtained during the site reconnaissance and desk study exercise and are discussed in the following section.
- 1.4.2 It is understood that this section of the route will comprise temporary construction compounds linking sections of cable trenches to be excavated and subsequently infilled.

Potential Contamination Sources

On-Site – Current

- 1.4.3 Several roads cross Areas 4 to 11, which potentially present a source of localised soil/groundwater contamination through rain wash-off of water that may have been contaminated by minor oil/fuel spills.

On-Site – Historical

- 1.4.4 Historical maps indicate the following potentially contaminative historical sources:
- historical Quarry located to the east of Area 7 (infilled with unknown materials);
 - lime kilns in Areas 6 and 11 (potential demolition materials, high alkalinity waste materials); and
 - former rifle range in Area 11 (metals).
- 1.4.5 In addition, given the long period of agricultural site usage the possibility of localised contamination from former use of agrochemicals or other agricultural activities cannot be discounted.

Off-Site – Current

- 1.4.6 Current Maps indicate the following potentially contaminative sources within 250 m of the Onshore Infrastructure Area:
- Transport depot station, north of Area 4 (possible fuel storage, vehicle maintenance activities) downgradient of the Proposed Development.

Off-Site – Historical

- 1.4.7 Historical maps indicate the following potential off-site historical sources within 250 m:
- Area 10 - Old quarries to the north (possible landfill usage);
 - Area 11 - Railway (metals, asbestos);
 - historical landfills present to the north of Area 5/6/7 (potential for ground gas generation or mobilisation of leachates); and

- former use of agrochemicals or other agricultural activities across the Proposed Development in general.

Potential Pathways

- 1.4.8 The risks to future on site human health receptors via the pathways of dermal contact and ingestion will be mitigated by use of clean inert material to infill service trenches. Given the absence of recorded significant sources of Made Ground over much of Areas 4 to 11 there is not considered to be a risk to human health posed by exposure in soft landscaping areas where Made Ground is likely to be absent or minimal in thickness.
- 1.4.9 The inhalation pathway in outdoor areas from ground gases associated with off-site landfill or former quarry sites on or in close proximity to the route is not considered viable from the anticipated short period of exposure for any future maintenance workers.
- 1.4.10 This section of the Proposed Development is indicated to be underlain by both mudstones (Areas 4 to 6) and sandstones (Areas 7 to 11) the latter which will readily allow migration of gaseous and liquid contaminants. Off-site current potential sources of contamination are generally downgradient of the Proposed Development which is unlikely to be prone to contaminant migration via shallow groundwater. Historical off-site sources such as the railway line are to the north and therefore downwind of the prevailing south west wind direction in the United Kingdom suggesting historical impact on the Proposed Development by airborne contaminants is unlikely.

Potential Receptors

Controlled Waters

- 1.4.11 A number of surface watercourses are present in the locality, the main one being the River Torridge aligned north to south between Areas 5 and 6. Surface water therefore comprises a potentially sensitive receptor.
- 1.4.12 The shallow bedrock and localised fluvial superficial deposits comprise Secondary A Aquifers which represent a potential significant receptor, however the absence of identified abstractions and SPZs would indicate low sensitivity.

Human Health

- 1.4.13 Potential post development human health receptors include future site users and off-site residents in what is a low-density residential setting. It is unlikely following placement that there will be regular usage of this section of the Proposed Development by future site users.
- 1.4.14 The preliminary masterplan indicates construction workers will be temporarily based in construction compounds along the route and closed to public access. The assessment does not consider the risk to construction workers during redevelopment. These risks will be managed through appropriate Health and Safety legislation including the Health and Safety at Work Act and CDM regulations.
- 1.4.15 Human health is discounted as being a significant receptor based upon the site setting and Desk Study findings.

Outline Conceptual Site Model (Areas 4 to 11)

- 1.4.16 An outline CSM has been developed on the basis of the desk study findings. The CSM is used to identify potential sources, pathways, and receptors (i.e., potential pollutant linkages) on site post development and is summarised in the table below. Should the development layout plan vary from that reviewed and included as a part of this PRA or a change of proposed site usage be proposed then the CSM and derived risk ratings should be reviewed accordingly.
- 1.4.17 Based on the identified potential sources and the site setting, there is not considered to be a significant risk to ecological receptors, crops/vegetation, or archaeological receptors.

Table 1.25: Outline Conceptual Site Model (Areas 4 to 11)

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors	Qualitative Risk Rating	Notes
On site – current/historical Farmland, natural strata, Quarry, lime kiln, agricultural land, roads	Agrochemicals, metals, hydrocarbons,	Soil	Direct contact/ingestion	*	Future site users	-	No regular occupation of the Proposed Development post development Exposure pathway will be mitigated by reinstatement of trenches following placement of cables with clean inert material.
			Inhalation of volatiles	*	Future site users	-	No regular occupation of the Proposed Development post development.
			Airborne migration of soil or dust	*	Off-site users	-	Few confirmed sources of contamination have been identified in Areas 4-11. Low density occupation of immediate surrounding area. Requirements for dust mitigation should be assessed further in event of confirmation of Made Ground during construction, e.g., infilled quarry between areas 6 and 7.
			Leaching of mobile contaminants	✓	Groundwater	Low	Post construction drainage patterns unlikely to be altered by Proposed Development. Low risk considered applicable to areas where potential; contamination sources have been identified.
		Groundwater	Direct contact/ingestion	*	Future site users	-	No regular occupation of the Proposed Development post construction Exposure pathway will be mitigated by reinstatement of trenches following placement of cables with clean inert material.
			Vertical and lateral migration in permeable strata	✓	Secondary A aquifers	Low	Post construction drainage patterns unlikely to be altered by Proposed Development. Low risk considered applicable to areas where potential; contamination sources have been identified.
			Vertical and lateral migration in permeable strata	✓	Surface waterbodies	Low	The bedrock has the ability to easily transmit pollution, however, no confirmed sources of contamination have been identified.
Off-site – historical: Railway	Metals, asbestos	Soil	Airborne migration of dust or particulates	*	Future site users	-	Former railway to the north of Area 11 unlikely to have resulted in significant residual soil contamination across the Proposed Development given prevailing south west wind direction.
Off-site – historical: Lime Kiln, agricultural land, landfill sites	Metals, hydrocarbons, Agrochemicals.	Groundwater	Direct contact/ingestion	*	Future site users and Off-site users	-	Exposure pathway via groundwater unlikely post development. Shallow excavations for cable laying are unlikely to alter the groundwater drainage pattern and impact on off-site human health receptors.
On and off-site – Made Ground/landfills/Alluvium or TFD containing peat and other organic material,	Methane/carbon dioxide/radon	Soil	Inhalation of ground gas/explosive risks	* * *	Future site users Off-site users Future and off-site buildings	- - -	Buildings do not form part of the development plans in this section of the Proposed Development. Future usage likely to be restricted to routine maintenance checks. No radon precautions required.

Note *The Qualitative Risk Rating does not consider the potential for the pathway to be active. In the event that a Moderate or High Qualitative Risk Rating is identified further assessment is recommended.

1.5 Preliminary Geotechnical Risk Register

Introduction

- 1.5.1 It is understood the Proposed Development in either Area 1, 2 or 3 is to comprise a converter station and possible relocation of existing electricity pylons. As the proposals include potentially excavation and subsequent construction of new on-site buildings/structures, the following section provides a preliminary assessment of potential geotechnical constraints. It should be emphasised that the comments listed below are based solely on the Desk Study data available. Intrusive ground investigation together with geotechnical testing will provide further confirmatory information on ground conditions and the significance of these potential constraints.

Preliminary Geotechnical Risk Register - Areas 1 to 3

- 1.5.2 The following table summarises the potential geotechnical hazards associated with the Proposed Development based on freely available published information. Preliminary information relating to the hazard and associated engineering considerations are provided.
- 1.5.3 The potential geotechnical risks are given one of the following classifications:
- Low risk - it is considered unlikely that issues within the category will give rise to significant abnormal construction activities in relation to the Proposed Development.
 - Moderate risk - it is possible, but not certain that issues within the category will give rise to significant abnormal construction activities in relation to the Proposed Development.
 - High risk - there is a high potential that issues within the category will give rise to significant abnormal construction activities in relation to the Proposed Development.
 - N/A - The anticipated ground conditions are not consistent with this hazard.

Table 1.26: Preliminary Geotechnical Risk Register (Areas 1 to 3)

Hazard Description	Potential for Hazard	Comments/Possible Engineering Comments
Sudden lateral/vertical changes in ground conditions	Low	There are no indicated superficial deposits across Areas 1 to 3, it is anticipated that the shallow ground conditions will comprise weathered mudstones/siltstones of the Bude Formation potential tending to sandstones towards the south. These conditions should represent suitable load-bearing strata for foundations.
Highly compressible/low bearing capacity soils, (including peat and soft clay)	N/A	The BGS database indicates that there is negligible risk of highly compressible ground across the Areas.
Ground dissolution features/natural cavities	N/A	Ground conditions beneath the site are not consistent with these conditions.
Shrinking and swelling clays	Low	The BGS database indicates that there is a very low/negligible risk of shrinking or swelling clays.
Slope stability issues	Low	Whilst no significant slopes are present on site, any temporary slopes created as part of the development should be subject to appropriate geotechnical design based on site-specific site investigation information.
High groundwater table (including waterlogged ground)	N/A	Ground conditions across the site are not consistent with these conditions.
Filled and Made Ground (including embankments)	Low	The possible presence of localised backfilled historical surface workings of a culm seam, if present at outcrop on Areas 1 and 2, cannot be entirely discounted although there is no supportive map evidence for this. Made Ground is likely to be limited to construction debris in close proximity to existing structures such as the substation, pylons or farm outbuildings.
Obstructions (including foundations, services, basements, tunnels, and adjacent sub-structures)	Low	Due to the absence of identified former historical development of Areas 1 to 3, it is unlikely that any obstructions will be encountered during intrusive groundworks.
Underground mining	Low/Moderate	Areas 1 and 2 are indicated to be at potential risk of underground mining, with a conjectured location of a coal (culm) seam present at outcrop in both areas. Whilst underground conditions are not likely to be difficult, it is recommended that a visual inspection of the area around the identified outcrop is undertaken by a suitably qualified and experienced person to identify any currently identifiable mining related settlement or subsidence effects. The north of Area 1, Area 2 and south of Area 3 are classed as areas with potential for restricted sporadic non-coal mining, however there is no historical map evidence to indicate that any historical mining activities have occurred and the risk presented by non-coal mining is considered to be low.
Concrete classification	Moderate	There is potential for the Carboniferous mudstones/siltstones of the Bude Formation to contain elevated sulphate concentrations that would necessitate use of sulphate resistant concrete.

Preliminary Geotechnical Risk Register – Areas 4 to 11

- 1.5.4 It is understood the rest of the Proposed Development is to comprise an onshore HVDC Cable Corridor, with construction of temporary on-site compounds for construction activities. The following section provides a preliminary assessment of potential geotechnical constraints. It should be emphasised that the comments listed below are based solely on the Desk Top Study data available. Intrusive ground investigation together with geotechnical testing will provide further confirmatory information on ground conditions and the significance of these potential constraints.
- 1.5.5 It is assumed that the main geotechnical risks in Areas 4 to 11 will be associated with the excavation of trenches and laying of cables, construction compounds are assumed to comprise temporary portacabin type structures and surfaced areas for vehicles, plant and equipment storage.
- 1.5.6 The following table summarises the potential geotechnical hazards associated with the Proposed Development based on freely available published information. Preliminary information relating to the hazard and associated engineering considerations are provided.

Table 1.27: Preliminary Geotechnical Risk Register (Areas 4 to 11)

Hazard Description	Potential for Hazard	Comments/Possible Engineering Comments
Sudden lateral/vertical changes in ground conditions	Low/Moderate	It is indicated that there will be localised superficial deposits associated with watercourses crossing the Proposed Development. These are likely to be of variable composition, both cohesive and granular in nature. It is unlikely that these deposits would present a widespread constraint to excavation of trenches, however the moderate risk potential of running sands has been identified close to the river crossing which may represent a localised constraint. No other superficial deposits have been identified, resulting in bedrock, considered suitable stratum for bearing foundations and structures.
Highly compressible/low bearing capacity soils, (including peat and soft clay)	Low/Moderate	In areas with superficial Alluvium and TFD (Area 5 and 6) BGS records indicate a moderate risk from compressible ground. Although these may result in uneven settlement from surface loading, excavation trenches are unlikely to be adversely impacted. For all the other sites, BGS data considers there to be a negligible risk from compressible deposits.
Ground dissolution features/natural cavities	N/A	Ground conditions beneath the site are not consistent with these conditions.
Shrinking and swelling clays	Low	The BGS database indicates that there is a very low to negligible hazard from shrinking and swelling clays across all of these Areas.
Slope stability issues	Low/Moderate	Whilst no significant slopes are present in the Areas suggested for compound construction, any temporary slopes created as part of the development should be subject to appropriate geotechnical design based on site-specific site investigation information. Localised moderate landslide risks have been identified on the north and south banks of the River Torridge possibly from past instability issues and risks of further induced instability by the

Hazard Description	Potential for Hazard	Comments/Possible Engineering Comments
		Proposed Development should be considered further through slope stability assessment.
High groundwater table (including waterlogged ground)	Low	BGS data indicates that Areas 4 to 11 are a low risk of groundwater flooding indicating that it is unlikely that there will be a high groundwater table present.
Filled and Made Ground (including embankments)	Moderate	An infilled quarry is located between area 6 and 7, potentially representing a source of Made Ground in this part of the Proposed Development. This may represent a source of variable ground density or shallow obstructions dependent upon infill materials.
Obstructions (including foundations, services, basements, tunnels, and adjacent sub-structures)	Low	Due to the limited historical development of this part of the Proposed Development, it is unlikely that any such obstructions will be encountered during intrusive groundworks.
Underground mining	Low	Coal Authority data indicates that although Areas 11, 5 and 4 are within a designated Coal Mining Reporting Area there are not any conjectured locations of outcropping coal/culm seams or associated mining activities within 250 m.
Concrete classification	Low/Moderate	Where geological conditions are indicated to be of sandstone, there is a low risk of sulphate attack on concrete. Where the Carboniferous mudstones/siltstones of the Bude, Bideford or Crackington Formations are encountered, there is considered to be a medium risk from elevated sulphate concentrations.

1.5.7 The potential risks are given one of the following classifications:

- Low risk - it is considered unlikely that issues within the category will give rise to significant abnormal construction activities in relation to the Proposed Development.
- Moderate risk - it is possible, but not certain that issues within the category will give rise to significant abnormal construction activities in relation to the Proposed Development.
- High risk - there is a high potential that issues within the category will give rise to significant abnormal construction activities in relation to the Proposed Development.
- N/A - The anticipated ground conditions are not consistent with this hazard.

1.6 Conclusions and Recommendations

Areas 1, 2 and 3

Conclusions

- 1.6.1 The outline CSM produced upon completion of the DTS and PRA has identified no potentially active pollutant linkages.

Recommendations

- 1.6.2 It is recommended that site investigation is undertaken to include geotechnical testing, to facilitate preliminary design and confirmation on suitable concrete classification and design parameters for new development.
- 1.6.3 Due to the potential risk for small scale culm mining in Areas 1 and 2, a visual inspection by a suitably qualified and experienced person is recommended and sourcing of a CON29 mining report for all of Area 2 within the Onshore Infrastructure Area. The conjectured location of the Culm seam in both areas should be considered when finalising the Proposed Development layout and further liaison would be required with the Coal Authority should the development encroach within the area of the recorded outcrop.
- 1.6.4 It is recommended that if evidence of unexpected contamination is identified during groundworks that could lead to pollution of the underlying superficial or bedrock Secondary aquifers or impact on surface water quality that specialist advice is sought on how to proceed.

Areas 4 to 11

Conclusions

- 1.6.5 The outline CSM produced upon completion of the desk study assessment has identified few potential pollutant linkages that may be active upon the redevelopment of the site. Those that have been identified are considered to represent a low risk and no further assessment is considered necessary.
- 1.6.6 There is a potential for localised moderate risks of ground instability associated with the river crossing resulting from landslides and running sands which should be taken into consideration with construction/placement of construction compounds and trench excavation if proposed in these areas.

Recommendations

- 1.6.7 It is recommended that if evidence of unexpected contamination is identified during groundworks that could lead to pollution of the underlying superficial or bedrock Secondary aquifers or impact on surface water quality that specialist advice is sought on how to proceed.
- 1.6.8 It is recommended that a detailed slope stability assessment is undertaken of the crossing points on north and south banks of the River Torridge to further evaluate the moderate risk rating applied by BGS.

1.7 References

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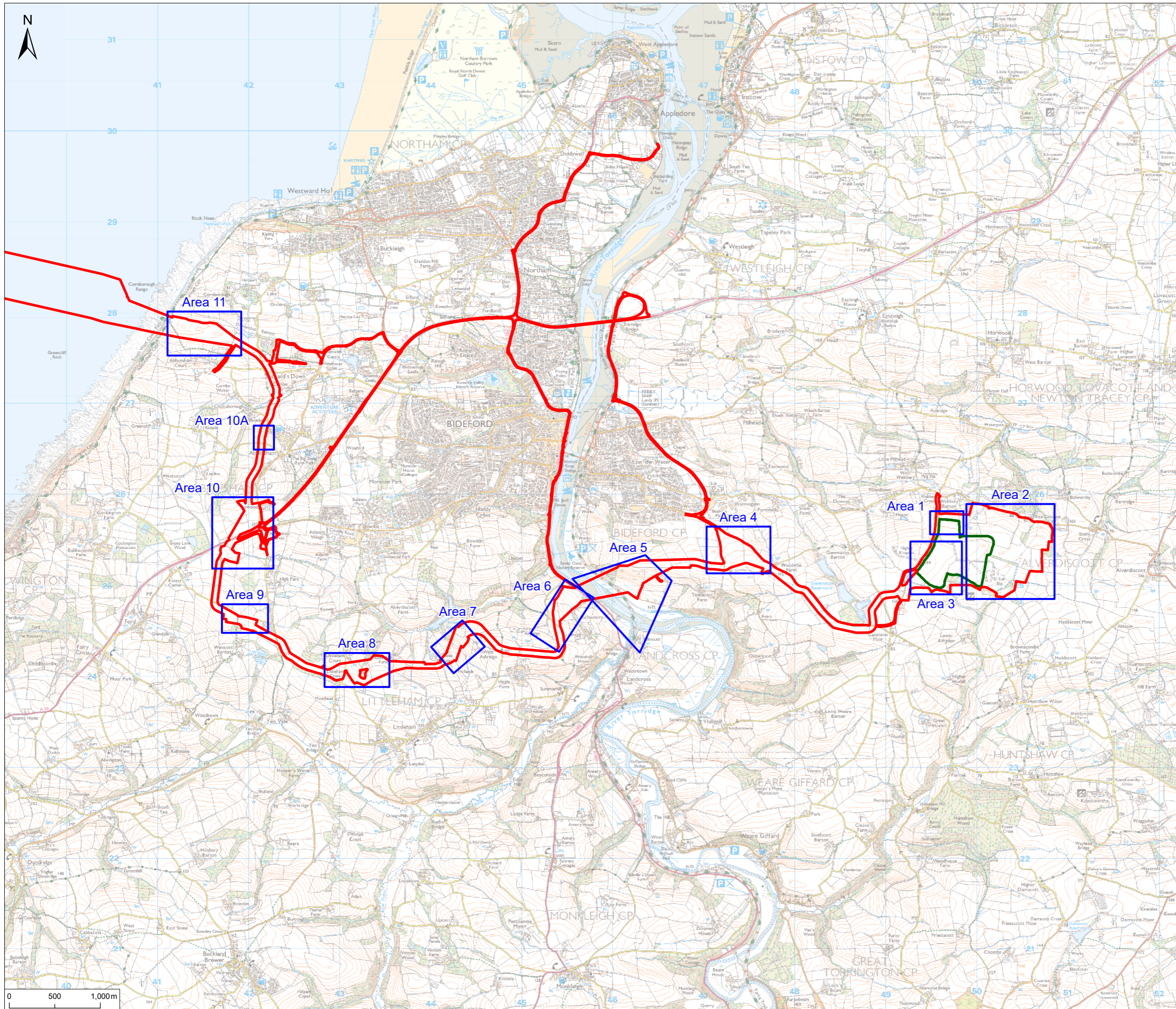
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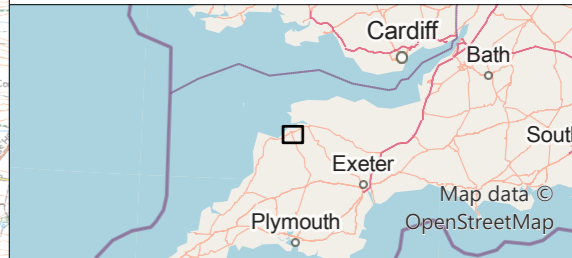
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Drawings



Notes
 1. This plan is scaled at paper size A3. If received electronically it is the recipients responsibility to print to the correct scale. Only written dimensions should be used.

- Legend**
- Proposed Development Draft Order Limits
 - Converter Site
 - Assessment Areas



Rev	Description	By	CB	Date

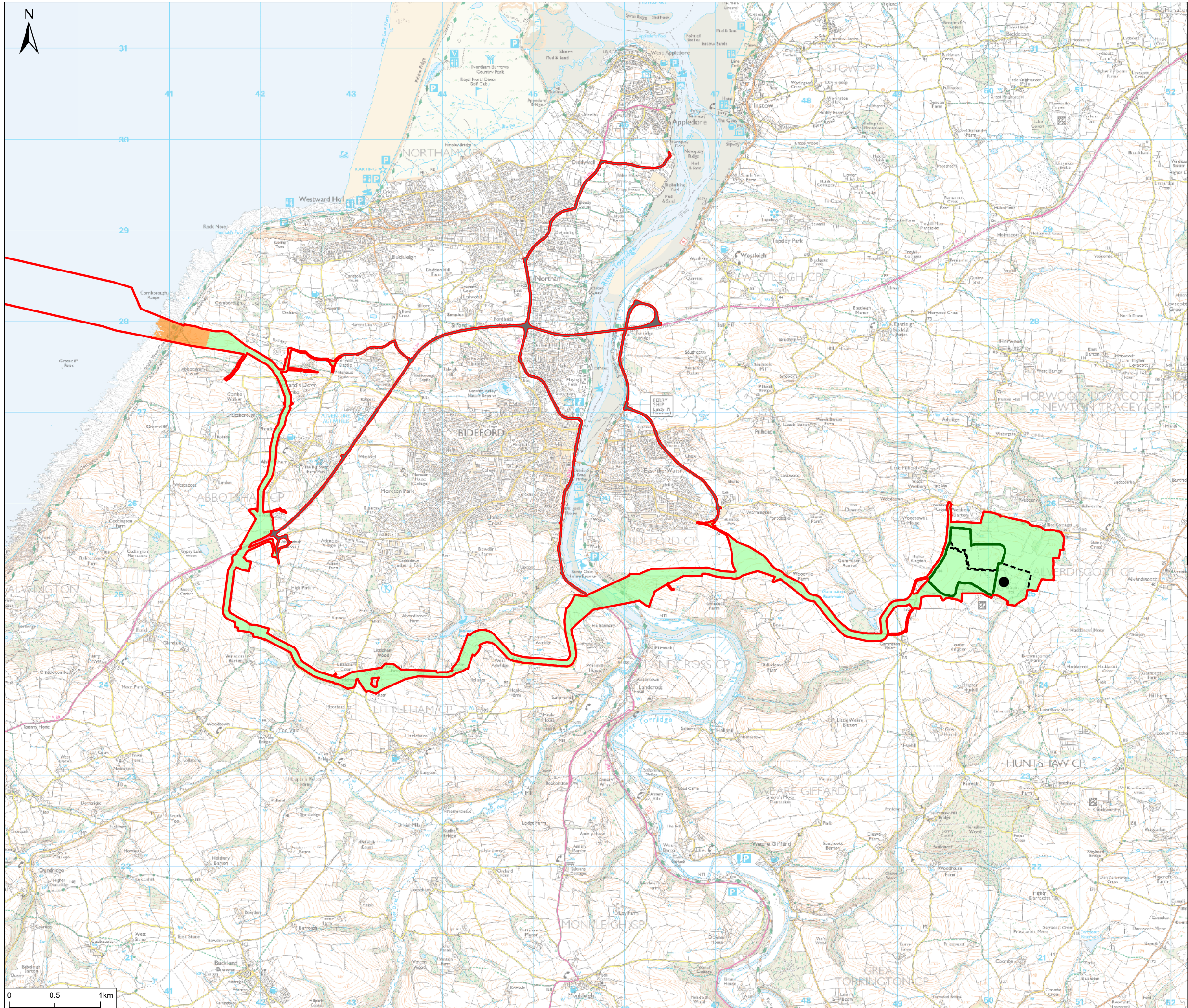


Client Xlinks 1 Limited
 Project Xlinks Morocco-UK Power Project
 Title Site Location & Assessment Areas
 Status **FINAL** Drawn By SHB PM/Checked By MB
 Project Number 794-PLN-ESH-00030 Scale @ A3 1:40,000 Date Created April 2024
 Figure Number **1** Rev **01**

www.xlinks.co

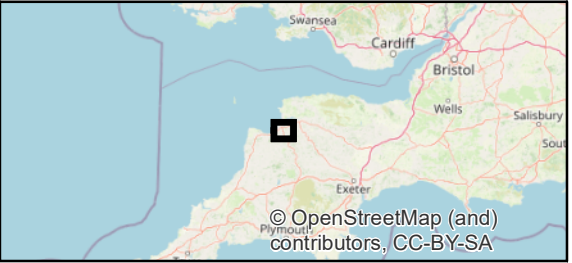
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Annex A: Onshore Infrastructure Area



Notes
 1. This plan is scaled at paper size A3. If received electronically it is the recipient's responsibility to print to the correct scale. Only written dimensions should be used.

- Legend**
- Proposed Development Draft Order Limits
 - Landfall
 - Onshore Infrastructure Area
 - Abnormal Infrastructure Load Routes
 - Converter Site
 - Alverdiscot Substation Site
 - Alverdiscot Substation



Rev	Description	By	CB	Date



Client Xlinks 1 Limited
 Project Xlinks Morocco-UK Power Project
 Title Onshore Infrastructure Area

Status	Drawn By	PM/Checked By
FINAL	MP	MB
Project Number	Scale @ A3	Date Created
794-PLN-ESH-00030	1:40,000	April 2024
Figure Number		Rev
3.1		02

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Annex B: Coal Mining Report

LITTLE WEARE MANOR, ROAD FROM PINEWOOD TO MILESTONE COTTAGE, WEARE GIFFARD, EX39 4QZ

Professional opinion

Inc. integrated mine entry interpretive assessment

Site plan



Search results

	1. Past underground coal mining Identified	page 5		9. Coal mining subsidence claims Not identified
	2. Present underground coal mining Not identified			10. Mine gas emissions Not identified
	3. Future underground coal mining Not identified			11. Emergency Call Out incidents Not identified
	4. Shafts and adits (mine entries) Not identified			12. Withdrawal of support Not identified
	5. Coal mining geology Not identified			13. Working facilities orders Not identified
	6. Past opencast coal mining Not identified			14. Payments to copyhold owners Not identified
	7. Present opencast coal mining Not identified			Cheshire Brine Not identified
	8. Future opencast coal mining Not identified			

Coal mining (CON29M) assessment

We consider there to be a potential risk to the property from past coal mining activity. For further details refer to: Past underground coal mining.



Coal mining

Past underground coal mining

Potential risk due to past underground coal mining has been identified within the boundary of the property. Whilst no further searches are required, it should be noted that in the event of coal mining settlement or subsidence occurring the property will benefit from the protection of the Coal Mining Subsidence Acts of 1991 and as amended 1994.

Next steps for consideration:

- A visual inspection of the property by a suitably qualified and experienced person may be of value in identifying any currently identifiable mining related settlement or subsidence effects.

Coal Mining Subsidence Act 1991

If any coal mining subsidence damage has occurred, as determined by the appropriate persons/bodies, the property will benefit from the protection of the Coal Mining Subsidence Acts of 1991 and as amended 1994.

This Act, however, does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester. In this instance it would be prudent to have the property visually inspected for signs of mining related settlement or subsidence by a suitably qualified and experienced person, who could be sought through <https://www.ricsfirms.com/>.

The Coal Authority provide a call out service on 01623 646 333 to take remedial action concerning the movement or collapse of any coal entries or coal mining surface hazards. Further details can be found on www.groundstability.com.

CON29M reports are a requirement for conveyancing and are recommended throughout the official Coal Mining Reporting Area. This is the area within which it is deemed prudent to clarify the risk presented by coal mining, using the questions laid out in the Law Society's CON29M form. The need for a CON29M does not always translate to an identification of risk, and reports will often be assessed as free from risk or 'Passed' even though they are within the official Coal Mining Reporting Area.

Development risk

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating both to the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the



CON29M

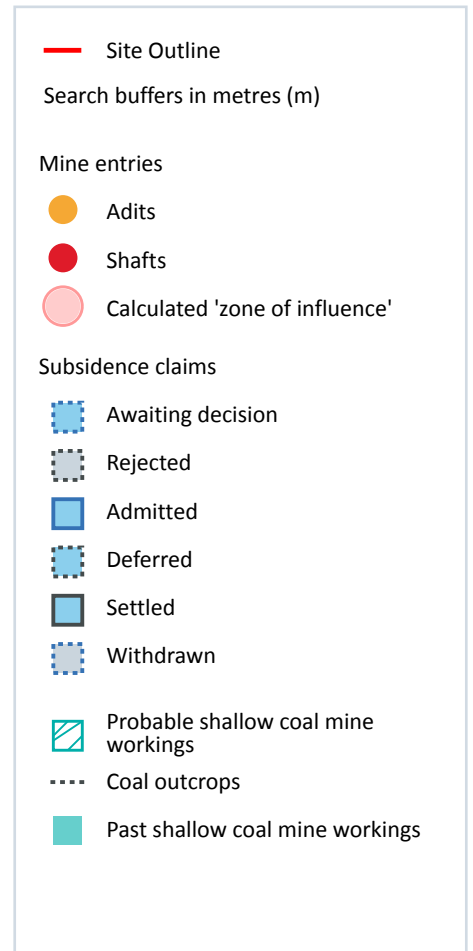
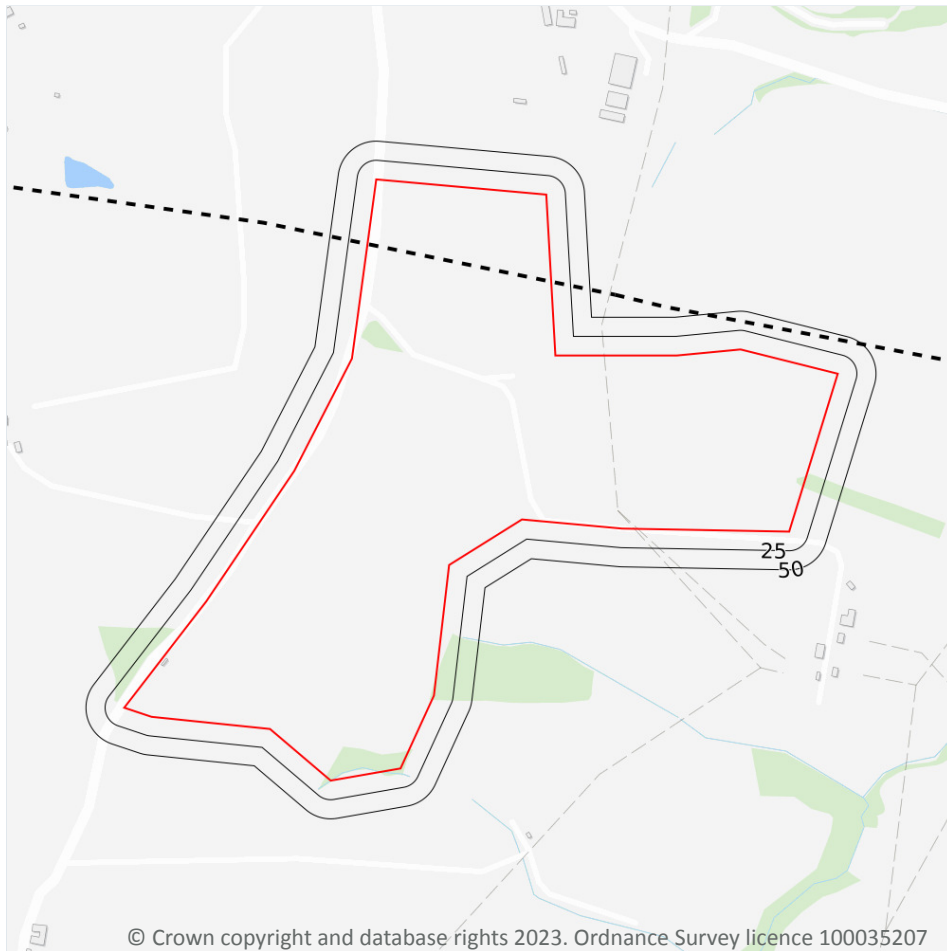
LITTLE WEARE MANOR, ROAD FROM
PINWOOD TO MILESTONE COTTAGE,
WEARE GIFFARD, EX39 4QZ

Ref: GS-9293852
Your ref: JER9727_PO23-0026_
Grid ref: 249585 125237

Coal Authority.

Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Coal mining (CON29M)



Coal mining (CON29M)

The map above shows relevant, mappable hazards identified that could constitute a risk to the property. It does not necessarily show all features or potential issues identified in this report. Further details of any features shown indicating the location of Mine Entries or Subsidence Claims can be found in the relevant sections of this report (4 and 9 respectively).

Responses to the Law Society CON29M Coal Mining search enquiries are produced using official Coal Authority data and the expert interpretation of Groundsure. This report is prepared in accordance with The Law Society CON29M (2018) Guidance Notes. Additional interpretation and calculation of mine entry zones of influence has also been carried out by Groundsure using Coal Authority and British Geological Survey data.

Please read this report carefully, and in particular any sections flagged with an amber 'i'.



The Law Society

These enquiries are The Law Society CON29M (2018) Coal Mining search enquiries and are used with permission of The Law Society. The Law Society CON29M Coal Mining search enquiries are protected by copyright owned by The Law Society of 113 Chancery Lane, London WC2A 1PL. The Law Society has no responsibility for information provided in response to CON29M (2018) Coal Mining search enquiries within this report or otherwise.

1. Past underground coal mining



Is the property within the zone of likely physical influence on the surface of past underground coal workings?

- The property does not lie within the potential zone of influence of any recorded underground coal workings.
- A coal outcrop is recorded to pass through the property boundary. There is a possibility of unrecorded mining features associated with this coal outcrop within the property boundary.

2. Present underground coal mining



Is the property within the zone of likely physical influence on the surface of present underground coal workings?

- The property does not lie within the boundary of an underground site from which coal is being removed by underground methods.

3. Future underground coal mining



(a) Is the property within any geographical area for which the Coal Authority is determining whether to grant a licence to remove coal by underground methods?

- The property does not lie within the boundary of an underground site for which the Coal Authority is determining whether to grant a licence to remove coal by underground methods.

(b) Is the property within any geographical area for which a licence to remove coal by underground methods has been granted?

- The property does not lie within the boundary of an underground site for which a licence to remove coal by underground methods has been granted.

(c) Is the property within the zone of likely physical influence on the surface of planned future underground coal workings?

- The property does not lie within the zone of likely physical influence on the surface of planned future underground workings.

(d) Has any notice of proposals relating to underground coal mining operations been given under section 46 of the Coal Mining Subsidence Act 1991?

- No notices have been given under Section 46 of the Coal Mining Subsidence Act 1991 stating that the land is at risk of subsidence.

4. Shafts and adits (mine entries)



Are there any shafts and adits or other entries to underground coal mine workings within the property or within 20 metres of the boundary of the property?

- No coal mine entries are recorded to lie within 20 metres of the property.

5. Coal mining geology



Is there any record of any fault or other line of weakness due to coal mining at the surface within the boundary of the property that has made the property unstable?

- No damage arising from geological faults or other lines of weakness activated by coal mining are recorded within the property.

6. Past opencast coal mining



Is the property situated within the geographical boundary of an opencast site from which coal has been removed in the past by opencast methods?

- The property does not lie within the boundary of an opencast site from which coal was removed by opencast methods.

7. Present opencast coal mining



Is the property within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods?

- The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8. Future opencast coal mining



(a) Is the property within 800 metres of the boundary of an opencast site for which the Coal Authority are determining whether to grant a licence to remove coal by opencast methods?

- **The property does not lie within 800 metres of the boundary of an opencast site for which the Coal Authority are determining whether to grant a licence to remove coal by opencast methods.**

(b) Is the property within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted?

- **The property does not lie within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.**

9. Coal mining subsidence claims



(a) Has any damage notice or claim for alleged coal mining subsidence damage to the property been given, made or pursued since 31st October 1994?

- **We have no evidence of a damage notice or subsidence claim for the property or within 50m of the property since 31st October 1994.**

(b) In respect of any such notice or claim has the responsible person given notice agreeing that there is a remedial obligation or otherwise accepted that a claim would lie against them?

- **Not applicable.**

(c) In respect of any such notice or acceptance has the remedial obligation or claim been discharged?

- **Not applicable.**

(d) Does any current "Stop Notice" delaying the start of remedial works or repairs affect the property?

- **There are no current Stop Notices delaying the start of remedial works or repairs to the property.**

(e) Has any request been made under Section 33 of the 1991 Act to execute preventive works before coal is worked, which would prevent the occurrence or reduce the extent of subsidence damage to any buildings, structures or works and, if yes, has any person withheld consent or failed to comply with any such request to execute preventive works?

- **There is no record of a request that has been made to carry out preventive works before coal is worked under Section 33 of the Coal Mining Subsidence Act 1991.**

NB. Records of damage notices or subsidence claims before 31st October 1994 are excluded from The Coal Authority data from which this search is compiled.

10. Mine gas emissions



Does the Coal Authority have record of any mine gas emission within the boundary of the property being reported that subsequently required action by the Authority to mitigate the effects of the mine gas emission?

- **No mine gas emissions are recorded within the boundary of the property.**

11. Emergency Surface Hazard Call Out incidents



Have the Coal Authority carried out any work on or within the boundaries of the property following a report of an alleged hazard related to coal mining under the Authority's Emergency Surface Hazard Call Out procedures?

- **No Emergency Surface Hazard Call Out procedures are recorded against the property.**

12. Withdrawal of support



(a) Does the land lie within a geographical area in respect of which a notice of entitlement to withdraw support has been published?

- **The property does not lie in an area where the right to withdraw support has been granted.**

(b) Does the land lie within a geographical area in respect of which a revocation notice has been given under section 41 of the Coal Industry Act 1994?

- **The property does not lie within a geographical area in which a revocation notice has been given under section 41 of the Coal Industry Act 1994.**

13. Working facilities orders



Is the property within a geographical area subject to an order in respect of the working of coal under the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof?

- **The property is not in an area where a court order has been issued.**

14. Payments to owners of former copyhold land



(a) Has any relevant notice, which may affect the property, been given?

- **The property does not lie within former copyholder land.**

(b) If yes, has any notice of retained interests in coal and coal mines been given?

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Your ref: JER9727_PO23-0026_
Grid ref: 249585 125237

- **No notices of retained interests in coal and coal mines been given.**

(c) If yes, has any acceptance notice or rejection notice been served?

- **No acceptance or rejection notices have been served.**

(d) If any such acceptance notice has been served, has any compensation been paid to a claimant?

- **No compensation has been paid to a claimant.**

CON29M notes and guidance

This report is prepared in accordance with [The Law Society Guidance Notes 2018](#); under which all replies to these enquiries are made. Groundsure's Terms and Conditions are applicable at the time the report was produced.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0345 762 6848. Further information can be found on their website:

www.groundstability.com.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries).

The Coal Authority emergency telephone number at all times is 01623 646333.

Responses to The Law Society CON29M (2018) Coal Mining Search enquiries and associated findings and recommendations relating to coal mining risk have been provided by Groundsure Ltd. Groundsure Ltd have additionally provided information relating to the Cheshire Brine Compensation Area, and have compiled all information into this report.

Queries should be made of Groundsure Ltd on 0844 415 9000, or via email: info@groundsure.com.

CON29M report limitations

This CON29M (2018) Coal Mining Report has been carried out with reference to all available official Coal Authority licensed data, an extensive collection of abandoned mine plans, maps and records. From this material, we have endeavoured to provide as accurate a report as possible. Any and all analysis and interpretation of licensed Coal Authority data in this report is made by Groundsure

The information provided in this report by Groundsure Ltd has been compiled in response to The Law Society CON29M (2018) Coal Mining search enquiries. The scope of the assessment is limited to interpretation of past, present and future extraction of coal, and does not consider the impact from non-coal mining hazards and/or natural ground stability hazards. The Law Society's Guidance Notes 2018 recommends separate enquiries to the appropriate sources are made with regard to other minerals.

The Report is created by a remote investigation and reviews only information provided by the client (address and site location boundaries) and from the databases of publicly available and/or licensable information that enable a desk-based assessment of the Site. The Report does not include a Site Investigation, nor does Groundsure Ltd make additional specific information requests of the regulatory authorities for any relevant information they may hold.

This report is concerned solely with the Site searched and should not be used in connection with nearby properties, as only known coal mining features that could potentially have a direct influence upon the Site searched are considered relevant; other features present in the general area may have been omitted for ease of reference.

This report is confidential to the client, the client's legal advisor and the client's Mortgage lender, as defined in the Groundsure terms & conditions, and as such may be used by them for conveyancing or related purposes. Groundsure has no liability toward any person or organisation not party to commissioning this report. This report or any part of it is not permitted to be reproduced, copied, altered or in any other way distributed by any other person or organisation.

Additional mine entry assessment is based on and limited to the data supplied by the Coal Authority at the time of production. In order to determine whether a property is within the likely zone of influence of a disused coal mine entry the following is considered: the actual or plotted position of the mine entry, its known or assumed diameter and the thickness of superficial deposits above rockhead. Where these figures are not known, assumptions based on established estimations have been made.

CON29M report licensing

This report contains Data provided by the Coal Authority. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure Ltd prior to any re-use.

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This report may contain public sector information licensed under the Open Government Licence v3.0.

This report may contain plans and records held by the Coal Authority and made publicly available at the time of inspection which may include British Geological Survey and Ordnance Survey data.

Conveyancing Information Executive and our terms & conditions

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Groundsure Ltd, Sovereign House, Church Street, Brighton, BN1 1UJ. Tel: 08444 159 000. Email: info@groundsure.com. Groundsure adheres to the Conveyancing Information Executive Standards.

The Standards

- Conveyancing Information Executive Members shall act in a professional and honest manner at all times in line with the Conveyancing Information Executive Standards and carry out the delivery of the Search with integrity and due care and skill.
- Compliance with the Conveyancing Information Executive Standards will be a condition within the Conveyancing Information Executive Member's Terms and Conditions.
- Conveyancing Information Executive Members will promote the benefits of and deliver the Search to the agreed standards and in the best interests of the customer and associated parties.

Complaints Advice

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure.

If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award up to £5,000 to you if the Ombudsman finds that you have suffered actual financial loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the Standards.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs.

COMPLAINTS PROCEDURE: If you want to make a complaint, we will:

- acknowledge it within 5 working days of receipt
- normally deal with it fully and provide a final response, in writing, within 20 working days of receipt
- liaise, at your request, with anyone acting formally on your behalf

Complaints should be sent to:

Operations Director, Groundsure Ltd, Sovereign House, Church Street, Brighton, BN1 1UJ. Tel: 08444 159 000. Email: info@groundsure.com If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk We will co-operate fully with the Ombudsman during an investigation and comply with their final decision.

Groundsure's Terms and Conditions can be viewed online at this link: <https://www.groundsure.com/terms-and-conditions-jan-2020/>

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All of the advice and reports that Groundsure produces are covered by a comprehensive Remediation Contribution policy to ensure customers are protected, see <https://www.groundsure.com/remediation> for full details.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information in your report. To find out who they are and their areas of expertise see <https://www.groundsure.com/sources-reference>.

Coal Mining Report Insurance Policy



Coal Mining Report Insurance Policy

The Schedule

Policy Number: The Reference contained in the **Coal Mining Search Report**

Premium: £1.40 inclusive of Insurance Premium Tax at 12%

Property: The property which is the subject of the **Coal Mining Search Report**

Limit of Indemnity: £100,000 increasing by 10% compound per annum on each anniversary of and for the first 10 years following the **Commencement Date**

Commencement Date: The date of the **Coal Mining Search Report**

You/Your:

1. A purchaser of the **Property**
2. A lender providing a **Mortgage** in connection with a purchase of the **Property**
3. A lender providing a **Mortgage** by way of a re-mortgage of the **Property**

Definitions

Where a word is defined below or in the schedule it shall carry the same meaning wherever it appears in bold text in this policy

Insured Use: The continued use of the **Property** as a single house or flat or a single commercial premises

Market Value: The value as determined by a surveyor appointed by agreement between **You** and **Us** or (in default of agreement) the President for the time being of the Royal Institution of Chartered Surveyors

Mortgage: A mortgage or charge secured on the **Property** by an institutional mortgage lender

Coal Mining Search Report: The coal mining search report attached to this policy

Search: An official search comprising a search in form CON29M (2018) being mining searches relating to coal and brine in the area in which the **Property** is situated

We/Our/Us:

Zurich Insurance plc. A public limited company incorporated in Ireland. Registration No. 13460. Registered Office: Zurich House, Ballsbridge Park, Dublin 4, Ireland. UK Branch registered in England and Wales Registration No. BR7985. UK Branch Head Office: The Zurich Centre, 3000 Parkway, Whiteley, Fareham, Hampshire PO15 7JZ.

Zurich Insurance plc is authorised by the Central Bank of Ireland and authorised and subject to limited regulation by the Financial Conduct Authority. Details about the extent of our authorisation by the Financial Conduct Authority are available from us on request. Our FCA Firm Reference Number is 203093.

Communications may be monitored or recorded to improve our service and for security and regulatory purposes.

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Your Policy

This is a legal document and should be kept in a safe place.

This policy is an agreement between **You** and **Us** and cover is provided subject to the payment of the **Premium**.

You must read this policy and its conditions, exclusions, schedule and any endorsements as one contract. Please read all of them to make sure that they provide the cover **You** require. If they do not, please contact **Us** or **Your** insurance adviser who arranged the policy for **You**.

When **You** take out and make changes to the cover provided by this policy, **You** must take reasonable care to ensure that **You** accurately answer any questions which **We** ask of **You** and that any information **You** give **Us** is accurate. If **You** are taking out this policy for purposes which are mainly related to **Your** trade, business or profession, **You** must also let **Us** know about all facts which are material to **Our** decision to provide **You** with insurance. Failure to meet these obligations could result in this policy being invalidated, a claim not being paid, or an additional premium being charged.

Fair presentation of the risk

a) At inception of this policy and also whenever changes are made to it at **Your** request **You** must:

- i) where **You** have taken out this policy for purposes which are wholly or mainly related to **Your** trade, business or profession, disclose to **Us** all material facts in a clear and accessible manner and not misrepresent any material facts, and
- ii) where **You** have taken out this policy for purposes which are wholly or mainly unrelated to **Your** trade, business or profession, take reasonable care not to misrepresent any material facts.

b) If **You** do not comply with clause a) of this condition **We** may:

- i) avoid this policy which means that **We** will treat it as if it had never existed and refuse all claims where any non-disclosure or misrepresentation by **You** is proven by **Us** to be deliberate or reckless in which case **We** will not return the premium paid by **You**; and
- ii) recover from **You** any amount **We** have already paid for any claims including costs or expenses **We** have incurred.

c) If **You** do not comply with clause a) of this condition and the non-disclosure or misrepresentation is not deliberate or reckless this policy may be affected in one or more of the following ways depending on what **We** would have done if **We** had known about the facts which **You** failed to disclose or misrepresented:

- i) if **We** would not have provided **You** with any cover **We** will have the option to:
 1. avoid the policy which means that **We** will treat it as if it had never existed and repay the premium paid; and
 2. recover from **You** any amount **We** have already paid for any claims including costs or expenses **We** have incurred
- ii) if **We** would have applied different terms to the cover **We** will have the option to treat this policy as if those different terms apply. **We** may recover any payments made by **Us** on claims which have already been paid to the extent that such claims would not have been payable had such additional terms been applied
- iii) if **We** would have charged **You** a higher premium for providing the cover **We** will charge **You** the additional premium which **You** must pay in full.

d) If any insured person, other than **You**, is responsible for a misrepresentation or failure to make a fair presentation of the risk, **We** will invoke the remedies available to **Us** under this condition as against that particular person as if a separate insurance contract had been issued to them leaving the remainder of the policy unaffected.

NB: For the purposes of the duty of disclosure stated in paragraphs a) i) and ii) above the content of the **Coal Mining Search Report** will be deemed to satisfy **Your** disclosure obligations.

Cover

1. **You** are in the process of purchasing the **Property** relying on the **Coal Mining Search Report** and/or
2. **You** (being a lender) have agreed to provide a **Mortgage** in connection with **Your** borrower's purchase or re-mortgage of the **Property** relying on the **Coal Mining Search Report**.

We will pay the following losses sustained by **You** arising out of the **Property** being affected by any matter which would have been revealed by a **Search** had one been carried out on the date of the **Coal Mining Search Report** but which was not revealed by the **Coal Mining Search Report**:

1. any reduction in **Market Value** of the **Property** calculated at the date **You** become aware of the matter(s) and/or loss in connection with a **Mortgage** as a result of such reduction.
2. all other costs and expenses including out of court settlement costs incurred by **Us** or by **You** with **Our** prior written agreement.

Waiver of Breach of Policy Condition

We will not exercise **Our** right to avoid **Our** liability to **You** in respect of loss where **You** have inadvertently breached any term or condition of the policy provided that such breach does not prejudice **Our** rights and remedies under the policy or otherwise directly or indirectly result in or increase the amount of any loss.

Protection for Mortgagees and Successors in Title

We will not avoid **Our** liability to make a payment to **You** solely because another person breaches the terms and conditions of this policy, provided such breach was not committed on **Your** behalf or with **Your** agreement, and **We** will invoke the remedies available to **Us** under the Policy as against that other person as if a separate insurance contract had been issued to them leaving the remainder of the policy unaffected.

Joint Insured

Any party insured under this policy standing in the relation of parent company, subsidiary company, associated company, branch office or joint venture partner to each other will be deemed to be joint insured for the purposes of this policy and jointly liable and responsible for any breach of any terms and conditions of this policy. If there is any inconsistency between this clause and any other term of this policy, this clause shall prevail.

Exclusions

We will not pay for any:

1. amount in excess of the **Limit of Indemnity**.
2. loss which would be recoverable under a household buildings insurance policy.
3. loss arising from any matter that **You** were aware of at the **Commencement Date**.
4. loss if the **Property** is used for any purpose other than the **Insured Use**.

Claims Conditions and How to Claim

1. **You** must:

- i) give **Us** written notice as soon as possible of any potential or actual claim or any circumstances likely to result in a claim. Please provide the policy number, **Your** name, the full address of the **Property** and a brief description of the incident that has occurred. Notifications should be sent to: Speciality Lines Claims Team, Zurich Insurance, 8th Floor, 70 Mark Lane, London, EC3R 7NQ. Email: claims@uk.zurich.com, Enquiry line: telephone 0207 648 3523
- ii) pass all court documents and/or other communications to **Us** as soon as possible after receipt
- iii) not deal with, make any admission of liability or attempt to settle a claim without **Our** prior written agreement.
- iv) agree to and carry out at **Our** expense all things necessary to minimise any loss.
- v) provide all information and assistance that **We** may require to help defend and settle the claim.

2. **We** are entitled to:

- i) decide how to settle or defend a claim and may carry out proceedings in the name of any person insured under this policy, including proceedings for recovering any claim.
- ii) pay to **You** at any time, an amount equal to the **Limit of Indemnity** or any lower amount for which the claim can be settled, after deduction of any sum already paid. **We** may then give up control of and have no further liability in connection with the claim.

3. If **We** admit liability for a claim but there is a dispute as to the amount to be paid the dispute will be referred to an arbitrator. The arbitrator will be appointed jointly by **You** and **Us** in accordance with the law at the time. **You** may not take any legal action against **Us** over the dispute before the arbitrator has reached a decision.

4. If **You** or anyone acting on Your behalf:

- a) makes a fraudulent or exaggerated claim under this policy; or
- b) uses fraudulent means or devices including the submission of false or forged documents in support of a claim whether or not the claim is itself genuine; or
- c) makes a false statement in support of a claim whether or not the claim is itself genuine; or
- d) submits a claim under this policy for loss or damage which **You** or anyone acting on **Your** behalf or in connivance with **You** deliberately caused; or
- e) realises after submitting what **You** reasonably believed was a genuine claim under this policy and then fails to tell **Us** that **You** have not suffered any loss or damage; or
- f) suppresses information which **You** know would otherwise enable **Us** to refuse to pay a claim under this policy

We will be entitled to refuse to pay the whole of the claim and recover any sums that **We** have already paid in respect of the claim.

If any fraud is perpetrated by or on behalf of an insured person and not on behalf of **You** this condition should be read as if it applies only to that insured person's claim and references to this policy should be read as if they were references to the cover effected for that person alone and not to the policy as a whole.

5. If any claim is covered by any other insurance, **We** will not pay for more than **Our** share of that claim.

6. The most **We** will pay for any loss (or all losses in the aggregate), including costs and expenses agreed by **Us** is the **Limit of Indemnity**. Once **We** have paid a loss or losses equal to the amount of the **Limit of Indemnity**, **We** will have no further liability under this policy.

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2. In the UK the law allows both **You** and **Us** to choose the law applicable to the contract. This contract will be subject to the relevant law of England and Wales, Scotland, Northern Ireland, the Isle of Man or the Channel Islands depending upon the Property address stated in the Schedule. If there is any dispute as to which law applies it will be English law. The parties agree to submit to the exclusive jurisdiction of the English courts.
3. Notwithstanding any other terms of this policy **We** will be deemed not to provide cover nor will **We** make any payment or provide any service or benefit to **You** or any other party to the extent that such cover, payment, service, benefit and/or any business or activity of **Yours** would violate any applicable trade or economic sanctions law or regulation.

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We are committed to providing a high level of customer service. If you feel we have not delivered this, we would welcome the opportunity to put things right for you.

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Many concerns can be resolved straight away. Therefore in the first instance, please get in touch with your usual contact at Zurich or your broker or insurance intermediary, as they will generally be able to provide you with a prompt response to your satisfaction.

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If we can resolve your complaint to your satisfaction within the first few days of receipt, we will do so. Otherwise, we will keep you

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If you are not happy with the outcome of your complaint, you may be able to ask the Financial Ombudsman Service to review your case.

We will let you know if we believe the ombudsman service can consider your complaint when we provide you with our decision. The service they provide is free and impartial, but you would need to contact them within 6 months of the date of our decision.

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Post: Financial Ombudsman Service, Exchange Tower, London, E14 9SR

Telephone: 08000 234567 (free on mobile phones and landlines)

Email: complaint.info@financial-ombudsman.org.uk

If the Financial Ombudsman Service is unable to consider your complaint, you may wish to obtain advice from the Citizens Advice Bureau or seek legal advice.

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1. to provide you with a quotation and/or contract of insurance;
2. to identify you when you contact us;
3. to deal with administration and assess claims;
4. to make and receive payments;
5. to obtain feedback on the service we provide to you;
6. to administer our site and for internal operations including troubleshooting, data analysis, testing, research, statistical and survey purposes;
7. for fraud prevention and detection purposes.

We will contact you to obtain consent prior to processing your personal information for any other purpose, including for the purposes of targeted marketing unless we already have consent to do so.

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Where necessary, we will share the personal information you gave us for the purposes of providing you with the goods and services you requested with the types of organisations described below:

associated companies including reinsurers, suppliers and service providers;
introducers and professional advisers;
regulatory and legal bodies;
survey and research organisations;
credit reference agencies;
healthcare professionals, social and welfare organisations; and
other insurance companies

Or, in order to meet our legal or regulatory requirements, with the types of organisations described below:

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credit reference agencies; and
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 - in certain circumstances, to restrict the processing of your data;
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 - to object to direct marketing;
 - not to be subject to automated decision making (including profiling), where it produces a legal effect or a similarly significant effect on you;
 - to claim compensation for damages caused by a breach of the data protection legislation.
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- use industry fraud tools including undertaking credit searches and to review your claims history
- share information about you with other organisations including but not limited to the police, the Insurance Fraud Bureau (IFB), other insurers and other interested parties.

If you provide false or inaccurate information and fraud is identified, the matter will be investigated and appropriate action taken. This may result in your case being referred to the Insurance Fraud Enforcement Department (IFED) or other police forces and fraud prevention agencies. You may face fines or criminal prosecution. In addition, Zurich may register your name on the Insurance Fraud Register, an industry-wide fraud database.

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We may pass information relating to claims or potential claims to any relevant database. We and other insurers may search these databases when you apply for insurance, when claims or potential claims are notified to us or at time of renewal to validate your claims history or that of any other person or property likely to be involved in the policy or claim.

This helps to check information provided and prevent fraudulent claims.

Annex C: Site Photographs

SITE WALKOVER PHOTOGRAPHS



Plate 1: Entrance Road to Alverdiscott Substation (E)

SITE WALKOVER PHOTOGRAPHS



Plate 2: Gate to Gas Compound Area and Road (E)



Plate 3: Gas Valve Compound (NE)



Plate 4: N Boundary Gate into Area 1 (N)



Plate 5: West Boundary Gate into Area 2 (E)

SITE WALKOVER PHOTOGRAPHS



Plate 6: Area 2 – Agricultural Land (SE)

SITE WALKOVER PHOTOGRAPHS



Plate 7: Area 2 – Gate Entrance (E)



Plate 8: Area 2 – Entrance Gate Ground Conditions



Plate 9: Area 2 – Ground Conditions in Centre

SITE WALKOVER PHOTOGRAPHS



Plate 10: Area 2 – East Boundary Gate (NW)

SITE WALKOVER PHOTOGRAPHS



Plate 11: Area 3 – East Gate Access (W)



Plate 12: Area 3 – Farmland (NW)

SITE WALKOVER PHOTOGRAPHS



Plate 13: Area 3 – Farmland showing topographic slope to West (E)

SITE WALKOVER PHOTOGRAPHS



Plate 14: Area 1 – South Boundary Ditch (E)



Plate 15: Area 1 – South Boundary Ditch (W)



Plate 16: Area 1 – Topographic Slope North-westwards (NW)

SITE WALKOVER PHOTOGRAPHS



Plate 17: Area 1 – West Boundary Gate Access (W)

SITE WALKOVER PHOTOGRAPHS



Plate 18: Western Road, Site Access Gas Pipeline Marker (SE)

SITE WALKOVER PHOTOGRAPHS



Plate 19: Area 3 – West Boundary Gate Access (E)



Plate 20: Area 3 – Fresh Farm Waste present along Western Boundary (SE)



Plate 21: Area 3 – Topography over Farmland (E)

SITE WALKOVER PHOTOGRAPHS



Plate 22: Area 3 – Farm Structure in Land South of Hedgerow intersecting Site (S)

SITE WALKOVER PHOTOGRAPHS



Plate 23: Area 3 – Fence Barrier inside Area 3 (E)

Plate 24: Area 3 – Fence Barrier inside Area 3 (SE)



Plate 25: Area 3 – Hardstanding Around Farm Structure (SE)

SITE WALKOVER PHOTOGRAPHS

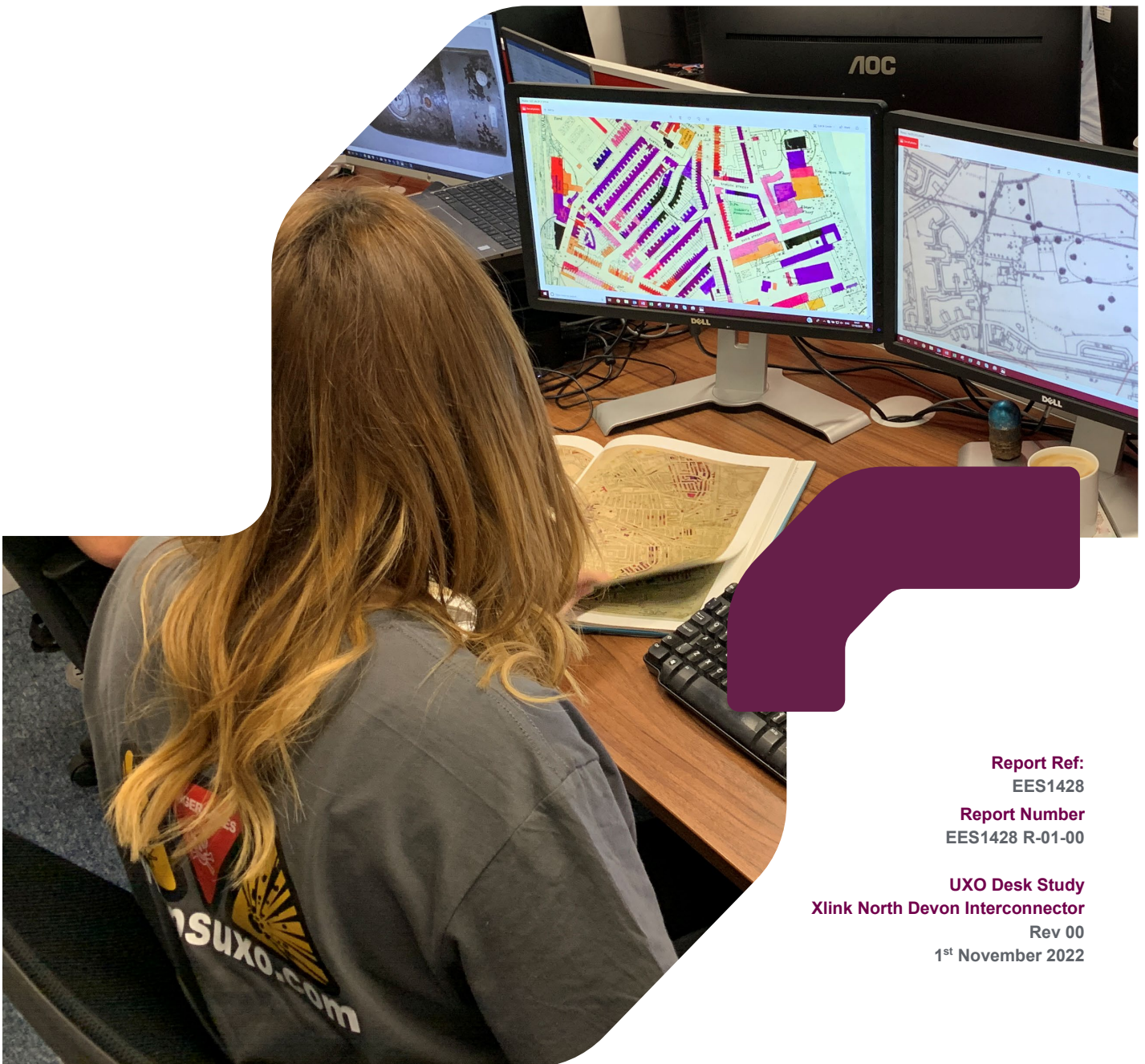


Plate 26: Area 9 – Wood Stockpile with other unknown structures present in Area (NW)

Annex D: UXO Report

DETAILED DESK STUDY (STAGE 2) FOR POTENTIAL UXO CONTAMINATION, XLINK NORTH DEVON INTERCONNECTOR

RPS



Report Ref:
EES1428

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UXO Desk Study
Xlink North Devon Interconnector
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UXO DETAILED DESKTOP STUDY – XLINK NORTH DEVON INTERCONNECTOR
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David Denman



1 November 2022

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ISO Accreditation

RPS Explosives Engineering Services are ISO 9001:2015 accredited to provide Explosives Safety Management Services and Detection of Conventional Explosives WSCS-OCE.



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Contents

APPENDICES	5
EXECUTIVE SUMMARY.....	6
Summary of UXO DTS	6
Observations.....	6
Recommendations for Future Intrusive Works	6
1 INTRODUCTION.....	7
1.1 Instruction.....	7
1.2 Scope of Work.....	7
1.3 Definitions.....	7
1.4 Reporting Conditions.....	7
1.4.1 Archive Limitations	8
1.5 Objectives.....	8
1.6 Legislation	8
2 SITE DETAILS AND DESCRIPTION	9
2.1 Site Location and Description	9
2.2 Proposed Scheme of Work	9
2.3 Geology.....	10
2.4 Historical Site Conditions	10
3 BRITISH MILITARY IMPACTS / SOURCES.....	12
3.1 General.....	12
3.2 World War I (WWI)	12
3.3 WWI Anti-Aircraft Artillery (AAA) Positions	12
3.4 World War II (WWII) Defensive Positions	12
3.5 WWII Anti-Aircraft Artillery (AAA) Positions	12
3.5 Military Presence / Training.....	12
3.6 Explosives Storage Areas	13
3.7 Military / Royal Air Force (RAF) Airfields	14
3.8 Decoy Sites	14
3.9 Munitions Production Facilities	14
4 GERMAN AERIAL BOMBING	15
4.1 WWI German Bombing	15
4.2 WWII German Bombing	15
4.2.1 German Bombing Targets.....	15
4.2.2 Details of Air-Raids	15
4.3 Reports of UXO	16
5 POTENTIAL ORDNANCE DETAILS	17
6 RISK HORIZON	18
6.1 General.....	18
6.2 Site Specific Ordnance Penetration Assessment	18
6.2.1 General Purpose/High Explosive (H.E) Bombs	19
7 REGULATORY AUTHORITY DATA.....	20
7.1 MoD Explosive Ordnance Disposal (EOD) Archives	20
7.2 Abandoned Bomb Register	20
8 UXO CONTAMINATION RISK ASSESSMENT	21
8.1 General.....	21
8.1.1 Unexploded Ordnance Detonation Characteristics.....	21
8.2 Sources / Hazards.....	21
8.3 Pathway.....	21

8.5	Receptors	22
8.6	Risk Assessment.....	22
8.6.1	Risk Assessment Matrix.....	23
8.7	Risk Assessment Analysis	24
8.7.1	Final Risk Level(s).....	24
9	RECOMMENDATIONS.....	26
9.1	The ‘ALARP’ Principle.....	26
APPENDICES		27

Figures

<i>Figure 001: The AOI (as detailed by the client) in relation to its surrounding environment.</i>	9
<i>Figure 002: Areas identified in context with the AOI that may have been affected by home Guard activity.</i>	13
<i>Figure 003: Penetration depth of selected ordnance.</i>	18

Tables

<i>Table 1. Summary of EES1428 Xlink North Devon Interconnector, UXO DTS</i>	6
<i>Table 2. Details of open-source historical map suites</i>	10
<i>Table 3. AOI bombing statistics from the Home Office</i>	15
<i>Table 4. Source of contamination</i>	21
<i>Table 5. Risk assessment matrix (*see Appendix 015 for assessment scheme)</i>	23
<i>Table 6. Summary of EES1428 Xlink North Devon UXO DTS</i>	25

APPENDICES

- Appendix 001: Site Location Map
- Appendix 002: Terminology
- Appendix 003: Sources of Information
- Appendix 004: Legislation
- Appendix 005: Historic Aerial Photographs
- Appendix 006: Examples of British Military Positions
- Appendix 007: German Bombing Campaign Overview
- Appendix 008: Air-Raid Records
- Appendix 009: Examples of German Bombs
- Appendix 010: Examples of German Bomblets
- Appendix 011: Examples of AAA
- Appendix 012: Examples of British LSA
- Appendix 013: Background to Bomb Penetration Depth
- Appendix 014: UXO Detonation Characteristics
- Appendix 015: Risk Assessment Matrix
- Appendix 016: 'ALARP' Principle
- Appendix 017: Mitigation Recommendations

EXECUTIVE SUMMARY

Summary of UXO DTS

RPS was commissioned to produce an unexploded ordnance (UXO) detailed desktop study for Xlink North Devon Interconnector Project, Area of Interest, which comprises a cable route commencing from landfall on the north Devon coast, progressing southwards through the county parish of Abbotsham, then eastwards through the county parish of Littleham, through the southeast of the county parish of Bideford, terminating in the county parish of Alverdiscott. This study was conducted in accordance with CIRIA, Unexploded Ordnance (UXO) A guide for the construction industry (C681) and CIRIA, Unexploded Ordnance (UXO) risk management guide for land-based projects (C785).

During its compilation the study collated information of various explosives-based contamination sources known to affect sites within the United Kingdom. This information was integrated to establish the level of risk it posed to the reporting area. Finally, a site-specific risk mitigation solution was developed to ensure that the final risk level was deemed As Low as Reasonably Practicable (ALARP).

The content of the UXO desktop study of the Xlink North Devon Project Area of Interest (AOI) is summarised in the subsequent table.

Table 1. Summary of EES1428 Xlink North Devon Interconnector, UXO DTS

UXO Contamination Source	Relevant Section	Negligible Risk	Low Risk	Moderate Risk	High Risk	Mitigation Solution
Defensive Positions	3.3					Ap017
Anti-Aircraft Artillery	3.4					n/a
Military Training / Presence	3.5					Ap017
Explosives Storage Areas	3.6					n/a
Military Airfield	3.7					n/a
Bombing Decoy Site	3.8					n/a
Munitions Production	3.9					n/a
WWI Bombing	4.1					n/a
WWII Bombing	4.2					n/a

Observations

The area has seen little military activity except for potential Second World War Home Guard activity.

Recommendations for Future Intrusive Works

Based on the assessed risk, the following mitigation is recommended to be implemented in support of works taking place for the project:

All Areas:

- **Explosives Safety & Awareness Briefings / Site Safety Guidelines,**

Full descriptions of each of the mitigation recommendations are presented at *Appendix 017*.

1 INTRODUCTION

1.1 Instruction

RPS Explosives Engineering Services (RPS EES), part of RPS Energy Ltd, has been commissioned by RPS to conduct a Stage 2, Detailed Desktop Study for potential Unexploded Ordnance (UXO) contamination for the Xlink North Devon Interconnector Project, and its associated Areas of Interest (AOI), in line with CIRIA C681 Guidelines, within the boundaries of the project sites.

1.2 Scope of Work

The purpose of this Desktop Study is to assess the likelihood of buried historic air-delivered ordnance and / or UXO-related items to be present within the footprint of the Area of Interest (AOI). Moreover, to then evaluate the implications of potential items on any future land use.

The site is considered to offer a potential explosives risk based on the successive sources:

- **Enemy Bombing:** Great Britain sustained widespread aerial attacks throughout historic German air-raids, and as such, there is the potential for aerial-delivered ordnance to have been dropped within the area local to the site.
- **Anti-Aircraft Artillery (AAA) Shells:** Throughout World War II (1939-1945), AAA batteries were utilised in the defence of key strategic positions. If projectiles were fired in the immediate environment of the AOI and failed to function as intended, then it is conceivable that the projectiles could have come to rest within the bounds of the site.
- **Land Service Ammunition (LSA) / Small Arms Ammunition (SAA):** The terms LSA / SAA cover a whole spectrum of ordnance types that are propelled, placed or thrown during land warfare. They may be filled or charged with explosives, smoke, incendiary or pyrotechnics. They are commonly encountered in areas used by the military for training and are often found discarded on or near historic military bases or defensive positions.

1.3 Definitions

The term 'site' and / or 'Area of Interest' (AOI) refers to the area that encompasses the extent of the works associated with the Xlink North Devon Interconnector Project and its associated AOI as supplied by the client. This report will focus on the activities that occurred within the bounds of the site and its immediate environment. A location map is presented at *Appendix 001*, which details the extent of the site. Selected terminology referred to throughout this report is presented at *Appendix 002*.

1.4 Reporting Conditions

It must be emphasised that this detailed Desktop Study can only indicate the potential for UXO-related items to be present on-site, and, dependent on the information identified throughout the desk-based process, further UXO mitigation may be advised / recommended prior to and in support of any future redevelopment and / or works on-site. Any such recommendations are stipulated later in this document.

It should be recognised that any recommendations made may require alteration, or further mitigation may be advised, if information outside of that already documented within the Desk Study subsequently comes to light. This Desk Study did not involve a site visit, or any non-intrusive survey or intrusive site investigation works.

Our appraisal relies on the accuracy of the information contained within the documents consulted; therefore, RPS will in no circumstances be held responsible for the accuracy of such information or data supplied.

Records of air raids, bomb damage, casualties and the locations of Unexploded Bombs (UXB) were rarely released into public domain in the interest of national security and moral, this is particularly pertinent with military establishments. Furthermore, details pertinent to these records are often difficult to locate. The records compiled were only as detailed and accurate as the availability of time, personnel and the ease of access to information would allow. Densely populated areas, such as those associated with major cities, tended to have a greater number of records than those produced for the more provincial, or rural areas. Official records were often supplemented by press reports and local information. This source of information was sometimes discredited as being inadvertently inaccurate, or purposely made inaccurate, in order to confuse enemy intelligence. Even the accuracy of classified official records is somewhat dubious. This stance has been established based on the quantities of unrecorded German UXO and part-exploded ordnance discovered since 1945.

1.4.1 Archive Limitations

This study consists solely of a desk-based collation and review of accessible official records, relating to the possibility of UXO being present within the project area. Certain information acquired for the purpose of this study may be either classified or restricted material; therefore, summaries of such information have been provided.

1.5 Objectives

The primary objective of this document is to ensure the safety of site personnel and members of the public within the vicinity of the AOI with regards to possible impacts from potential UXO contamination and to identify the potential risk of unearthing either buried UXO or explosive devices. Research into the history of the AOI and its immediate environment has been undertaken to establish the following:

- Frequency and intensity of WWII bombing raids,
- Bomb impacts and associated damage,
- Review of military activities in the area,
- Records of Explosive Ordnance Clearance (EOC) tasks or bomb disposal activities throughout and post-WWII,
- The potential for UXO-related devices to remain on-site,
- Site-specific assessment of the penetration depths of UXO to determine the risk horizon on-site.

The main sources of information consulted are presented at *Appendix 003*.

1.6 Legislation

Whilst undertaking this desk study, the requirements of a number of legislations have been borne in mind, as presented at *Appendix 004*.

2 SITE DETAILS AND DESCRIPTION

2.1 Site Location and Description

The AOI is located in north Devon.

RPS understands that the works comprise the construction and installation of an electric cable route and associated power network infra-structure.

The cable route makes landfall on the North Devon coast at British NGR SS 41131 27912, then follows a path:

- Southwards through the county parish of Abbotsham.
- Eastwards through the county parish of Littleham.
- Eastwards through the southeast of the county parish of Bideford.
- Eastwards and terminating in the county parish of Alverdiscott.

The AOI can be observed in relation to the immediate environment, below in *Figure 001* and at *Appendix 001*.



Figure 001: The AOI (as detailed by the client) in relation to its surrounding environment.

2.2 Proposed Scheme of Work

RPS understand this Detailed (Stage 2) UXO Desktop Study (UXO DTS) is being written to support works for the Xlinks North Devon Interconnector. However, at the time of publication RPS is unaware of the specific processes to be used in the development. Typically, however, development involves ground breaking processes such as Ground Investigation works, excavation works, trenching, piling works, and installation of roads and underground services. Any of these activities may, therefore, have the potential to disturb buried UXO.

2.3 Geology

One of the principal factors in the assessment of the maximum ordnance penetration depth is to establish the geological stratigraphy of the site. Ground conditions present will have a significant influence on the path of ordnance; therefore, the consistency and thickness of pre-WWII made ground should be considered as this would have the potential to restrict the penetration depth. The ordnance penetration calculation will be stipulated later in the document.

At the time of issue, the Client has not provided any geological data for the AOI, Therefore, RPS has reviewed open-source British Geological Survey (BGS) Geology viewer.

The records indicate that the AOI consist of varying geology, detailed below:

- Landfall area – a bedrock geology of Bideford Formation mudstone and siltstone/Bideford Formation sandstone.
- Abbotsham area – a bedrock geology of Bude Formation - mudstone and siltstone.
- Littleham area – a bedrock geology of Bude Formation – sandstone.
- Bideford area – a bedrock geology of Bude Formation - mudstone and siltstone.
- Alverdiscott area – a bedrock geology of Bude Formation - mudstone and siltstone.

No Ground Investigation data has been made available by the client and the BGS has no available data relating to boreholes for the AOI.

Given the lack of detailed data an accurate bomb penetration depth has not been possible, at this time and should be determined by a UXO consultant on site, if required.

2.4 Historical Site Conditions

The Client has not disclosed a historical map suite pertinent to the land located within the AOI. Therefore, RPS has studied a number of historical map suites and aerial photographs that were available within the public domain: Google Earth, Heritage England, the National Library of Scotland and National Collection of Aerial Photography (NCAP) websites. The process was undertaken to develop a greater knowledge of the historical alterations experienced within the site boundaries.

A selection of Historic mapping reviewed are presented at *Appendix 005*.

Table 2. Details of open-source historical map suites

Date	Map / Photograph	Description of the Area of Interest
1887 – published 1907	Map Bartholomew half Inch mapping	The AOI comprises a mix of open rural land, roads, small settlement, farms, and a section of the river Torridge. To the west at Abbotsham the route crosses a railway line.
1941, published 1941	Map OS one inch to the mile military mapping	The AOI evidences no significant change.
1950, published 1950	Map	The AOI evidences no significant change.

Date	Map / Photograph	Description of the Area of Interest
	OS 1:25,000 Mapping	
2022, published 2022	Map OS 1:50,000 Mapping	The AOI evidences no significant change.
1999 – Current	Google Earth Imagery	The AOI evidences no significant change.

2.4.1 Post-World War II (1939-1945) Alterations

Through the examination of historical map suites and aerial photographic sources, RPS has established that the AOI does not appear to have been subject to any major post WWII development.

3 BRITISH MILITARY IMPACTS / SOURCES

3.1 General

The successive sections present information identified relevant to the various categories of military positions historically present across the UK (as observed throughout periods of warfare). Additional information relevant to categories of military positions identified can be observed at *Appendix 006*.

3.2 World War I (WWI)

There is no recorded activity associated with the First World War in the AOI. RPS therefore consider the potential for the presence of ordnance arising from this source to be **Negligible**.

3.3 WWI Anti-Aircraft Artillery (AAA) Positions

There are no recorded WW1 anti-aircraft defences associated with the AOI. RPS therefore consider the potential for the presence of ordnance arising from this source to be **Negligible**.

3.4 World War II (WWII) Defensive Positions

There are no recorded defensive positions within the AOI. RPS therefore consider the potential for the presence of ordnance arising from this source to be **Negligible**.

3.5 WWII Anti-Aircraft Artillery (AAA) Positions

There are no recorded defensive positions within the AOI. RPS therefore consider the potential for the presence of ordnance arising from this source to be **Negligible**.

3.5 Military Presence / Training

The only military presence or military training associated with the AOI is related to potential Home Guard activity.

RPS EES is aware that the 5th (Bideford) Battalion Devon Home Guard was responsible for the defence of the Bideford area.

The Home guard were responsible for local area protection and supported regular forces in their respective duties. They were also responsible for supporting the Civil Defence organisations. They were armed with different types of conventional weapons as well as improvised weapons. Local defence comprised of performing armed patrols, manning roadblocks and defending key infra-structure assets. Figure 002 below details potential areas of Home Guard activity in context to the AOI.

Home Guard activity is likely to have taken place in the AOI during the Second World War. RPS understand that the potential to encounter a UXO-related device associated with this source, at the AOI, is **Low**.

UXO DETAILED DESKTOP STUDY – XLINK NORTH DEVON INTERCONNECTOR

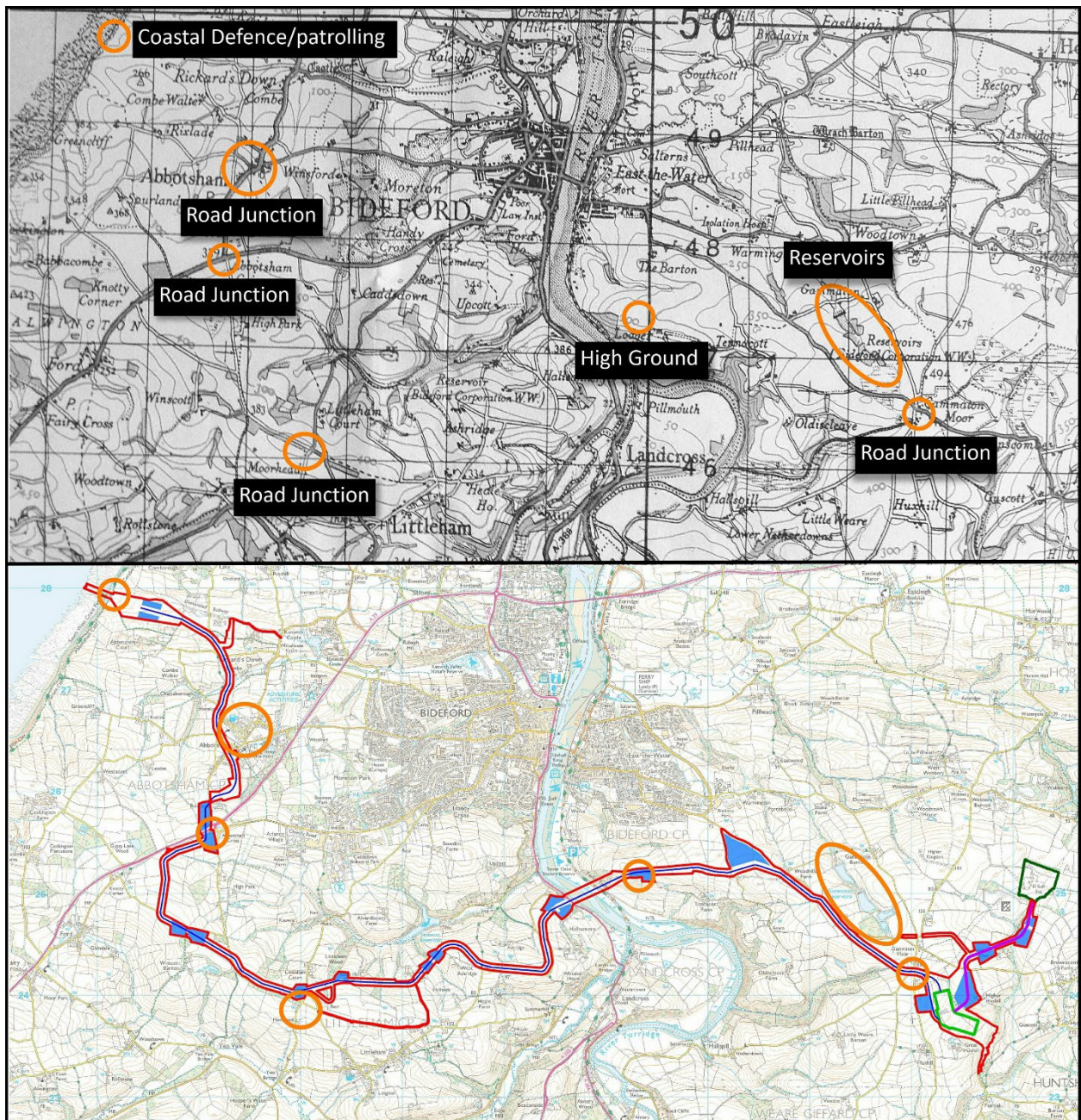


Figure 002: Areas identified in context with the AOI that may have been affected by home Guard activity.

3.6 Explosives Storage Areas

No evidence has come to light to indicate that any formal explosive storage areas are located within the AOI's.

RPS understand that the potential to encounter a UXO-related device associated with this source, at the AOI, is **Low**.

3.7 Military / Royal Air Force (RAF) Airfields

No RAF units or activity were associated with the AOI or wider area.

RPS have determined that the potential to encounter a UXO-related device associated with this source, at the AOI, is **Negligible**.

3.8 Decoy Sites

At the outbreak of WWII, a sophisticated system of decoy sites was deployed across Great Britain with the intention of diverting aerial attacks from major cities, military sites and essential infrastructure. In the event of an imminent air-raid, beacons were ignited at the decoy sites. These were occasionally successful in misleading the Luftwaffe bombers into thinking it was their intended target, with ordnance jettisoned upon open, unoccupied landscapes.

No evidence has come to light to suggest that a bomb decoy site was located at the AOI. The closest recorded decoy is located 10 km north-west of the AOI, at Arne. Designated as HH1, this decoy was specifically intended to act as a decoy for the Royal Naval cordite Factory at Holton Heath.

RPS have determined that the potential to encounter a UXO-related device associated with this source, at the AOI, is **Negligible**.

3.9 Munitions Production Facilities

No munition production facilities have been identified within the AOI. RPS have determined that the potential to encounter a UXO-related device associated with this source, at the AOI, is **Negligible**.

4 GERMAN AERIAL BOMBING

Successive sections present the relevant information that has been identified with regard to German Aerial Bombardment of the UK (throughout historic periods of warfare). Additional information pertinent to these periods and the sources of information consulted are presented in the relevant appendices. Basic overviews of the German WWI and WWII bombing campaigns against the UK are presented at *Appendix 007*.

4.1 WWI German Bombing

In the latter phases of World War I (1914-1918), the Luftstreitkräfte utilised zeppelin aircraft and later Gotha G.V. and Zeppelin-Staaken R.VI bombers, to drop payloads of High Explosive (H.E.) and Incendiary Bombs (I.B.) in aerial assaults upon the UK. The majority of air-raid activities were experienced within the counties located on the South and East Coasts and within London; although, a number of isolated incidents have been registered in alternate counties.

There is no evidence to show that Bideford or the surrounding area were subject to air raids during WWI. Given the lack of evidence of bombing RPS has determined that the potential to encounter a UXO-related device associated with this source, at the AOI, is **Negligible**.

4.2 WWII German Bombing

4.2.1 German Bombing Targets

RPS EES has reviewed multiple sources and based on the information gleaned at this juncture RPS EES has established that no strategic or tactical targets existed in the AOI or in proximity to the AOI. Recorded bombing activity was extremely low in the Bideford area.

4.2.2 Details of Air-Raids

Classified records, Local Government reports, Air Raid Precaution (ARP) reports and RPS EES archival documents pertinent to local air-raids have been examined. It should be recognised that air-raid records in no way constitute an exhaustive account of the potential air-raids that could have occurred throughout WWII.

During WW2 the site was located within the administrative area of the Municipal Borough of Bideford.

Table 3. AOI bombing statistics from the Home Office

Administrative Area	Land Area		Numbers of items of Ordnance Recorded								Ordnance Density	
	Acres	Hectares	High Explosive Bombs	Parachute Mines	Oil Bombs	Phosphorus Bombs	Fire Pots	V1	V2	Total	Per 1,000 Acres	Per 100ha
Bideford (MB)	3,902	1,580	0	2	0	0	0	0	0	2	2	0.5

The bombing density experienced within the AOI is considered to be low.

RPS has determined that the potential to encounter a UXO-related device associated with this source, within the AOI, prior to the consideration of other mitigating factors, is **Low**.

4.3 Reports of UXO

RPS have examined media sources and our records for UXO-related incidents within and in the wider area of the of the AOI and have found the following results.

There are no incidents relating to UXO finds were identified.

5 POTENTIAL ORDNANCE DETAILS

Based on the information gleaned at this juncture, RPS consider that the subsequent categories of ordnance have the potential to have been utilised on-site, or within its immediate environment.

- **German High Explosive Aerial Delivered Bombs:** Description and examples are presented at *Appendix 009*,
- **German Aerial Delivered Bomblets:** Description and examples are presented at *Appendix 010*,
- **British Land Service Ammunition:** Description and examples are presented at *Appendix 012*.

6 RISK HORIZON

6.1 General

The risk horizon at a site will depend on the expected categories of ordnance to be encountered and the manner in which they may have been deposited at the site. The subsequent diagram provides a basic simplified overview of the ‘zones’ within the ground where alternate classifications of ordnance may typically be encountered at onshore sites within the UK:

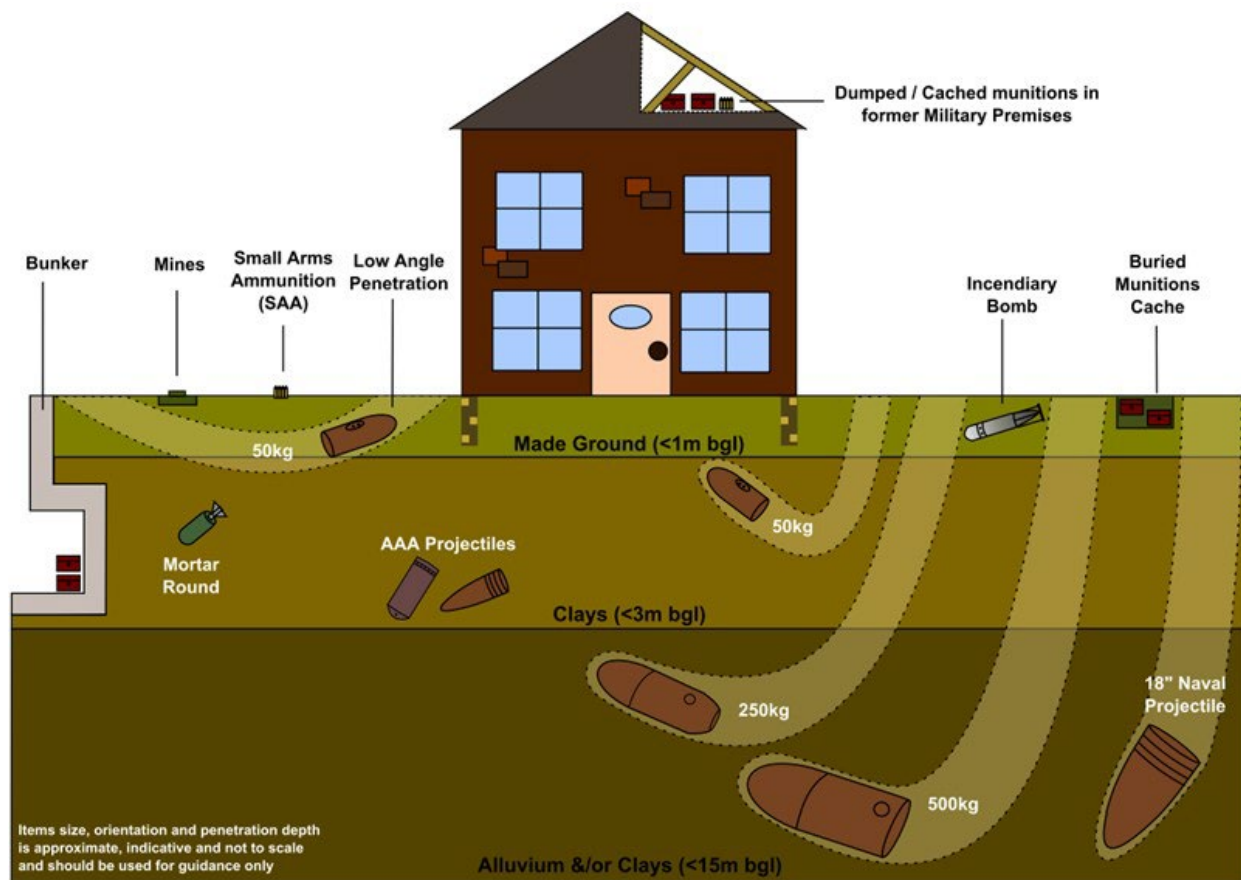


Figure 003: Penetration depth of selected ordnance.

6.2 Site Specific Ordnance Penetration Assessment

RPS typically assesses the bomb penetration for a site based on the typical penetration depths for a 500kg German Sprengbombe Cylindrisch (SC) bomb. When assessing the potential for ordnance ground penetration, it is essential not to rely solely on either an empirical, statistical or arithmetical formula. Experience has shown that a realistic depth is determined through the consideration of the above approaches, supplemented by accounts of Bomb Disposal Tasks.

It should be acknowledged that the bomb penetration at the site would have been significantly deeper for bombs larger than this; however, comparatively, only a limited number of devices in excess of 500 kg were utilised throughout WWII Luftwaffe bombing campaigns.

Background information on Bomb Penetration Depths can be observed at *Appendix 013*.

6.2.1 General Purpose/High Explosive (H.E) Bombs

As alluded to in *Section 2.3*, one of the most important factors in the assessment of the maximum ordnance penetration depth is to establish the geological stratigraphy present within the bounds of the AOI.

RPS has reviewed open-source geotechnical information with regards to depths of strata in close proximity to the AOI's however given the differences between both RPS has been unable to determine a maximum site-specific bomb penetration for a 500kg HE bomb at the time of this report's publication.

In the instance where mitigation is required on-site, where applicable and possible, the bomb penetration depth may be able to be assessed by UXO personnel in attendance, on a location by location basis, when the sub-surface strata become exposed.

Any penetration depths detailed relate to the depths below ground level at the time of WWII. If levels have experienced significant variation post-WWII, this could have an effect on the possible depths at which UXO-related items could be present, relative to current ground levels in the area of the site.

7 REGULATORY AUTHORITY DATA

7.1 MoD Explosive Ordnance Disposal (EOD) Archives

Historically, RPS has received a response that states the archives are unable to respond to requests until further notice.

RPS has been advised that an official Freedom of Information (FOI) request should be made in order to attain the information at this juncture through the overarching MoD Information Rights Team.

At the time of issue, RPS has outstanding FOI requests issued to the MoD through the overarching MoD Information Rights Team. RPS has a limited database of historic Explosive Ordnance Clearance (EOC) tasks conducted within the UK by the MoD. A review of this database indicates that there are no recorded EOC tasking within the AOI or its wider area.

At the time of this reports publication no Freedom of Information (FOI) has been made to the MoD in order to understand any EOD activities undertaken within the site boundaries.

7.2 Abandoned Bomb Register

RPS has been provided with a database held by the Home Office, which details the abandoned bombs that are located throughout the UK. The list has been collated from various sources and details items that have been abandoned, but importantly, also those that have since been removed.

Having consulted the database, it is evident that no records exist within the site boundaries or in proximity to the site.

8 UXO CONTAMINATION RISK ASSESSMENT

8.1 General

Risk assessment is a formalised process to assess the level of risk associated with a particular situation or action. It involves the identification of the hazards present and the potential receptor that could be affected by this hazard. The degree of risk is associated with the potential for a pathway to be present that links the hazard to the receptor. This relationship is usually summarised as the Source – Pathway – Receptor.

8.1.1 Unexploded Ordnance Detonation Characteristics

Since the conclusion of WWII, there have been a limited number of recorded incidents in the UK where items of ordnance have detonated during engineering works; however, significant quantities of ordnance have been unearthed. Information and discussion pertinent to the UXO detonation characteristics can be observed at *Appendix 014*.

8.2 Sources / Hazards

Previous sections of this report have specified a number of activities that are known to have occurred on/around the site. The subsequent sections will assess if they have the potential to cause significant explosive ordnance contamination.

Table 4. Source of contamination

Source of Contamination	Contaminate
German Bombing	High Explosive (H.E) Bombs
	Incendiary Bomblets & anti-personnel bombs
Military Presence	Land Service ammunition; grenades, mortars and Small Arms Ammunition

8.3 Pathway

The pathway is described as the route as to which the hazard reaches the site personnel. Given the nature of the site and the proposed developments, the only pathways would be through:

- Enabling Works,
- Intrusive Site Works (site investigations, trenching etc.),
- Excavations.

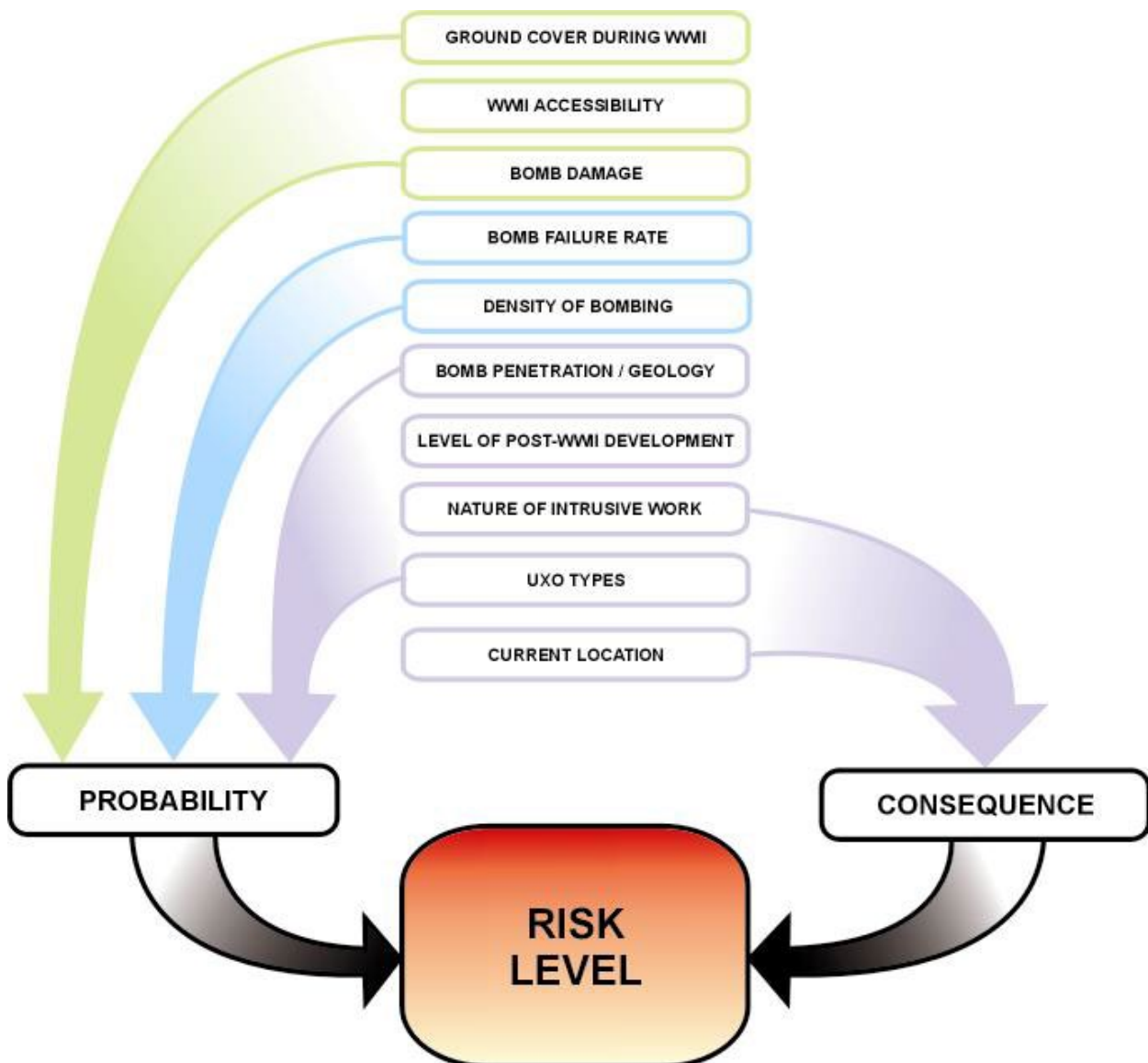
8.5 Receptors

Sensitive receptors applicable to this site would be:

- People (Site Personnel, Construction Works, and General Public),
- Plant and Equipment,
- Structures (Including existing buildings and nearby properties),
- Environment.

8.6 Risk Assessment

The successive sections contain the risk assessment for the site, prior to the implementation of any risk mitigation measures. For the risk to be properly defined, several factors have to be taken into consideration including the consequences of initiation and the probability of encountering UXO at the site. The technique used to assess the level of risk is detailed in the diagram below:



8.6.1 Risk Assessment Matrix

In order to identify an appropriate risk mitigation strategy for the proposed works, it is now necessary to complete a semi-quantitative assessment of the identified risks.

Once the factors detailed above have been assessed for the site, the consequence level is obtained from the table presented in *Appendix 015*, which provides a consequence rating from 1 to 5, depending upon the severity. The probability is also deduced and given a rating between ‘Improbable’ and ‘Almost Certain’. These two ratings are then combined to determine the final risk levels to the proposed site works from the various threat items, using the risk matrix in *Appendix 015*, taking into consideration the potential UXO threat items as detailed earlier.

Within *Table 5* is the risk assessment for the site, prior to the implementation of any risk mitigation measures:

Table 5. Risk assessment matrix (*see Appendix 015 for assessment scheme)

Contaminate	Hazard	Potential Pathway	Potential Sensitive Receptors	Probability of Encounter*	Consequence of Initiation*	Final Risk Level		
German	Incendiary Bombs (excluding 2kg with Explosive Nose)	Heat	Surface Activities	Enabling Works	Site Personnel, General Public, Engineering Equipment, Existing Buildings & Infrastructure, Environment.	1	4	L
			Intrusive Activities	Excavations		1-2	4	L - M
				Piling/Boreholes		1-2	4	L - M
	HE Bombs	Blast, Fragmentation	Surface Activities	Enabling Works	Site Personnel, General Public, Engineering Equipment, Existing Buildings & Infrastructure, Environment.	1	5	L
			Intrusive Activities	Excavations		1-2	5	L - M
				Piling/Boreholes		1-2	5	L - M
British	AAA Rounds	Blast, Fragmentation	Surface Activities	Enabling Works	Site Personnel, General Public, Engineering Equipment, Existing Buildings & Infrastructure, Environment.	1	5	L
			Intrusive Activities	Excavations		1-2	5	L - M
				Piling/Boreholes		1-2	5	L - M
	LSA	Blast, Fragmentation	Surface Activities	Enabling Works	Site Personnel, General Public, Engineering Equipment, Existing Buildings & Infrastructure, Environment.	1	5	L
			Intrusive Activities	Excavations		1-2	5	L - M
				Piling/Boreholes		1-2	5	L - M

Contaminate	Hazard	Potential Pathway	Potential Sensitive Receptors	Probability of Encounter*	Consequence of Initiation*	Final Risk Level	
SAA	Blast, Fragmentation	Surface Activities	Enabling Works	Site Personnel, General Public, Engineering Equipment, Existing Buildings & Infrastructure, Environment.	1	3	L
		Intrusive Activities	Excavations		2	2	L
			Piling/Boreholes		2	2	L

KEY:

N: Negligible

L: Low

M: Moderate

H: High

8.7 Risk Assessment Analysis

WWII Bombing: Documentary evidence for bombing in wider area associated with the AOI. Records indicate that activity in the Bideford areas was extremely low.

RPS have therefore determined that the likelihood to encounter a UXO-related device associated with this source, is **Low**.

Military Positions: RPS has determined the potential military activity was limited to Second World War Home Guard activity. The risk of a UXO device being located in the AOI is therefore considered to be **Low**.

Anti-Aircraft Artillery (AAA): Research identified has identified no anti-aircraft positions in context to the AOI. Combined with the low density of recorded German air attack, the likelihood of encounter fall to earth UXO anti-aircraft projectiles is considered to be **Negligible**.

8.7.1 Final Risk Level(s)

RPS was commissioned to produce an unexploded ordnance (UXO) detailed desktop study for the Xlink North Devon Interconnector Project. This study was conducted in accordance with CIRIA, Unexploded ordnance (UXO) A guide for the construction industry (C681) and CIRIA, Unexploded Ordnance (UXO) risk management guide for land-based projects (C785).

During its compilation the study collated information of various explosives-based contamination sources known to affect sites within the United Kingdom. This information was integrated to establish the level of risk it posed to the reporting area. Finally, a site-specific risk mitigation solution was developed to ensure that the final risk level was deemed As Low as Reasonably Practicable (ALARP).

UXO DETAILED DESKTOP STUDY – XLINK NORTH DEVON INTERCONNECTOR

The content of the UXO desktop study of the AOI is summarised in the following table:

Table 6. Summary of EES1428 Xlink North Devon UXO DTS

UXO Contamination Source	Relevant Section	Negligible Risk	Low Risk	Moderate Risk	High Risk	Mitigation Solution
Defensive Positions	3.3					<i>Ap017</i>
Anti-Aircraft Artillery	3.4					<i>n/a</i>
Military Training / Presence	3.5					<i>Ap017</i>
Explosives Storage Areas	3.6					<i>n/a</i>
Military Airfield	3.7					<i>n/a</i>
Bombing Decoy Site	3.8					<i>n/a</i>
Munitions Production	3.9					<i>n/a</i>
WWI Bombing	4.1					<i>n/a</i>
WWII Bombing	4.2					<i>n/a</i>

8.7.1.1 Observations

The area has seen little military activity except for potential Second World War Home Guard activity.

9 RECOMMENDATIONS

9.1 The 'ALARP' Principle

Based on the aforementioned risk assessment, RPS has found there to be a **Negligible** UXO risk from British anti-aircraft projectiles, **Low** UXO risk from Land Service Ammunition and a **Low** UXO risk from German airdropped weapons generally across the AOI.

On sites where a UXO-related risk has been identified, an aim must be to mitigate the UXO risk to As Low as Is Reasonably Practicable (ALARP) considering safety and cost vs. benefit. Further detail and diagrammatic representations of the ALARP principles are presented at *Appendix 016*.

Based on the assessed risk, the following mitigation is recommended to be implemented in support of works taking place across the entire site:

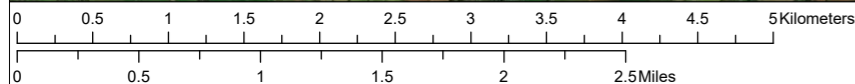
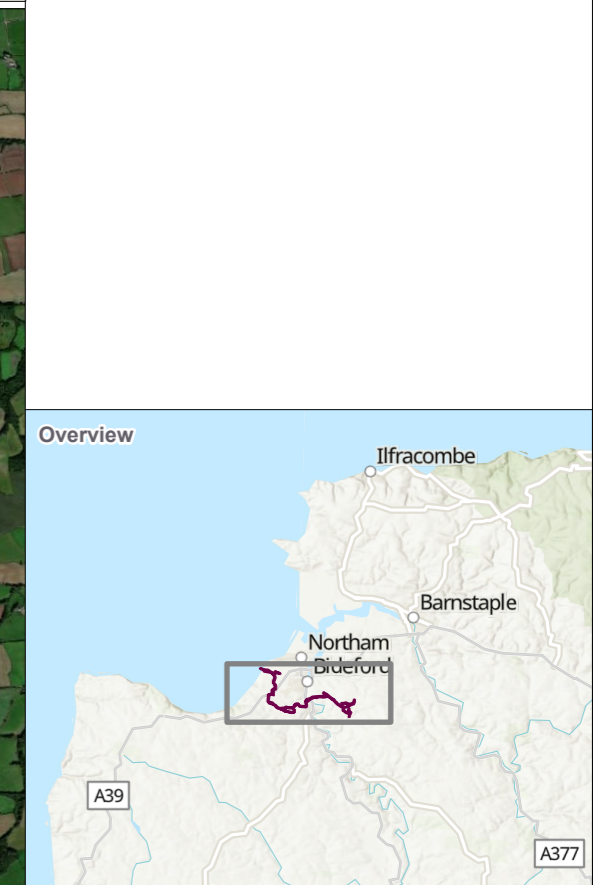
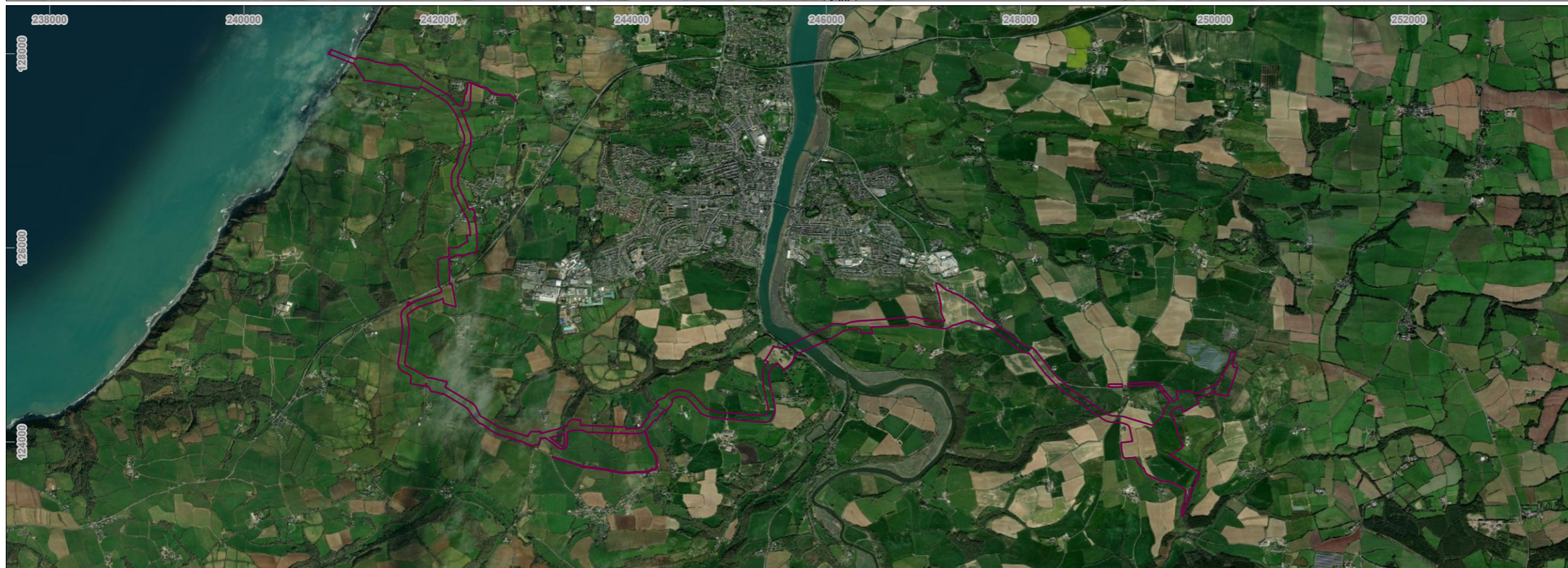
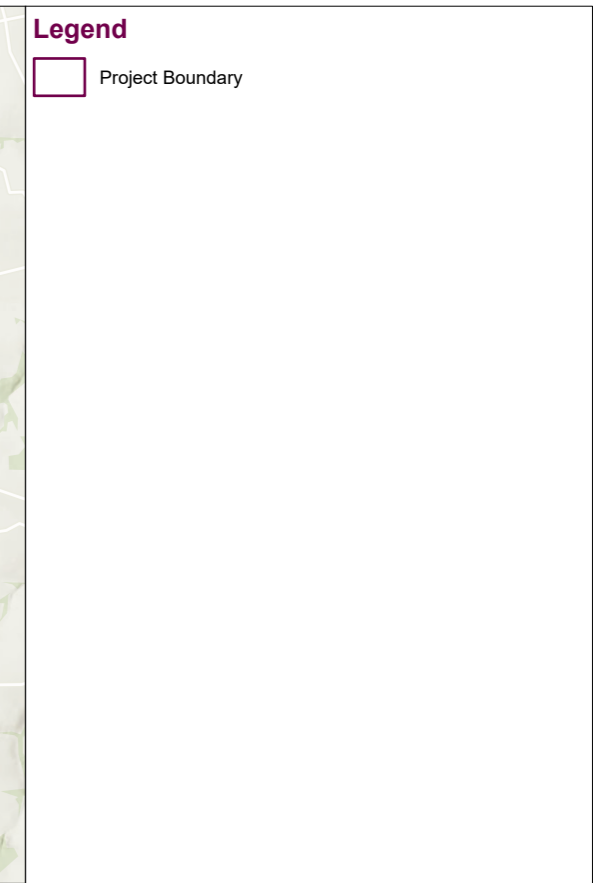
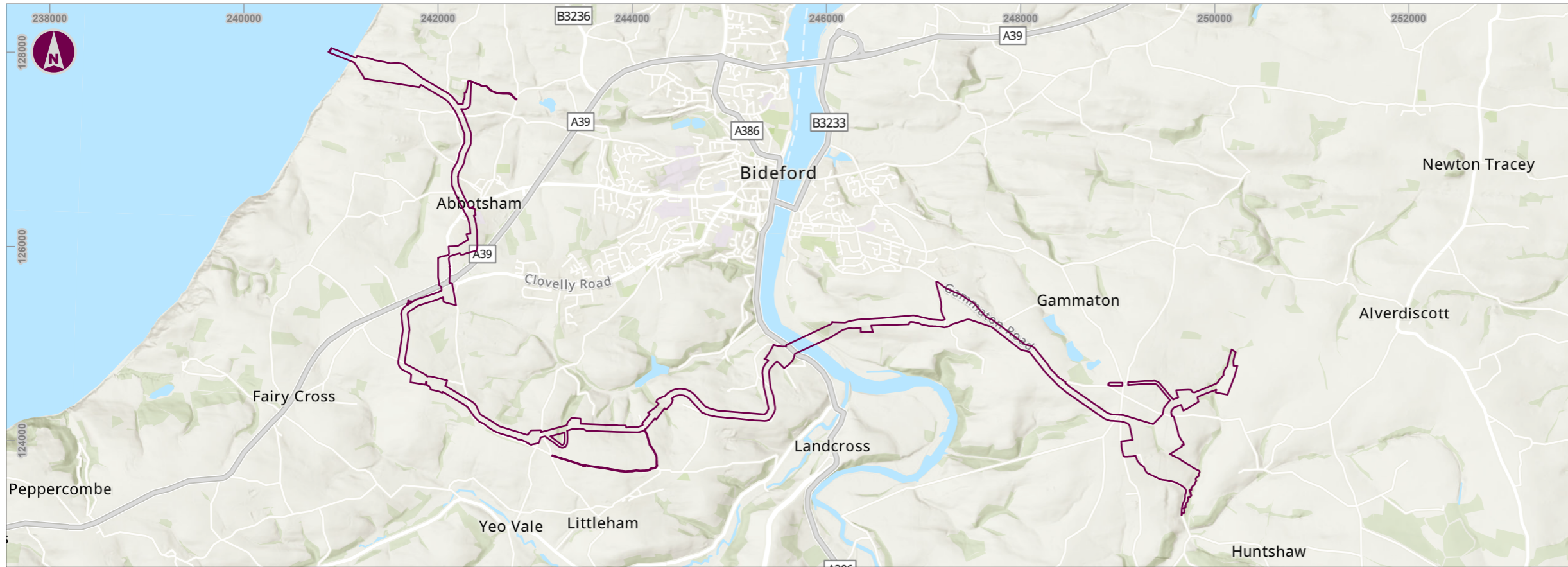
- **Explosives Safety & Awareness Briefings / Site Safety Guidelines,**

Full descriptions of each of the mitigation recommendations are presented at *Appendix 017*.

APPENDICES

Appendix 001

Site Location Map



Geodetic Information:
 CRS: British National Grid, Datum: OSGB 1936
 EPSG Code: 27700

Data Sources: Client
 Service Layer Credits: Esri, Intermap, NASA, NGA, USGS, Maxar, Microsoft, Esri UK, Esri, HERE, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS, Esri, CGIAR, USGS, Esri UK, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS

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EES1428-F-001	01			1 of 1

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Project	Xlinks North Devon Interconnector	Scale @ A3	1:50,000	Checked By	MK	Date Created	31/10/2022
Title	Project Location						

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Appendix 002

Terminology

Terminology

Explosive Ordnance Disposal (EOD) - The detection, identification, evaluation, rendering safe, recovery and disposal of UXO.

Fuze- A designed and manufactured mechanism to activate munitions. It can be designed for use by electrical, chemical or mechanical systems, by push, pull, pressure, release and time activation, singly or in combination. Usually consists of an igniter and detonator.

High Explosive (HE) - An explosive that normally detonates rather than burns; that is, the rate of detonation exceeds the velocity of sound.

Initiation - A physical process that sets in motion a cascade of chemical reactions of ever increasing energy (the explosive chain) that will eventually generate sufficient energy (the velocity of detonation) to allow the main charge to detonate in a violent, explosive chemical reaction, releasing energy in the form of heat and blast.

Unexploded Bomb (UXB) -The term UXB refers to any WWII aerial-delivered unexploded bomb, torpedo, projectile or mine consisting of a complete ferrous casing (without tailfins) weighing 50kg or greater.

Unexploded Ordnance (UXO) - Explosive Ordnance that has been primed, fuzed, armed or otherwise prepared for action, and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a threat to the safety and/or security of people, animals, property or material and remains unexploded either by malfunction or design or for any other reason.

UXO Contamination - UXO that is present, within any given physical context that is considered to be an impediment to the safe on-going or intended use of a facility, including geological features. Safety in this instance is measured against an acceptable level of exposure to the potential risks that UXO present.

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Appendix 002: Terminology



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Glossary

AAA	Anti-Aircraft Artillery
Allied Forces	The Allies of World War II were the countries officially opposed to the Axis powers during the Second World War
ARP	Air-raid Precautions
BD	Bomb Disposal (historic term for EOD)
BDO	Bomb Disposal Officer
bgl	Below Ground Level
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
FP	Fire Pot (Incendiary bomb)
HE	High Explosive
IB	Incendiary Bomb
Kg	Kilogram
LSA	Land Service Ammunition
Luftwaffe	German Air Force
mbgl	Metres Below Ground Level
MoD	Ministry of Defence
OB	Oil Bomb
PM	Parachute Mine
RAF	Royal Air Force
RPS	RPS Group Plc
SC	Sprengbombe-Cylindrisch, thin cased General Purpose Bomb
SD	Sprengbombe-Dickwandig, Semi-Armour-Piercing Fragmentation Bomb
SI	Site Investigation
Sqm	Square Metres
USAAF	United States Army Air Forces
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
WWI	First World War (1914 -1918)
WWII	Second World War (1939 – 1945)

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Project Ref: EES1428

Appendix 002: Terminology



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Appendix 003

Sources of Information

Sources of Information

- RPS related site records.
- RPS Company records.
- Central and Local Government records.
- National Archives.
- Historic maps, photographs and records.
- Internet Research.

Supplemental Sources of Historical Information Consulted

The following additional sources were consulted for general background information:

- **Fleischer, W (2003)** German Air Dropped Weapons to 1945. Midland Publishing and Stephen Thompson Associates
- **Morris J (1993)** German Air Raids on Britain 1914-1918. Naval & Military Press
- **Fegan T (2002)** The 'Baby Killers. Pen and Sword military publishing
- **Dobson, C (2001)** AA Command, Britain's Anti-Aircraft Defences of the Second World War. Methuen.
- **Dobson C (2000)** Fields of Deception, Britain's Bombing Decoys of World War 2. Methuen.
- **Ramsey, W.G. (1988)** The Blitz Then and Now, Volumes 1, 2 & 3. Battle of Britain Prints International Limited
- **Tait. D. (1994)** Devon at War 1939-45. Pen and Sword Publishing
- **UK National Archives** — HO203 Series Ministry of Home Defence Incidents

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Project Ref: EES1428

Appendix 003: Sources of Information



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Specific Internet Sources

- British Geological Survey Map viewers - British Geological Survey (bgs.ac.uk)
- National library of Scotland
- Britain from Above
- National Collection of Aerial Photographs

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Appendix 003: Sources of Information



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Appendix 004

Legislation

Whilst undertaking this desk study the requirements of a number of legislations has been borne in mind, as presented following:

- Explosive Regulations 2014
- Manufacture and Storage of Explosives Act 2005.
- Health & Safety at Work etc Act 1974.
- Construction (Design & Management) Regulations 2015.
- Control of Substances Hazardous to Health (COSHH) Regulations 2002.
- Personal Protective Equipment at Work Regulations 1992.

The Manufacture and Storage of Explosives Act 2005 does not specifically relate to UXO, but rather to the safety procedures and requirements associated with the storage and manufacturing of items containing explosive compounds. Even though this legislation is not directly applicable to site works where UXO may be encountered, there are several pertinent points which may be borne in mind when undertaking works on sites which pose a risk from encountering UXO, for example:

Disposal of explosives and decontamination of explosive-contaminated items

- Any person who disposes of explosives shall ensure, so far as is reasonably practicable, that they are disposed of safely.
- Any person who decontaminates explosive-contaminated items shall ensure, so far as is reasonably practicable, that they are decontaminated safely.
- No person shall store explosives unless he holds a licence for their storage and complies with the conditions of that licence.

These points just reinforce that when a significant risk from UXO is identified on a site, it is essential for proper procedures to be put in place and in higher risk scenarios for trained Explosives Safety Personnel to be present on site to mitigate the risks, and be on hand to handle the situation in the event of a suspicious item / UXO discovery.

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR), place a legal duty on:

- employers;
- self-employed people;
- people in control of premises;

To report work-related deaths, major injuries or over-three-day injuries, work related diseases, and dangerous occurrences (near miss accidents).

These regulations do not directly apply to UXO, but under the RIDDOR legislation it is stated that as an employer, a person who is self-employed, or someone in control of work premises you must report "*dangerous occurrences - where something happens that does not result in an injury, but could have done*". As such, where a site has been shown to present a risk from UXO this legislation should be borne in mind if an eventuality occurs where an item of UXO is uncovered.

Although the Health & Safety at Work etc Act 1974 and the Construction (Design & Management) Regulations 2015 do not specifically require a search for unexploded ordnance, there is an obligation on those responsible for intrusive works to ensure that comprehensive assessment and risk mitigation measures are taken with regard to all underground hazards on site.




The Health & Safety at Work etc Act 1974 - Section 3, states:

1. *It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.*
2. *It shall be the duty of every self-employed person to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that he and other persons (not being his employees) who may be affected thereby are not thereby exposed to risks to their health or safety.*
3. *In such cases as may be prescribed, it shall be the duty of every employer and every self-employed person, in the prescribed circumstances and in the prescribed manner, to give to persons (not being his employees) who may be affected by the way in which he conducts his undertaking the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their health or safety.*

Construction (Design & Management) Regulations 2015 - Regulation 10 states:

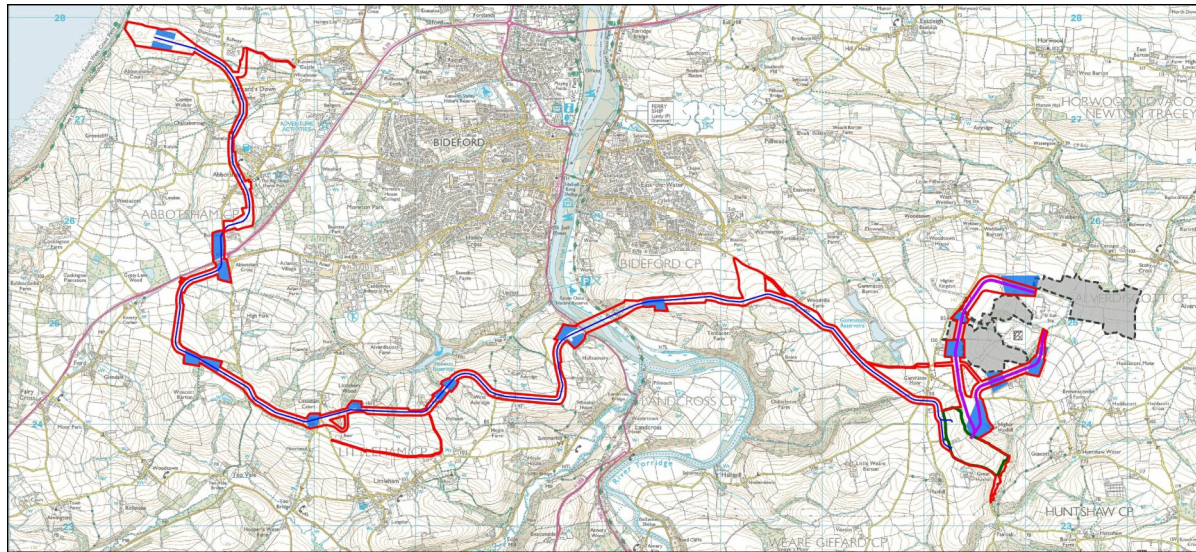
- (2) *The pre-construction information shall consist of all the information in the client's possession (or which is reasonably obtainable), including –*
- (a) Any information about or affecting the site or the construction works.

In addition to the above, the importance of adhering to safe systems of work should also be borne in mind, and explosives and their residues may have an implication concerning PPE requirements and COSHH.

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Appendix 004: Legislation	Explosives Engineering Services  +44 (0) 1291 621821  www.rpsgroup.com

Appendix 005

Historical Aerial Photographs

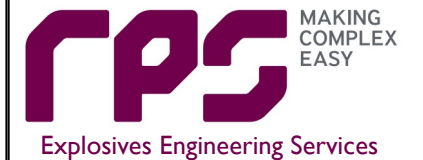


Historical Mapping—Top dated 1897

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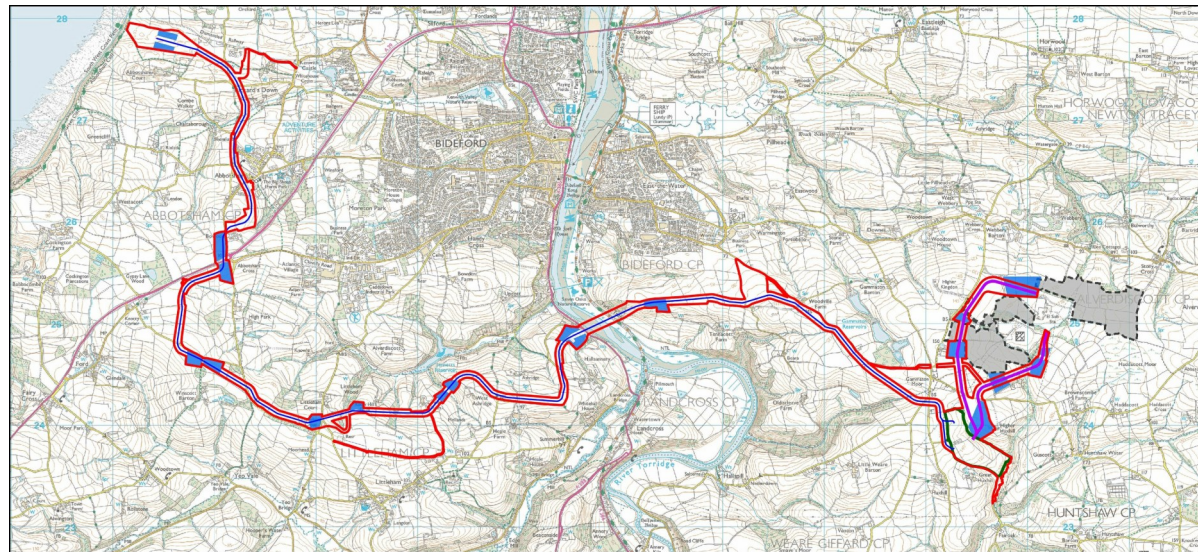
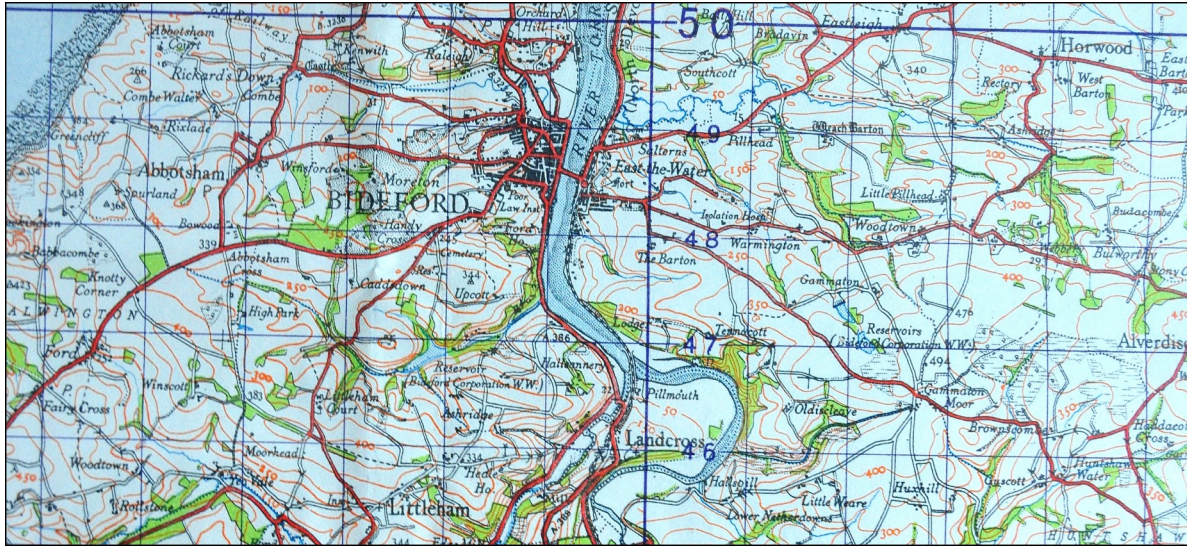
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Appendix 005: Historic Map Suite



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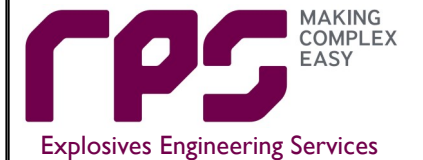


Historical Mapping—Top dated 1941

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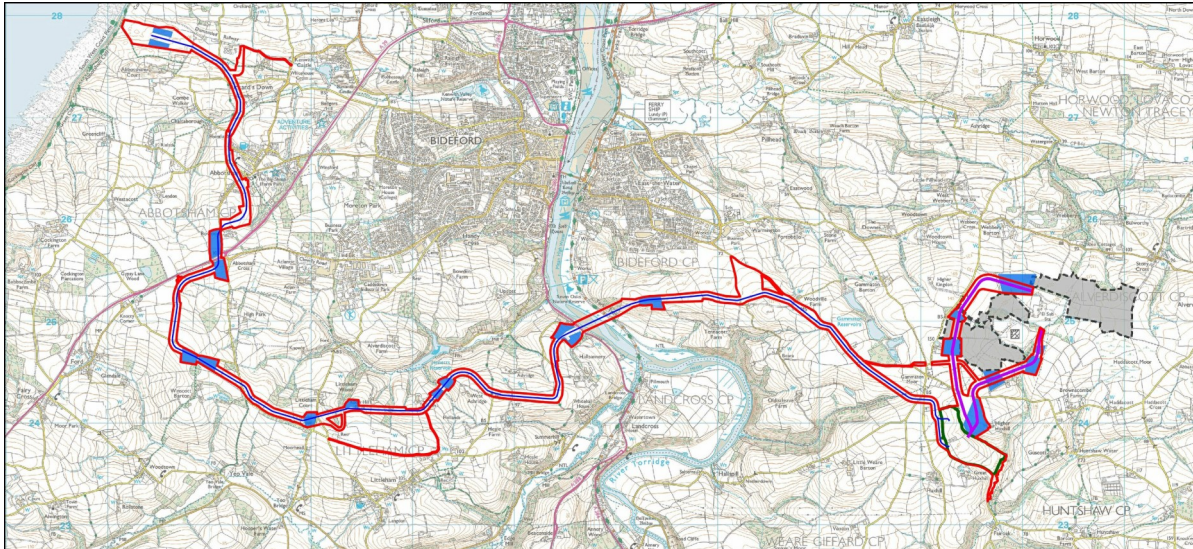
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Appendix 005: Historic Map Suite



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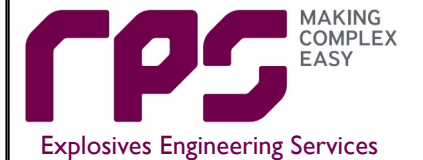


Historical Mapping — Top dated 1950.

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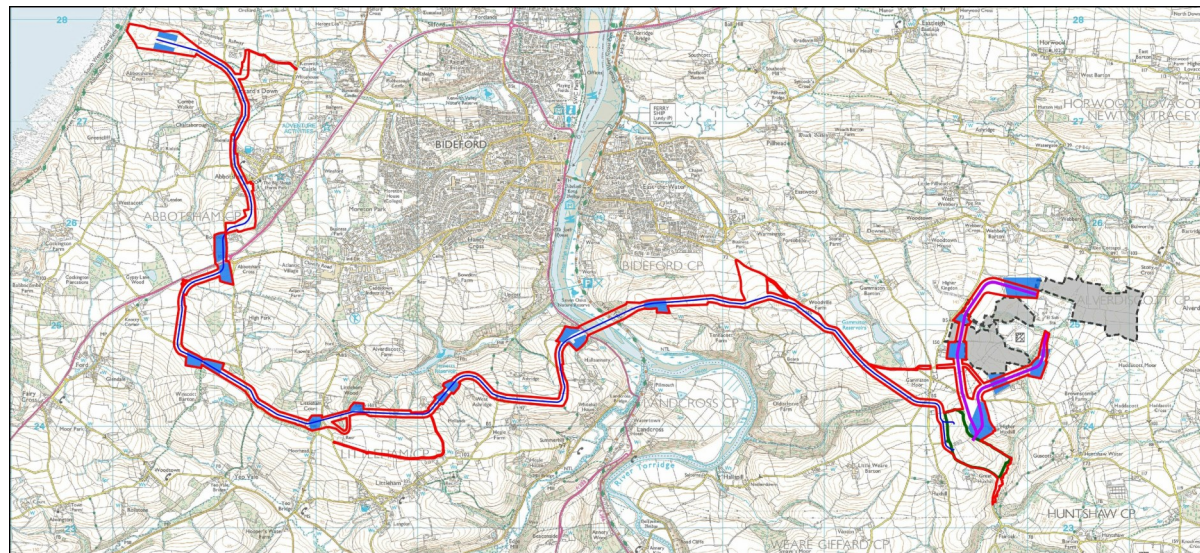
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Appendix 005: Historic Map Suite



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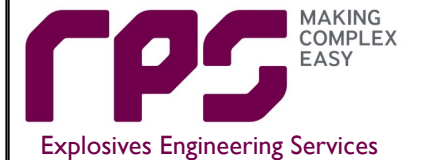


Historical Mapping — Top dated 2022.

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Appendix 005: Historic Map Suite



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Location of AOI, (Google Earth image with shape-file provided by the client overlaid)

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Appendix 005: Historic Map Suite

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Appendix 006

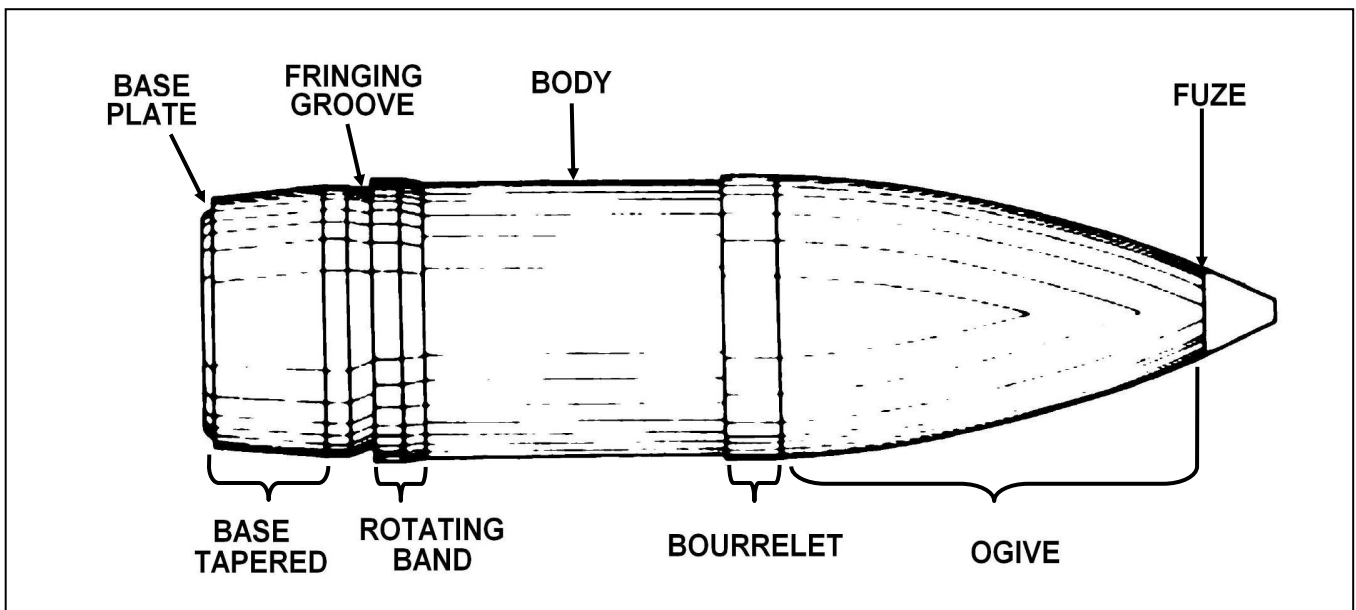
Examples of British Military Positions

Anti Aircraft Artillery Projectiles

During WWII, the munitions commonly used by the British AAA were the 4.5" and 3.7" varieties. An artillery munition generally consists of four main sections:

- **Fuze** – The part of the device which initiates the detonation of the payload. Usually artillery munitions have nose fuzes, although some do have base fuzes. When used with HE shells, 'airburst' fuzes usually have a combined airburst and impact function.
- **Projectile** – This is the part of the munition that generally contains the main payload, and will be ejected from the main munition during firing. Artillery shell projectiles can range between bursting, base ejection or nose ejection.
- **Propellant** – Propellant in artillery munitions is always low explosive.
- **Primer** – The primers purpose is to initiate the propellant upon firing.

In most cases, the part of the munition that is likely to remain as UXO, as a result of malfunction during firing, is the Projectile (potentially with fuze), as this is the part of the device that is fired through the air.



TYPICAL PROJECTILE COMPONENTS

"Z" Batteries, often manned by Home Guard units fired Rockets as part of the integrated aerial defences. These 'projectiles' were essentially fin stabilised rockets which contained a small propellant charge to ignite the rocket motor. Throughout WWII two variations of the rocket were utilised, the first being a 2" rocket which was later replaced by a 3" rocket after being discovered that it was far more effective.

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Appendix 011: Examples of WWII Anti-Aircraft Artillery



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3.7" Anti Aircraft Artillery Projectile



NOTE: Item is a training item and does not necessarily depict the correct identification colouration and/or markings

40mm Anti Aircraft Artillery Round

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Appendix 011: Examples of WWII Anti-Aircraft Artillery



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Appendix 007

German Bombing Campaign Overview

WWI German Bombing

During the First World War (WWI) Zeppelin airships followed by 'Gotha' and 'Giant' bombers conducted a succession of attacks dropping high explosive (HE) and incendiary bombs on Britain. The level of enemy bombing seen during WWI does not compare to that of WWII, nevertheless bombs were dropped on Britain.

WWII German Bombing

From the onset of WWII the German Air Force's (Luftwaffe) primary goals were to destroy key military assets such as airfields, during a series of daylight bombing raids. Shortly after, their plans changed to include targets such as economic and industrial sites, railway infrastructure, power stations, weapon manufacturing plants and gas works. Eventually, the amount of daylight raids were reduced and the attacking of targets commenced under the cover of darkness. Ultimately, the Germans resorted to attacking civilian areas through the 'carpet bombing' of major towns and cities, most notably during "The Blitz", which was in retaliation to the Allied bombing campaign.

RPS records indicate that the German bombing campaign during WWII saw the extensive use of a series of High Explosive (HE) filled bombs ranging in size from the relatively small 50kg bomb through to the 250kg, 500kg, 1,000kg and 1,800kg bombs to the largest at 2,500kg. The Luftwaffe also used parachute mines, incendiary/fuel bombs and anti-personnel bomblets. In the later stages of the war, vengeance weapons namely the V1 (doodle bug) and V2 (Long Range Rockets) were used. The V2 rocket contained a 980kg high explosive filled warhead.

Available records suggest that the most numerous bombs dropped over the majority of targets during WWII were 50kg to 500kg HE bombs and incendiary devices. It is a general industry accepted rule, where no specific statistics are available, that on average, around 10% of the German HE bombs dropped during WWII failed to explode. This percentage is based on empirical data collected and collated during WWII by the ARP, and derived from bombing records. This statistic is primarily based on statistics from the London area (where the actual statistics vary widely across the region), but on average the failure rate resulted to around 10%.

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Appendix 007: German Bombing Overview



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Appendix 008

Air-Raid Records

MOHS Incident Number	Date	Details of Raid
608	02/07/1940	There is an unconfirmed report that bombs were dropped near Bideford or Barnstaple in Devonshire.
1574	29/10/1941	2 H.E. fell at Bideford at 2221, damaging windows and telephone wires and causing 1 slight casualty.

Ministry of Home Security Records detailing Second World War bombing of the Bideford area.

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Appendix 008: Details of air raids

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Appendix 009

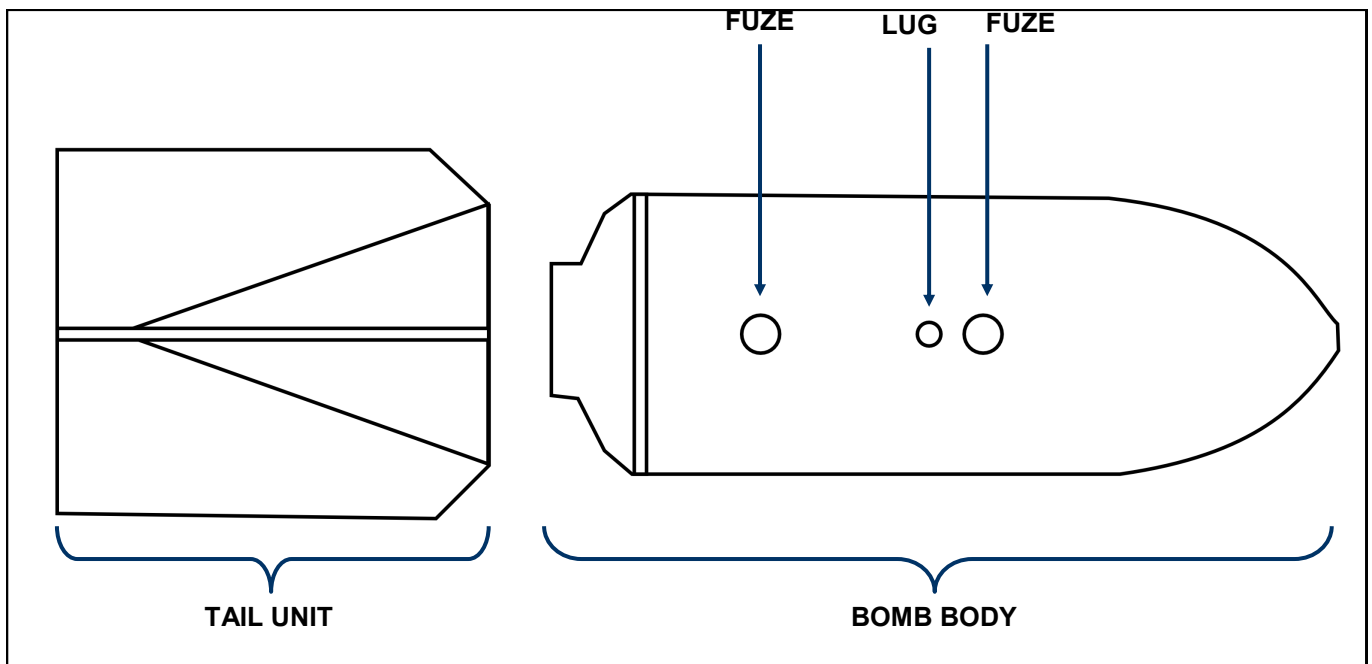
Examples of German Bombs

High Explosive / General Purpose Bombs

General-purpose bombs come in many shapes and sizes depending on the intention of the bombing mission. Generally, all these bombs are constructed the same and consist of a metal container (iron construction), a fuze (mainly transverse i.e. in the middle of the bomb), and a stabilizing device. The metal container (called the bomb body) holds the high explosive content. The body may be in one or in multiple pieces.

The main components of a bomb are:

- **Bomb Body** – This is the main item referred to as an Unexploded Bomb (UXB). The General Purpose bombs will have a typical bomb shape with parallel sides. Given the age and environmental conditions most bombs are found corroded. It is possible to mistake them for old gas cylinders or boiler tanks.
- **Tail Unit** – As the UXB enters the ground this section is removed. The presence of a tail unit may indicate that an UXB is buried at depth in the region.
- **Fuze** – With a German UXB it is most likely that the bomb would have a mechanical or electrical transverse fuse. In some case a bomb may contain two fuses. On a German UXB the fuzes were of an alloy construction and therefore a visual contrast from the bomb body.



TYPICAL WWII GERMAN AERIAL DELIVERED BOMB COMPONENTS

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Appendix 009: Examples of WWII German Bombs

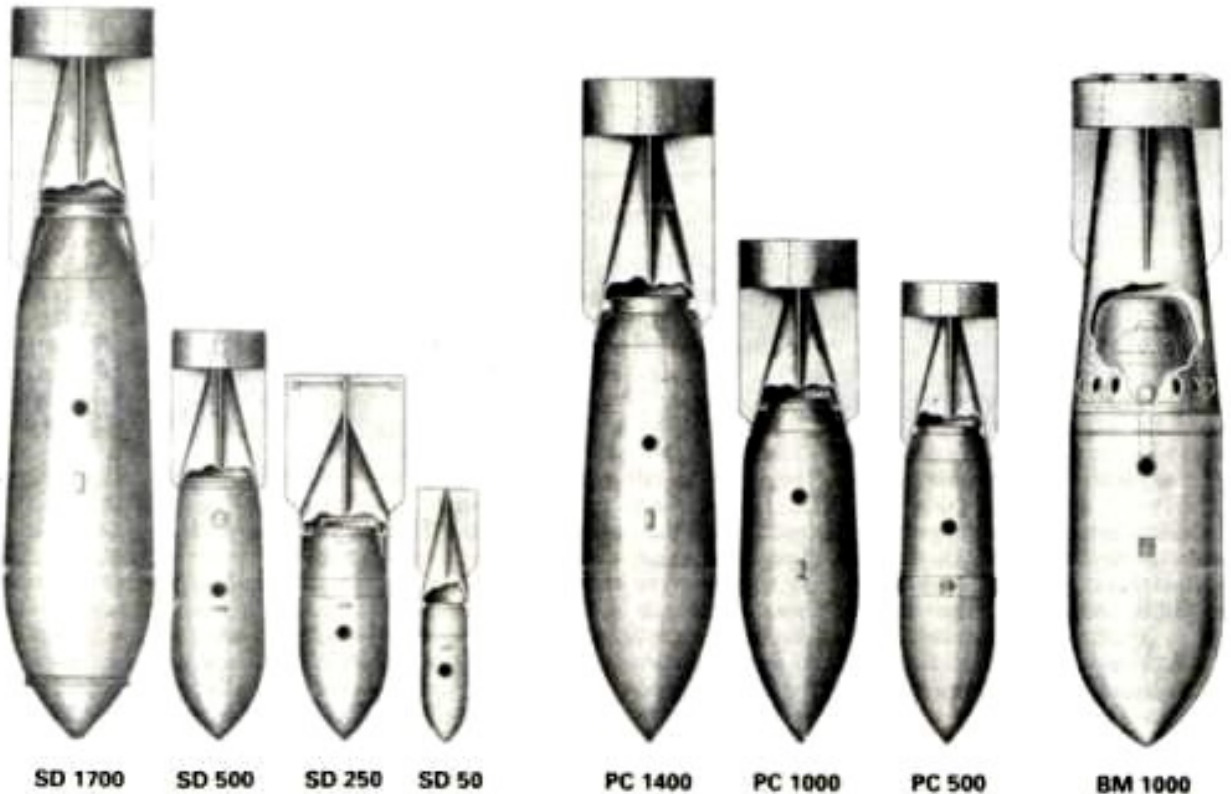
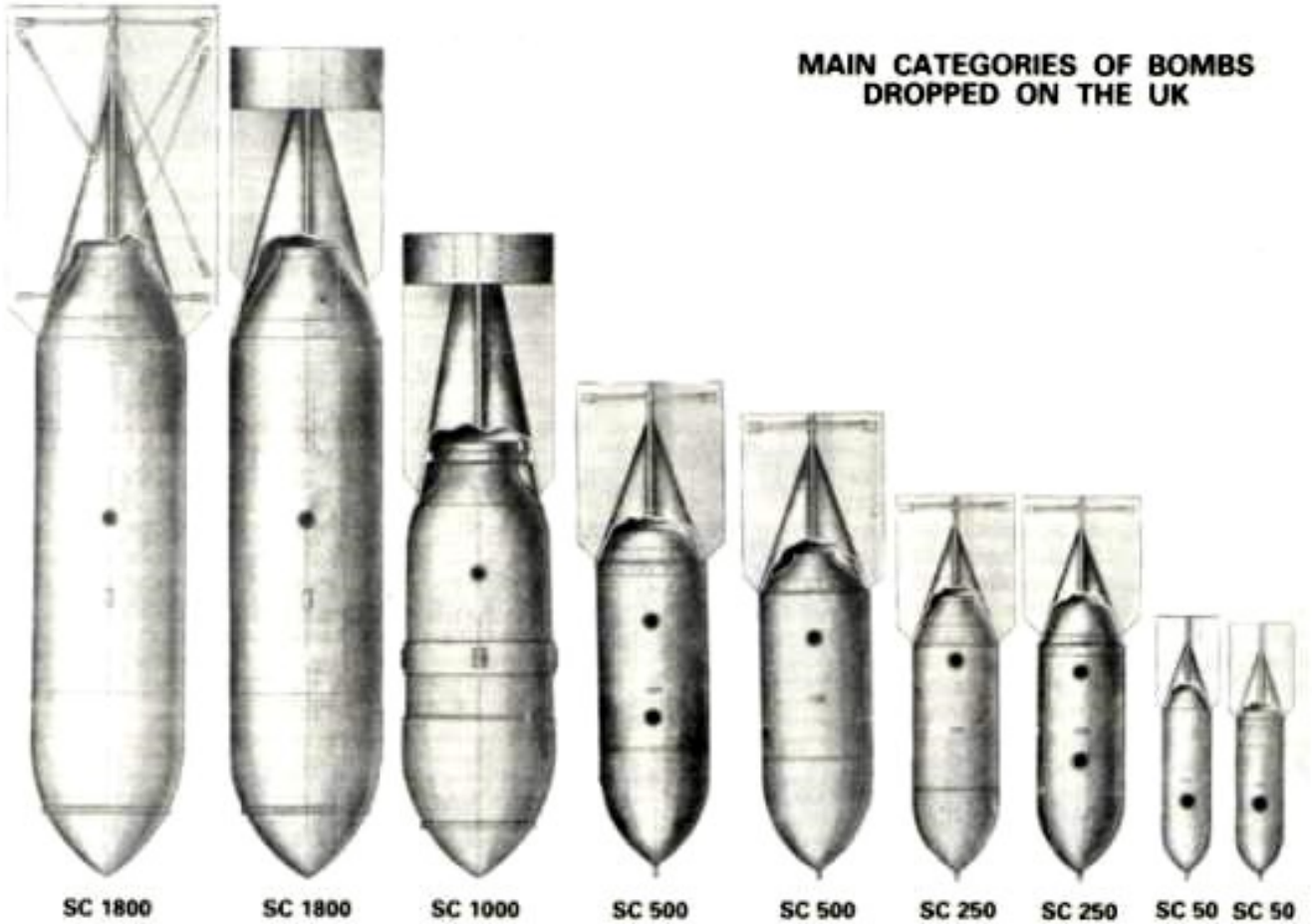


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**MAIN CATEGORIES OF BOMBS
DROPPED ON THE UK**



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Appendix 009: Examples of WWII German Bombs



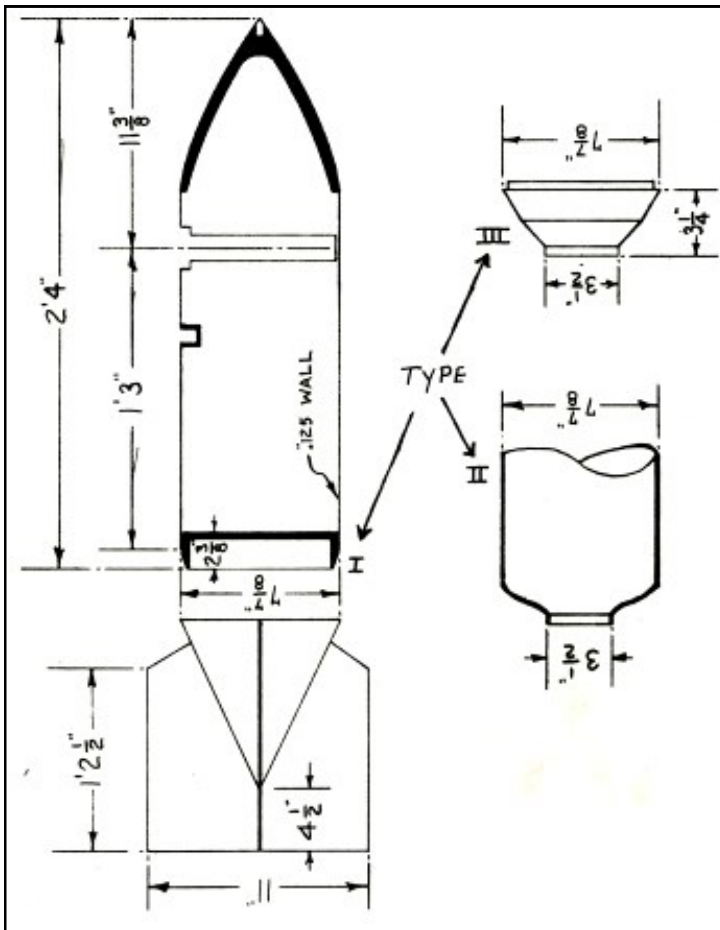
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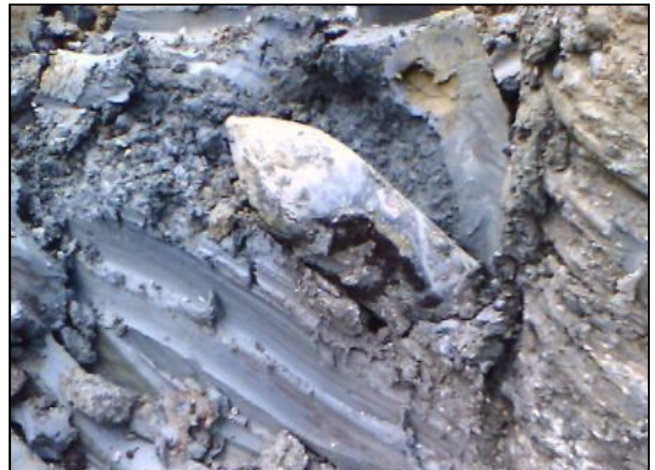
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An Example of a 50kg German Bomb



50kg SC High Explosive Bomb Schematic



50kg SC HE Bomb discovered by RPS on a construction site in London (2006)

SC50 Data

- Bomb Body Weight = 40-54kg
- Body Length = 2' 4.5" to 2' 7"
- Body Diameter = 200mm (7.87")
- Explosive = TNT or Amatol
- NEQ = 25kg (55lb)
- Fuze = Impact Fuzing

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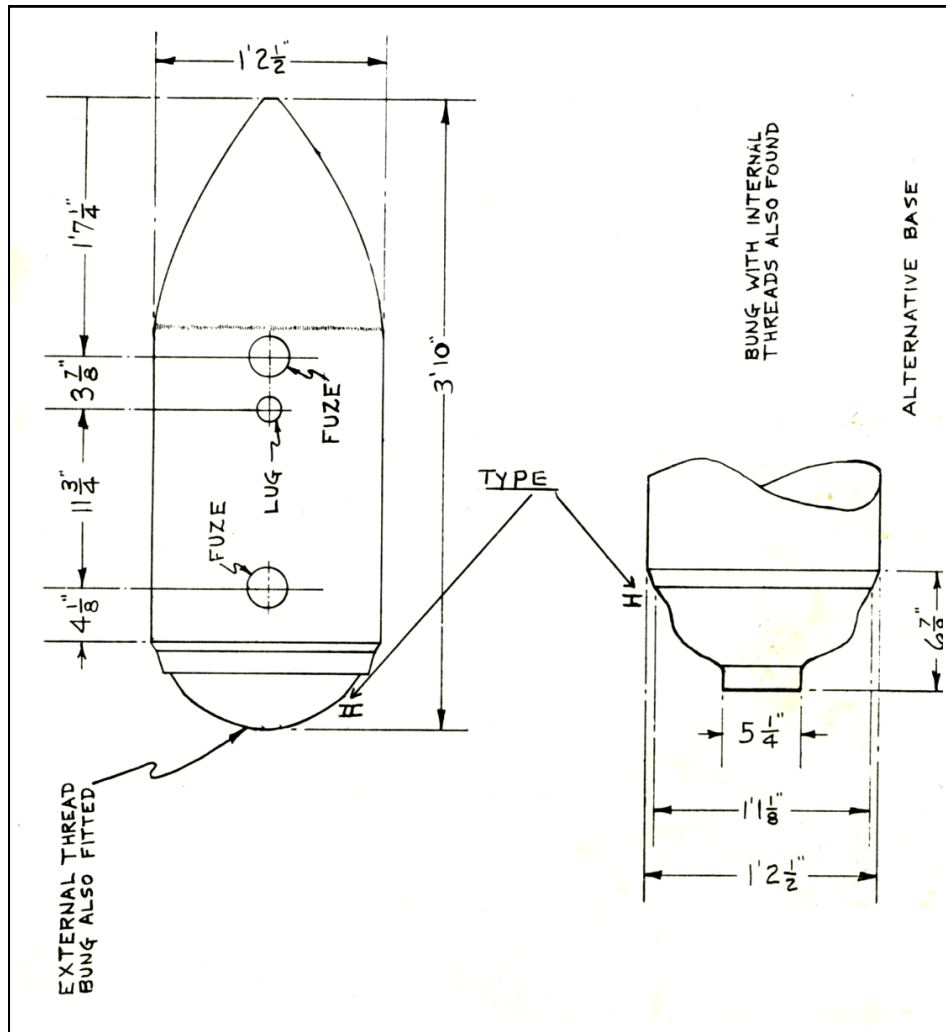
Appendix 009: Examples of WWII German Bombs



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SC250 Data

Bomb Body Weight = 245-256kg

Body Length = 5' 1" to 5' 5"

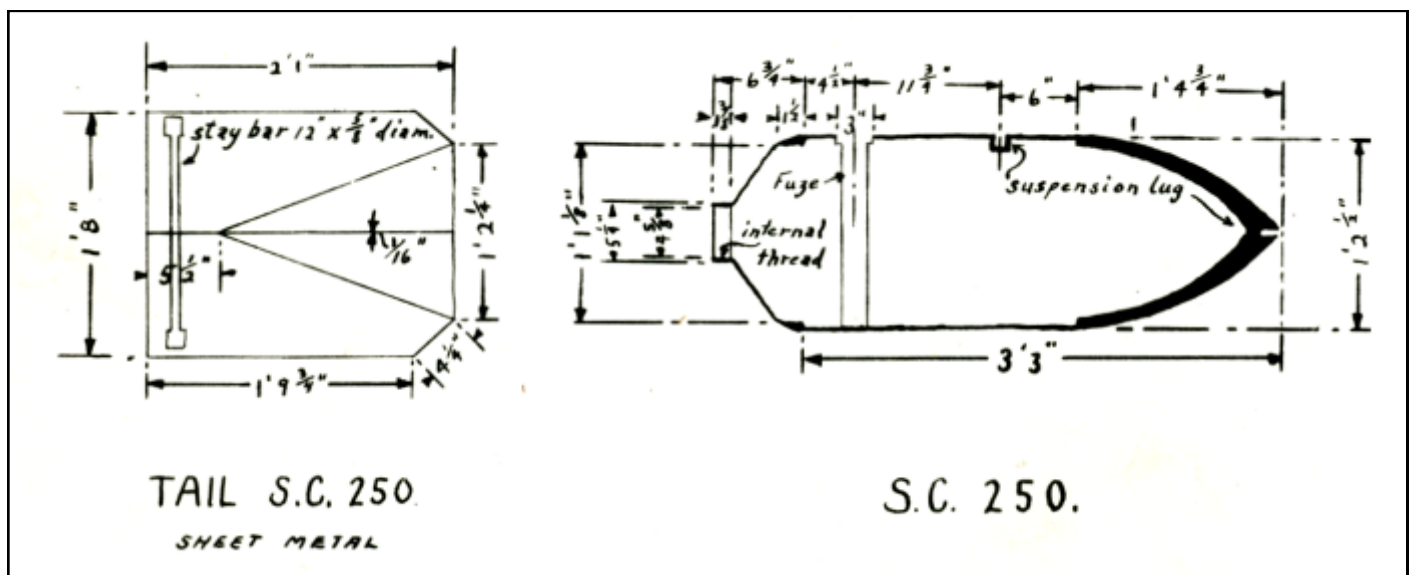
Body Diameter = 368mm (14.5")

Explosive = TNT or Amatol

NEQ = 125-130kg (276-287lb)

Fuze = Any (Commonly Type 7 Time Fuze)

250kg SC High Explosive Bomb Schematics



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Appendix 009: Examples of WWII German Bombs

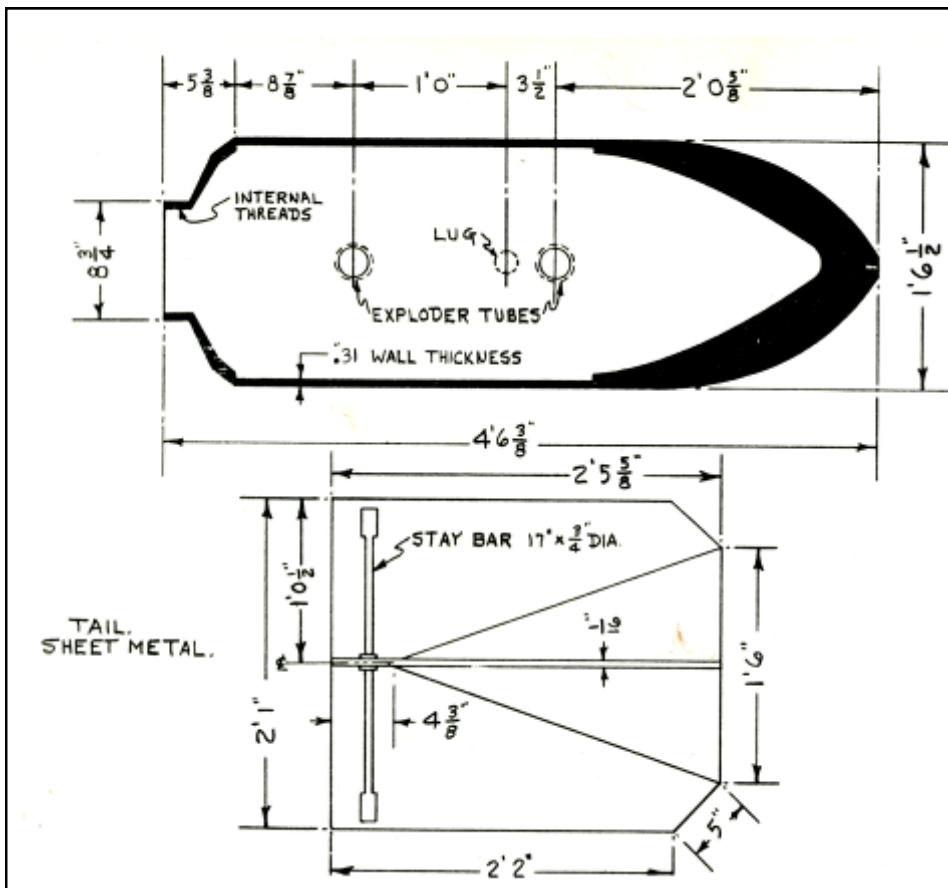
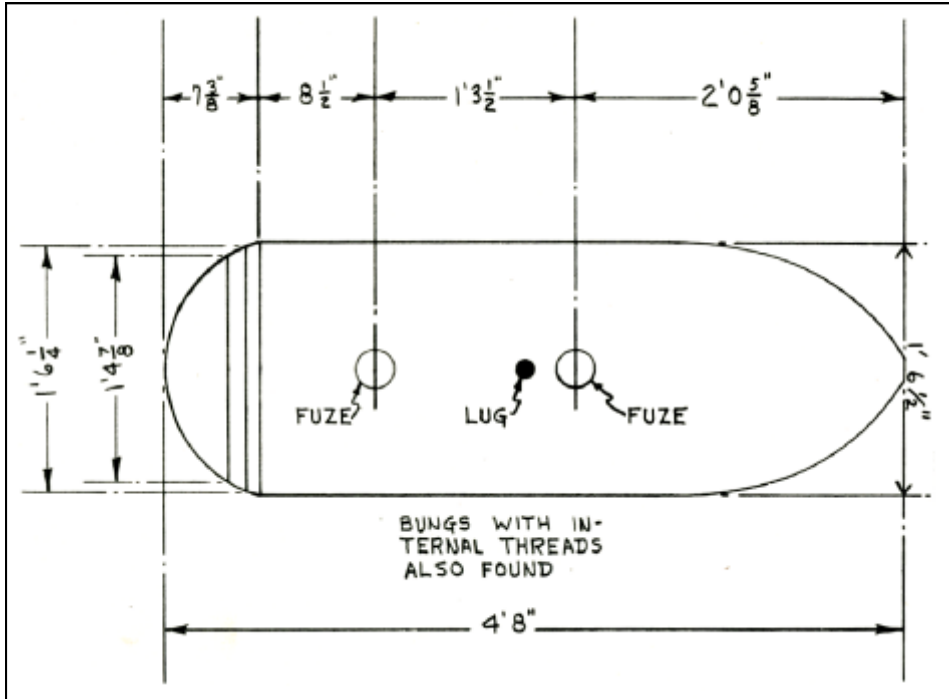


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500kg SC High Explosive Bomb Schematics



SC500 Data

Bomb Body Weight = 480-520kg

Body Length = 4' 6" to 5' 0"

Body Diameter = 470mm (18.5")

Explosive = TNT or Amatol

NEQ = 125-130kg (276-287lb)

Fuze = Electrical Impact Fuzing

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Appendix 009: Examples of WWII German Bombs



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Appendix 010

Examples of German Bomblets

German Bomblets & Containers

In addition to the larger individually deployed bombs, smaller HE bombs or “Bomblets” were also deployed by the Luftwaffe. The small bomblets were generally between 1-3kg or 10kg in weight and dropped in larger container bombs and most of these of these had simple impact fuzes. Many containers’ were shaped in a bomb form, with the aim of fitting into the existing bomb racks. If operating properly, they were designed to eject their cargo at predetermined height above ground level thereby spreading the bomblets over a wide area.

Some bomblets are considered the forerunners of cluster munitions which are very sensitive and considered more prone to initiate. These were used against civilians and can be considered an area denial weapon.

These weapons have been encountered in infill or rubble in larger cities and in other re-deposited contexts. They possess limited ground penetration (approximately 1-3m in a medium deposit) similar to the smaller Incendiary Bomblets discussed below. However, the small bomblets may be considered to have a greater potential to cause casualties than general incendiary bomblets based upon their fuze and explosive makeup.

German Incendiary Bomblets

In early stages of the war, the incendiary bombs dropped over the UK were of the "Oil Bomb" variation, where a flammable liquid was used with an explosive charge. The idea was to cause some blast damage with the explosive, but mainly to spray the burning liquid over a wide area and cause widespread fires. This bomb weighs approximately 50kg. The body diameter is 8 inches, and the over-all length 43.2 inches. The filling is 15 litres of a mixture of 86 per cent benzene, 10 per cent rubber, and 4 per cent phosphorus. It has a bursting charge of picric acid.

By 1942, Oil Bombs had been superseded by a smaller and more intensely burning incendiary bomblet made of magnesium. These weighed only 1kg, so could be dropped in containers carrying hundreds of individual bomblets. Some were coupled with a small High Explosive charge that went off when the magnesium was alight to spread the fire over a wider area. A corroded 1kg incendiary bomb can closely resemble a short section of scaffold tube.

- **1kg Incendiary Bomb** - The diameter is 2 inches, and over-all length 13.6 inches. The filling is 0.44lb of thermite.
- **2kg Incendiary Bomb** - The filling includes TNT or amatol in addition to thermite. The diameter is 2 inches, and the overall length is 20.7 inches.

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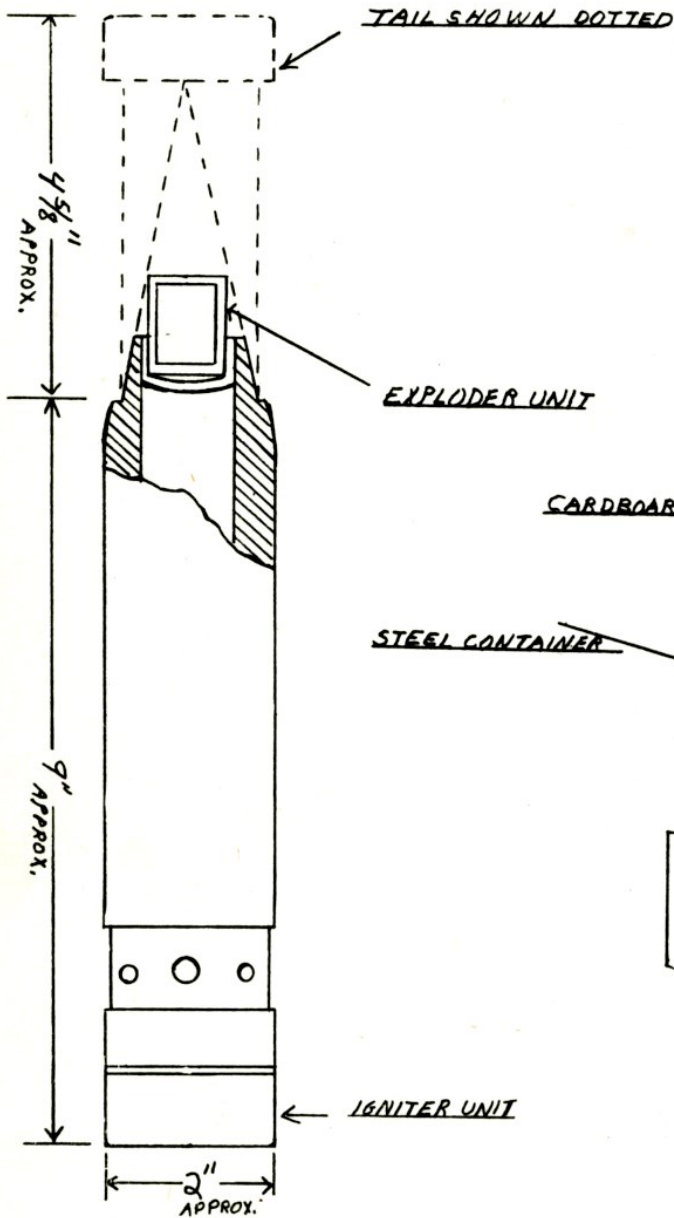
Appendix 010: Examples of WWII German Bomblets



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B-1 & B-1.3 E Data

Bomb Body Weight = 1kg

Construction = Electron casing with steel nosecap

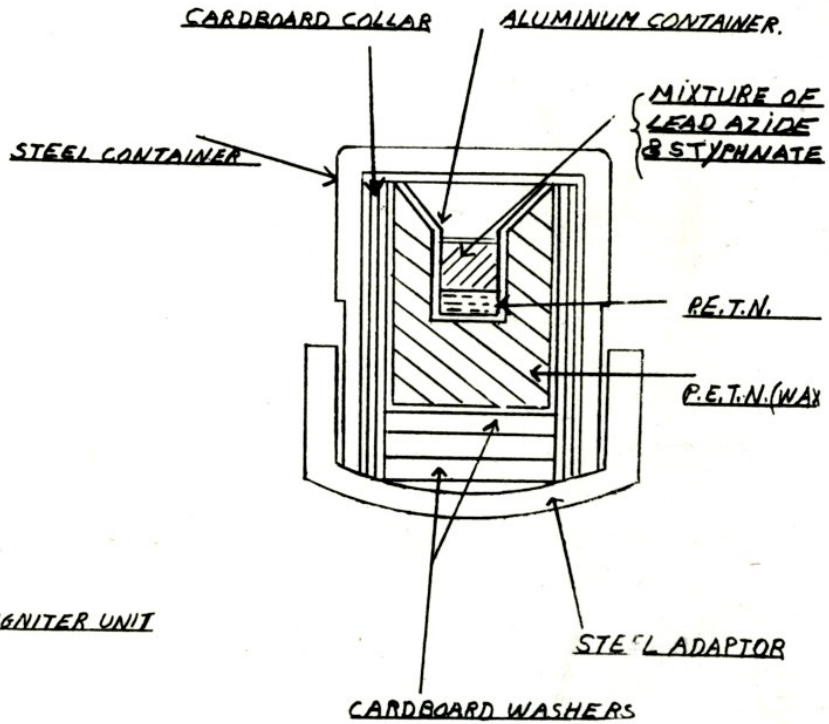
Length = 350mm

Body Diameter = 50mm (1.97")

Explosive = None

Fill = 680g (1.3lb) Thermit

Fuze = Impact



B-1 1kg Incendiary Bomblet



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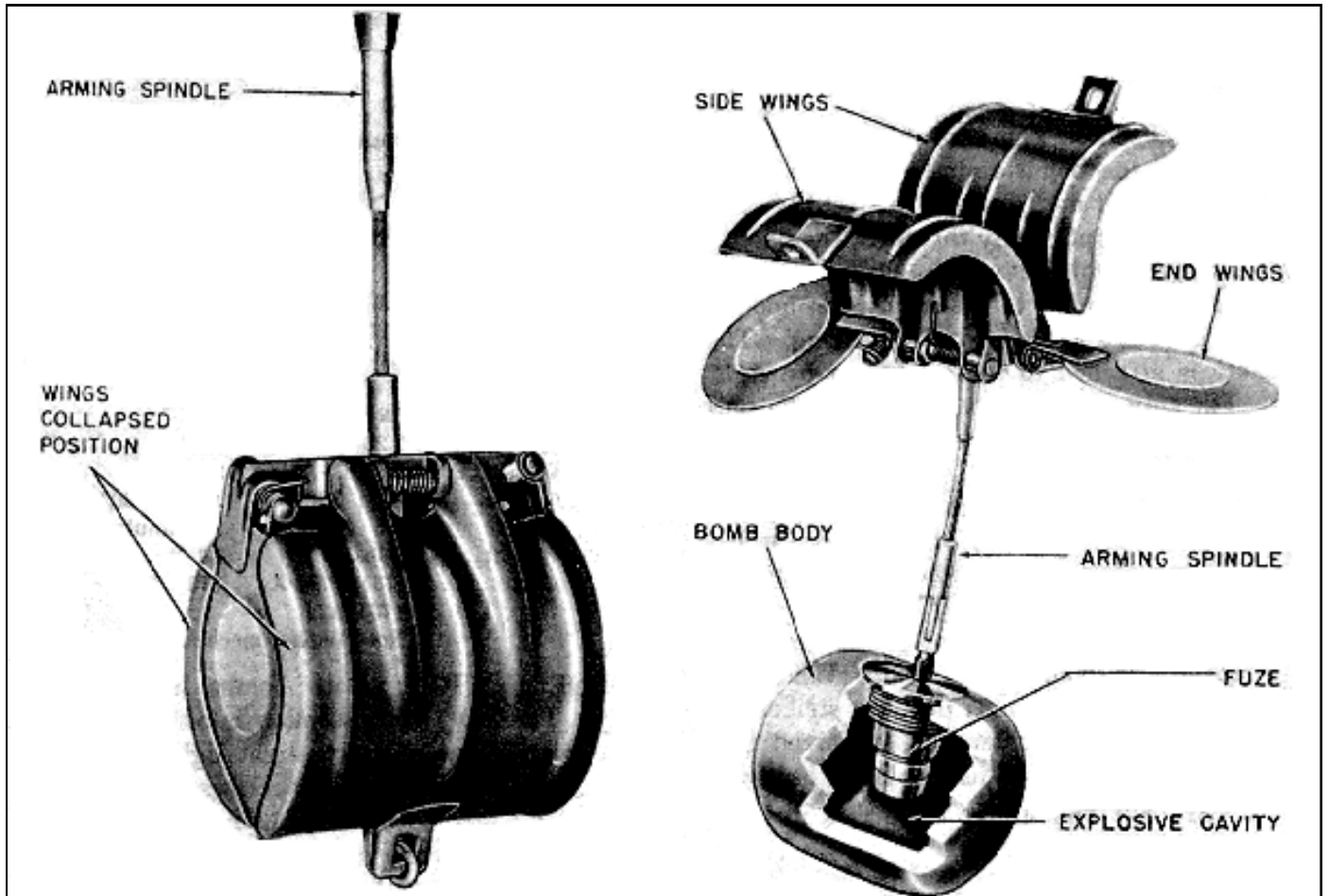
Appendix 010: Examples of WWII German Bomblets



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Butterfly Bomblet (SD2) Anti Personnel Device



SD-2 Data

Bomb Body Weight = 2kg

Length = 200mm (Including Arming Spindle)

Body Diameter = 80mm

Explosive = Fp 60/40

NEQ = 0.225kg (0.496lb)

Fuze = Mechanical Clockwork / Mechanical Time or B1/B2 Harassment

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Appendix 010: Examples of WWII German Bomblets



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Appendix 011

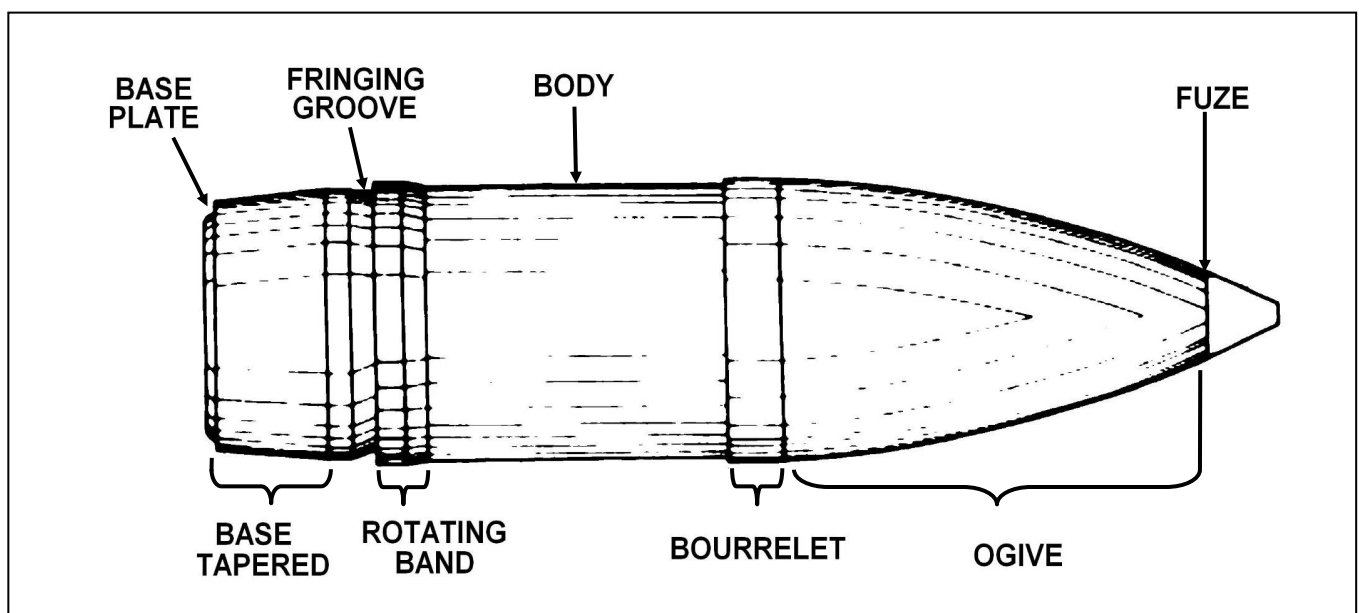
Examples of AAA

Anti Aircraft Artillery Projectiles

During WWII, the munitions commonly used by the British AAA were the 4.5" and 3.7" varieties. An artillery munition generally consists of four main sections:

- **Fuze** – The part of the device which initiates the detonation of the payload. Usually artillery munitions have nose fuzes, although some do have base fuzes. When used with HE shells, 'airburst' fuzes usually have a combined airburst and impact function.
- **Projectile** – This is the part of the munition that generally contains the main payload, and will be ejected from the main munition during firing. Artillery shell projectiles can range between bursting, base ejection or nose ejection.
- **Propellant** – Propellant in artillery munitions is always low explosive.
- **Primer** – The primers purpose is to initiate the propellant upon firing.

In most cases, the part of the munition that is likely to remain as UXO, as a result of malfunction during firing, is the Projectile (potentially with fuze), as this is the part of the device that is fired through the air.



TYPICAL PROJECTILE COMPONENTS

"Z" Batteries, often manned by Home Guard units fired Rockets as part of the integrated aerial defences. These 'projectiles' were essentially fin stabilised rockets which contained a small propellant charge to ignite the rocket motor. Throughout WWII two variations of the rocket were utilised, the first being a 2" rocket which was later replaced by a 3" rocket after being discovered that it was far more effective.

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Appendix 011: Examples of WWII Anti-Aircraft Artillery



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3.7" Anti Aircraft Artillery Projectile



NOTE: Item is a training item and does not necessarily depict the correct identification colouration and/or markings

40mm Anti Aircraft Artillery Round

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Appendix 011: Examples of WWII Anti-Aircraft Artillery



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Appendix 012

Examples of British LSA



3 Inch HE Mortar



4.2 Inch Mortar



3 Inch HE Mortar s



2 Inch Mortars

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Appendix 012: Examples of WWII Land Service Ammunition



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N° 22 'Pippin' Grenade



L107A1 Distraction Grenade



N° 94 'Energa' Grenade



N° 36 'Mills' Grenade



N° 68 A/T Grenades

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Appendix 012: Examples of WWII Land Service Ammunition



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2.5 Inch Rocket



3 Inch Rocket



3.5 Inch Rocket



60lb Rocket

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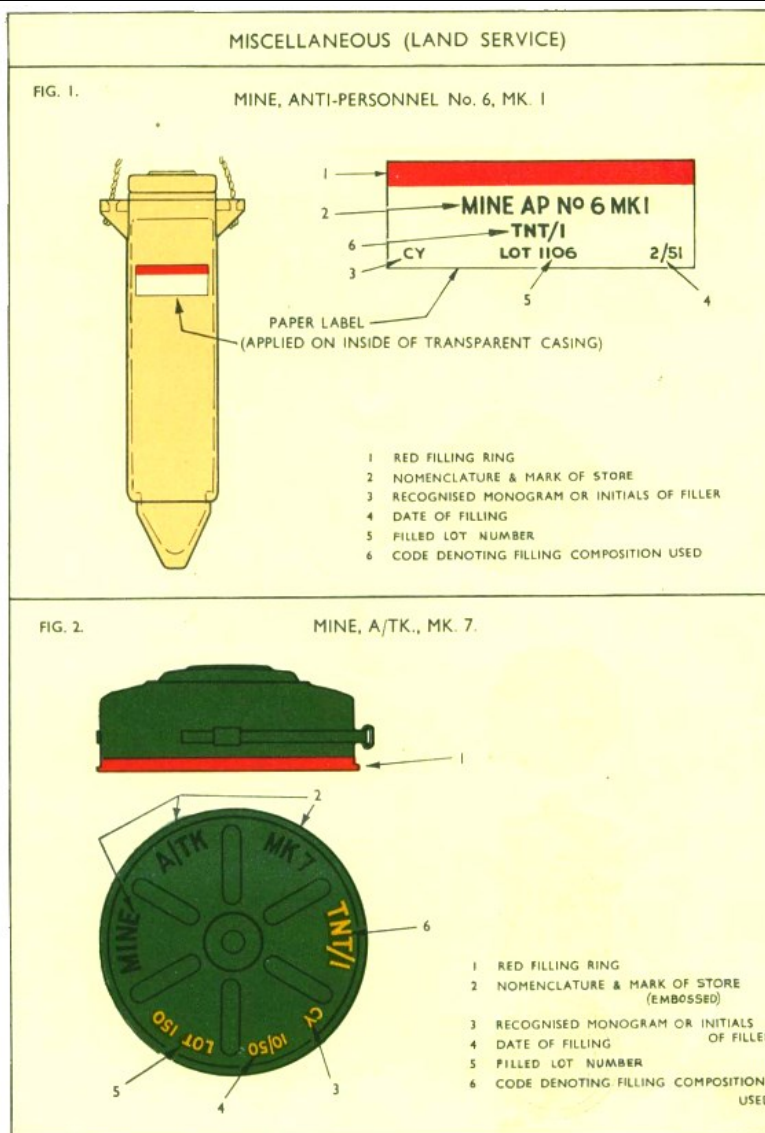
Appendix 012: Examples of WWII Land Service Ammunition



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Examples of Landmines



British Mk 4 A/T Landmine

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Appendix 012: Examples of WWII Land Service Ammunition



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Examples of Projectiles

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Appendix 012: Examples of WWII Land Service Ammunition



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Appendix 013

Background to Bomb Penetration Depth

Background on Bomb Penetration Depths

There are a number of reasons/factors applicable to bomb penetration depths, which can lead to variations in the bomb penetration depths for aerial delivered ordnance, as follows:

- **Shape & Weight of Ordnance** – variations in the design of the delivered ordnance has a large impact on the depths to which it is able to penetrate. Generally speaking, the heavier the ordnance, the deeper the penetration, and when constructed in a streamlined shape this can also lead to an increased penetration depth.
- **Geological Strata** – variations in the composition, thickness and homogeneity of the geological strata can lead to significant variations in penetration depths.
- **Height of delivery** – the altitude at which the ordnance was released can lead to variations in the final penetration depth. For example, in low level attacks, or where a fleeing aircraft has had to ditch its payload, it is likely for penetration to have been much less due to any ordnance having not reached its terminal velocity and appropriate penetration angle (for maximum depth burial).
- **Deflection** – should an item of ordnance impacted onto an obstruction/structure prior to penetration into the ground, it may have deflected and as such behaved anomalously upon penetration, and thus the final resting position may potentially be atypical to what is normally expected.

The following table provides a guide on average & probable maximum penetration depths of bombs in geological conditions that are typical in most areas of the United Kingdom. This is based on a survey & calculations undertaken by the Ministry of National Security in October 1949.

The following table is based on sums conducted by the Ministry on a data set from 1,304 bombs dealt with between January 1st to May 14th, 1941 (along with 24 bombs experimentally dropped on chalk). Only incidents with a definitive soil type, without structures on the surface, were used.

Weight of Bomb Kg	Sandstone		Sand		Gravel (Mixed)		Chalk (Soft)		Clay (Wet)		Average Penetration	Average Probable Maximum Penetration
	Average Penetration	Probable Maximum	Average Penetration	Probable Maximum	Average Penetration	Probable Maximum	Average Penetration	Probable Maximum	Average Penetration	Probable Maximum		
	m	m	m	m	m	m	m	m	m	m		
50	2.7	6.1	2.8	7.8	2.8	7.8	3.5	7.6	4.0	9.1	3.2	7.7
250	4.6	10.4	4.8	13.7	4.8	13.7	6.0	13.1	6.9	15.8	6.9	13.4
500	5.8	13.1	6.0	17.4	6.0	17.4	7.6	16.5	8.7	19.8	8.7	16.8
1000	7.3	16.5	7.6	21.9	7.6	21.9	9.6	20.7	11.0	25.0	11.0	21.2
1400	8.2	18.3	8.5	24.4	8.5	24.4	10.7	23.2	12.3	27.7	12.3	23.6
1800	9.0	20.3	9.4	27.0	9.4	27.0	11.8	25.5	13.5	30.5	13.5	26.0

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Appendix 012: Bomb Penetration



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UXB 'Offset'

A typical high altitude release bomb will enter the ground at between 10° and 15° (to the vertical), and will travel on this trajectory until momentum is nearly lost. The bomb will then turn abruptly to the horizontal before coming to rest. The distance between the centre of the entry hole and the centre of the bomb at the rest is known as the 'offset'. A marked lateral movement from the original line of entry is not uncommon.

The average offset is one third of the penetration depth, i.e. an offset of some 2.0m may be expected for a 50kg bomb in clay.

Hard standing on the impact zone can result in an offset increasing by some four times. It should be noted that bombs striking buildings might be deflected to give wider variation in the impacted area.

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Appendix 012: Bomb Penetration

Appendix 014

UXO Detonation Characteristics

UXO Detonations

The major effects of partial or full detonation of a device are shock, blast, heat and shrapnel damage. It should be noted that the detonation of a 50kg buried bomb would damage brick or concrete structures up to 16m away and unprotected personnel on the surface up to 70m away. Larger ordnance is obviously more destructive, with an accepted safety distance for a 500kg HE device being 1km.

Once initiated, the effects of the detonation of explosive ordnance such as shells or bombs are usually extremely fast, often catastrophic and invariably traumatic to the personnel involved. The degradation of a shell or bomb may also offer a source of explosive contamination into the underlying soils. Although this contamination may still present an explosion hazard, it is not generally recognised that explosives offer a significant toxicological risk at concentrations well below that at which a detonation risk exists.

Unexploded ordnance does not spontaneously explode in the conditions experienced in the UK. UXBs have lain un-disturbed for some 60 years and should not detonate unless they are significantly disturbed. All HE requires significant energy to create the conditions for detonation to occur. Intense impacts in intrusive engineering such as drilling / piling and mechanical excavations could initiate a detonation. There are a number of scenarios that may occur on sites which may potentially lead to the detonation of an encountered item of UXO, as follows:

- **Direct on the main body of the UXO** – needs to be significant impact e.g. In the case of piling or large scale excavations.
- **Re starting clock timer in a fuze** – contact or vibration applied to a clock timer, in certain situations, may cause it to reinitiate. However, in the case of WWII (and pre-WWII) ordnance it is likely that such devices would be corroded and no longer able to function.
- **Initiating Fuze Explosive** – environmental factors, such as introduction of temperature fluctuations and water, can lead to degradation of explosives within items of UXO, which may then exude from the main body of the device and crystallise. Certain resultant compounds from such processes can be very sensitive and volatile, and through application of a small amount of movement / energy through either vibration or impact may result in detonation of the main charge.

Apart from the explosives risk, the main concerns from UXBs are threefold, these are:

- Heavy metal (Copper, Zinc etc) contamination from the bomb's casing.
- Organic aromatics (Toluene, Nitrosamines, daughter products etc) contamination from the degradation of the explosive charge.
- Heavy metal (Lead, Mercury) contamination from the degradation of the detonator charge.

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Appendix 013: UXO Detonation Characteristics

Appendix 015

Risk Assessment Matrix

CONSEQUENCE LEVEL	POTENTIAL CONSEQUENCES OF DETONATION				
	People	Environment	Assets		Reputation
			Plant and Equipment	Structures	
1	First aid injury	Minor disturbance.	No noticeable effect	No noticeable effect	No significant impact
2	Lost time injury < 3 days	Significant disturbance.	Slight superficial damage	Slight superficial damage	Slight Impact
3	Serious debilitating injury	Moderate damage to habitats.	Minor component replacement repair	Repairs - non-structural	Moderate Impact
4	Localised fatalities	Moderate damage of habitats. Some long term effects.	Significant component replacement repair	Repairs - structural	Major Impact
5	Multiple fatalities over extended area	Localised destruction of habitats. Moderate long-term effects.	Unit loss, un-repairable damage	Localised structural failure and collapse	Massive Impact

PROBABILITY OF ENCOUNTER		CONSEQUENCE LEVEL				
		1	2	3	4	5
1	Improbable <i>(Vey Low: Not likely to encounter)</i>	1	2	3	4	5
2	Remote <i>(Low: Slight chance of encounter)</i>	2	4	6	8	10
3	Probable <i>(Moderate: likely to encounter)</i>	3	6	9	12	15
4	Highly Probable <i>(High: highly likely to encounter)</i>	4	8	12	16	20
5	Almost Certain <i>(Very High: almost certain to encounter)</i>	5	10	15	20	25

Risk Level Key:

1 to 2	Negligible	3 to 6	Low	8 to 12	Moderate	15 to 25	High
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Appendix 015: Risk Assessment Matrices

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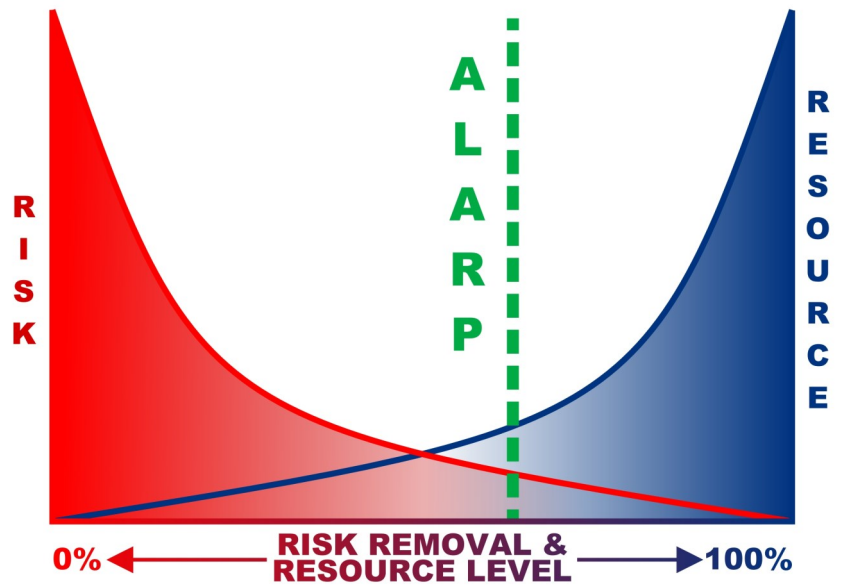
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Appendix 016

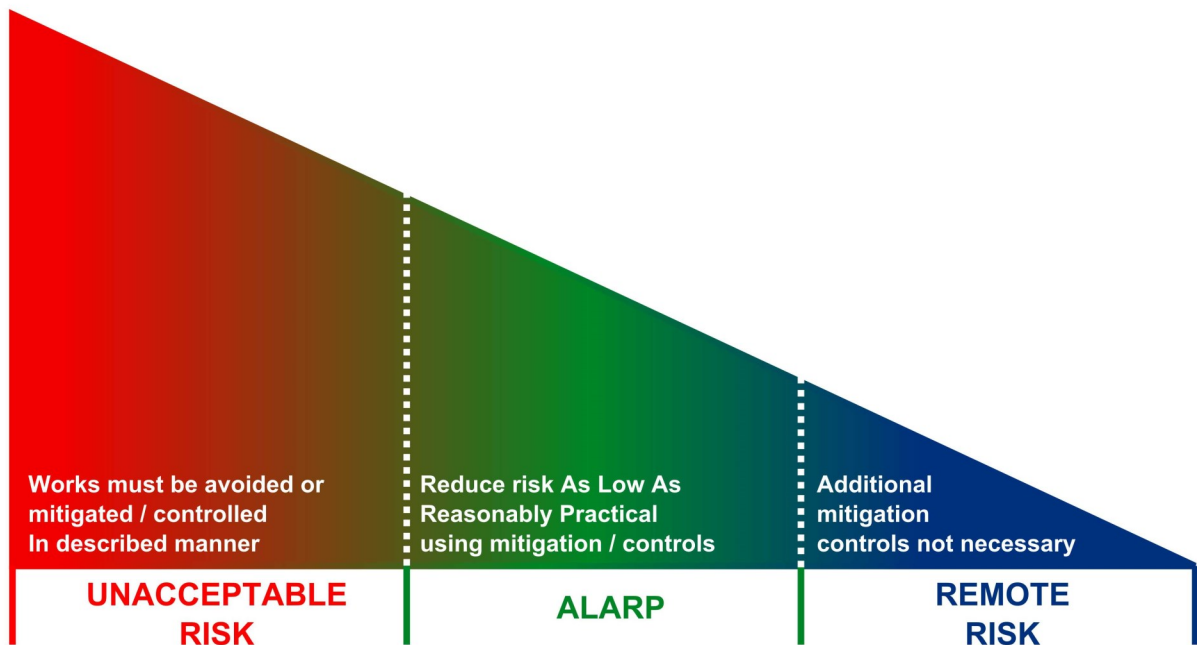
'ALARP' Principle

'ALARP PRINCIPLE'

ALARP has particular connotations in UK Health and Safety law and the core concept of what is "reasonably practicable". This involves weighing a risk against the effort, time and costs needed to control it. For a risk to be reduced in line with ALARP it must be possible to demonstrate that the cost involved in reducing the risk further would be "grossly disproportionate" to the benefit gained. The ALARP principle arises from the fact that it would be possible to spend infinite time, effort and money attempting to reduce a risk to zero. Importantly, it is not simply a quantitative measure of benefit against detriment but a common practice of "judgment" of the balance of risk and social benefit.



ALARP Resource Graph



ALARP Diagram Approach

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Project Ref: EES1428

Appendix 014: 'ALARP' Principle



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Appendix 017

Mitigation Recommendations

RPS Explosives Safety & Awareness Briefings / Site Safety Guidelines

It is recommended that all personnel conducting intrusive works, in any part of the site, should attend an **RPS Explosives Safety & Awareness Briefing**. This should comprise part of the standard site induction briefing and would form a component of the Health and Safety Plan for the site adhering to the requirements of CDM regulations 2015. All personnel working on site would be briefed on UXO recognition and made aware of the possible risks. They would be informed of the actions to take to alert the site manager and to keep people and equipment away from the hazard.

RPS feels it may be cost effective and prudent to produce a set of ***RPS Explosives Site Safety Guidelines (ESSG)***, which would be provided to the client along with training. The guidelines are designed to aid the Project Team to plan the proposed works and potentially deal with the event of a suspicious item / UXO discovery incident. The guidelines would also enable the client to incorporate the Explosives Safety & Awareness Briefings into their standard site inductions.

The guidelines would address the risk to all of the specific proposed works and will inform all personnel how to undertake the works safely, and will refer to the specific risk items/hazards that have been identified for the site.

The guidelines would typically be provided to the client in the form of a 'Guidelines Document' along with a supporting PowerPoint slideshow.

However, it should be noted that if a significant/elevated risk is subsequently identified then a fully qualified Explosives Engineer should manage the situation on behalf of the client.

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Project Ref: EES1428



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Appendix 016: Mitigation Recommendation Details

Annex E: PRA Methodology and General Notes

PRA METHODOLOGY

INTRODUCTION

This report provides available factual data for the site obtained only from the sources described below and related to the site on the basis of the location provided by the client. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.

This report is written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission. The report is provided for sole use by the client and is confidential to them and their professional advisors. No reliance whatsoever is provided to any party other than the client unless otherwise agreed.

INFORMATION SOURCES

Current and Historical Land Use

This section establishes the former and current uses of the site, which could have caused contamination. Details of the site location, the current and proposed site uses have been provided by the client.

Information about the history of the site has been obtained through an inspection of historical maps at 1:10,000, 1:2,500 and 1:1,250 scales and historical aerial photographs (where available). The accuracy of maps cannot be guaranteed, and it should be recognised that different conditions on-site may have existed between, and subsequent to, the map survey dates.

Regulatory Records

Regulatory records including landfills, pollution incidents ('major' and 'significant' only), industry authorisations and licensed water abstractions are derived from information purchased from Groundsure Ltd (unless otherwise specified).

Environmental Setting

The geological sequence underlying the site and the approximate depths of strata are provided by maps published by the British Geological Survey (BGS) 1:50,000 scale and available borehole records held by the BGS.

The hydrogeological classification is obtained from Groundwater Vulnerability mapping by the BGS/EA/National Resources Wales (NRW). The vulnerability of groundwater is determined from this mapping and geological information.

The location of surface watercourses is obtained from an inspection of current OS maps. Flood risk details and information on groundwater Source Protection Zones are obtained from readily available EA/NRW information published on-line and supplied by Groundsure Ltd.

Details of sensitive ecosystems/habitats and coal mining areas are supplied by Natural England, Natural Resources Wales and Scottish Natural Heritage and the Coal Authority respectively via Groundsure Ltd and inspection of the MAGIC website.

Radon is a radioactive gas produced naturally by certain types of geology. This report uses the Indicative Atlas of Radon in England and Wales (2007) produced by the Health Protection Agency (HPA) and the British Geological Survey (BGS) to determine whether the site is located in an area at risk from radon gas. Where potential issues are identified, a site-specific radon report is obtained from the HPA and BGS to provide a more accurate estimate of the probability of the site being affected by radon gas ingress.

General Notes

RPS Consulting Services Ltd

Phase 1 - Environmental Risk Assessment / Desk Study Environmental Review

1. A "desk study" means that no site visits have been carried out as any part thereof, unless otherwise specified.
1. This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the Client.
2. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources.
3. The accuracy of maps cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.
4. No sampling or analysis has been undertaken in relation to this desk study.
5. Any borehole data from British Geological Survey sources is included on the basis that: "The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation".
6. Where any data supplied by the Client or from other sources, including that from previous site investigations, have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.
7. This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission.
8. The copyright in the written materials shall remain the property of the RPS Company but with a royalty-free perpetual licence to the Client deemed to be granted on payment in full to the RPS Company by the Client of the outstanding amounts.
9. The report is provided for sole use by the Client and is confidential to them, their professional advisors, no responsibility whatsoever for the contents of the report will be accepted to any person other than the Client. [Unless otherwise agreed]
10. These terms apply in addition to the RPS "Standard Terms & Conditions" (or in addition to another written contract which may be in place instead thereof) unless specifically agreed in writing. (In the event of a conflict between these terms and the said Standard Terms & Conditions the said Standard Terms & Conditions shall prevail.) In the absence of such a written contract the Standard Terms & Conditions will apply.