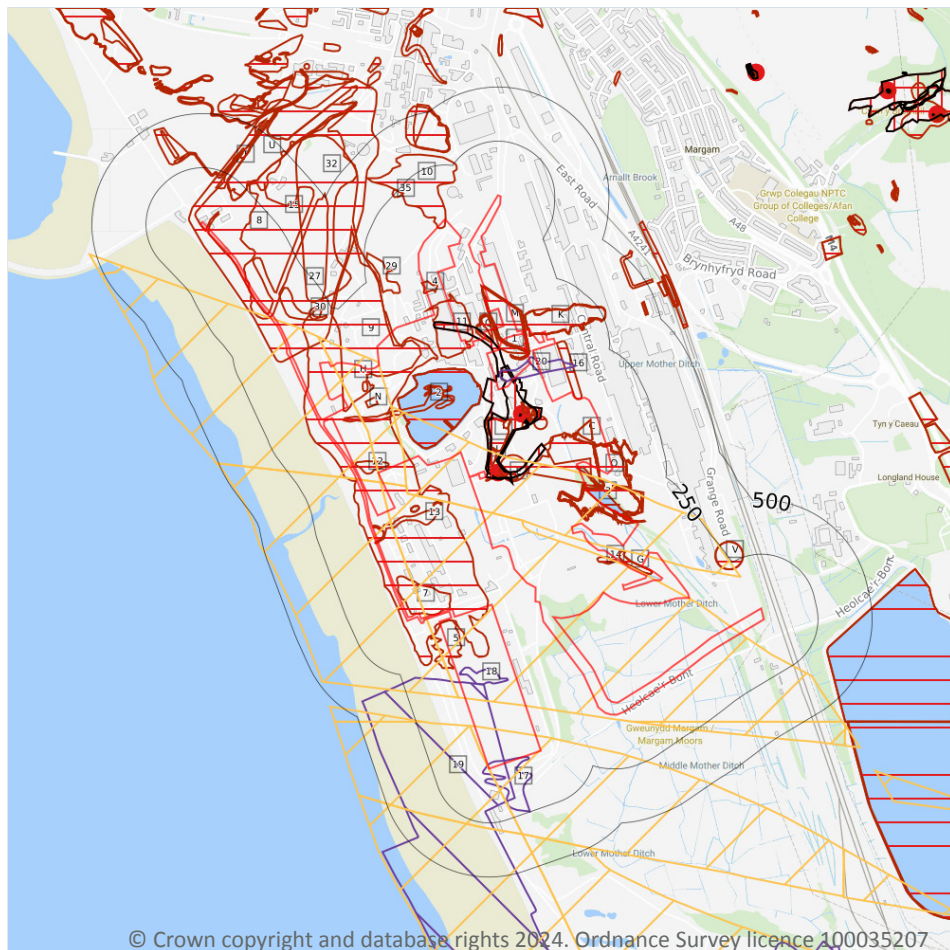


18 Mining and ground workings



- Site Outline
- Search buffers in metres (m)
- BritPits
- ▭ Surface ground workings
- ▭ Underground workings
- ▭ Underground mining extents
- ▭ Historical mineral planning areas
- ▭ TCA non-coal mining
- Non Coal Mining
- ▭ Sporadic underground mining of restricted extent possible
- ▭ Localised small scale underground mining possible
- ▭ Small scale mining possible
- ▭ Underground mining known or likely within or in close proximity
- ▭ Underground mining known within or in very close proximity

18.1 BritPits

Records within 500m

2

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

Features are displayed on the Mining and ground workings map on [page 233](#) >



ID	Location	Details	Description
A	On site	Name: Morfa Colliery Address: Margam, PORT TALBOT, West Glamorgan Commodity: Coal, Deep Status: Ceased	Type: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots) Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
B	On site	Name: Morfa Colliery Address: Margam, PORT TALBOT, West Glamorgan Commodity: Coal, Deep Status: Ceased	Type: Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots) Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.2 Surface ground workings

Records within 250m	82
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Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining and ground workings map on [page 233](#) >

ID	Location	Land Use	Year of mapping	Mapping scale
1	On site	Unspecified Ground Workings	1949	1:10560
2	On site	Unspecified Ground Workings	1914	1:10560
3	On site	Pond	1979	1:10000
4	On site	Pond	1965	1:10560
5	On site	Ponds	1965	1:10560
6	On site	Ponds	1965	1:10560
7	On site	Water Body	1965	1:10560
8	On site	Refuse Heap	1979	1:10000
9	On site	Refuse Heap	1979	1:10000
10	On site	Refuse Heap	1965	1:10560



ID	Location	Land Use	Year of mapping	Mapping scale
11	On site	Refuse Heap	1965	1:10560
12	On site	Unspecified Heap	1914	1:10560
13	On site	Unspecified Heap	1914	1:10560
14	On site	Pond	1991	1:10000
15	On site	Unspecified Disused Workings	1991	1:10000
16	On site	Unspecified Heap	1991	1:10000
A	On site	Unspecified Ground Workings	1914	1:10560
B	On site	Unspecified Ground Workings	1949	1:10560
B	On site	Pond	1876	1:10560
B	On site	Unspecified Pit	1914	1:10560
B	On site	Unspecified Pit	1900	1:10560
B	On site	Unspecified Pit	1921	1:10560
B	On site	Unspecified Heap	1876	1:10560
B	On site	Refuse Heap	1876	1:10560
B	On site	Unspecified Pit	1876	1:10560
C	On site	Unspecified Pit	1949	1:10560
C	On site	Unspecified Pit	1914	1:10560
D	On site	Unspecified Ground Workings	1914	1:10560
D	On site	Unspecified Ground Workings	1921	1:10560
E	On site	Unspecified Pit	1914	1:10560
E	On site	Unspecified Pit	1900	1:10560
E	On site	Unspecified Pit	1921	1:10560
F	On site	Reservoir	1979	1:10000
F	On site	Water Body	1965	1:10560
F	On site	Reservoir	1991	1:10000
G	On site	Unspecified Heap	1979	1:10000
G	On site	Unspecified Heap	1965	1:10560
G	On site	Unspecified Heap	1991	1:10000



ID	Location	Land Use	Year of mapping	Mapping scale
H	On site	Refuse Heap	1965	1:10560
H	On site	Unspecified Heap	1914	1:10560
I	On site	Unspecified Heap	1949	1:10560
I	On site	Unspecified Heap	1914	1:10560
I	On site	Unspecified Heap	1921	1:10560
J	On site	Unspecified Heap	1914	1:10560
J	On site	Unspecified Heap	1921	1:10560
K	On site	Water Body	1949	1:10560
K	On site	Water Body	1914	1:10560
K	On site	Water Body	1921	1:10560
K	On site	Water Body	1875	1:10560
K	On site	Water Body	1875	1:10560
L	On site	Water Body	1949	1:10560
L	On site	Water Body	1914	1:10560
L	On site	Water Body	1921	1:10560
L	On site	Water Body	1875	1:10560
L	On site	Water Body	1875	1:10560
M	On site	Pond	1914	1:10560
M	On site	Pond	1900	1:10560
M	On site	Pond	1921	1:10560
M	On site	Water Body	1875	1:10560
M	On site	Water Body	1875	1:10560
N	On site	Cuttings	1991	1:10000
O	On site	Pond	1900	1:10560
O	On site	Water Body	1876	1:10560
P	On site	Colliery	1900	1:10560
Q	On site	Refuse Heap	1938	1:10560
Q	On site	Refuse Heap	1921	1:10560



ID	Location	Land Use	Year of mapping	Mapping scale
R	On site	Colliery	1876	1:10560
R	On site	Unspecified Heap	1876	1:10560
27	56m NW	Refuse Heap	1979	1:10000
S	75m W	Unspecified Heap	1949	1:10560
S	75m W	Unspecified Heap	1914	1:10560
29	111m NW	Refuse Heap	1965	1:10560
30	144m NW	Refuse Heap	1938	1:10560
31	163m W	Unspecified Pit	1914	1:10560
T	171m NW	Refuse Heap	1965	1:10560
U	172m NW	Sludge Pond	1979	1:10000
32	175m NW	Refuse Heap	1938	1:10560
U	188m NW	Sludge Pond	1991	1:10000
V	193m E	Coal Dump	1979	1:10000
V	193m E	Coal Dump	1965	1:10560
33	217m NW	Unspecified Ground Workings	1949	1:10560
35	223m N	Unspecified Heap	1979	1:10000

This is data is sourced from Ordnance Survey/Groundsure.

18.3 Underground workings

Records within 1000m

3

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

Features are displayed on the Mining and ground workings map on [page 233 >](#)

ID	Location	Land Use	Year of mapping	Mapping scale
B	On site	Unspecified Shaft	1876	1:10560
P	On site	Colliery	1900	1:10560
R	On site	Colliery	1876	1:10560

This is data is sourced from Ordnance Survey/Groundsure.



18.4 Underground mining extents

Records within 500m**0**

This data identifies underground mine workings that could present a potential risk, including adits and seam workings. These features have been identified from BGS Geological mapping and mine plans sourced from the BGS and various collections and sources.

This data is sourced from Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m**4**

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

Features are displayed on the Mining and ground workings map on [page 233 >](#)

ID	Location	Site Name	Mineral	Type	Planning Status	Planning Status Date
17	On site	Morfa Mawr Beach	Not available	Not available	Not available	Not available
18	On site	Margam Moors	Not available	Not available	Not available	Not available
19	On site	Sker Sand Gravel	Not available	Not available	Not available	Not available
20	On site	Morfa Sand Siding	Not available	Not available	Not available	Not available

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m**14**

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

Features are displayed on the Mining and ground workings map on [page 233 >](#)



ID	Location	Name	Commodity	Class	Likelihood
21	On site	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
22	On site	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
23	On site	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
24	On site	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
25	On site	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
26	On site	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
N	On site	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
28	60m SE	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
34	219m S	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.



ID	Location	Name	Commodity	Class	Likelihood
36	271m S	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
37	336m S	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
38	405m NW	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
44	614m SE	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.
49	867m SE	Not available	Iron Ore (Bedded)	B	Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered.

This data is sourced from the British Geological Survey.

18.7 JPB mining areas

Records on site	0
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Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.8 The Coal Authority non-coal mining

Records within 500m	0
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This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. 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 prior to any re-use.

This data is sourced from The Coal Authority.

18.9 Researched mining

Records within 500m

0

This data indicates areas of potential mining identified from alternative or archival sources, including; BGS Geological paper maps, Lidar data, aerial photographs (from World War II onwards), archaeological data services, websites, Tithe maps, and various text/plans from collected books and reports. Some of this data is approximate and Groundsure have interpreted the resultant risk area and, where possible, specific areas of risk have been captured.

This data is sourced from Groundsure.

18.10 Mining record office plans

Records within 500m

0

This dataset is representative of Mining Record Office and/or plan extents held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.11 BGS mine plans

Records within 500m

0

This dataset is representative of BGS mine plans held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

This data is sourced from Groundsure.

18.12 Coal mining

Records on site

1

Areas which could be affected by past, current or future coal mining.

Location	Details
On site	The site is located within a coal mining area as defined by the Coal Authority. A Consultants Coal Mining Report is recommended to further assess coal mining issues at the site. This can be ordered directly through Groundsure or your preferred search provider.

This data is sourced from the Coal Authority.



18.13 Brine areas

Records on site	0
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The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.14 Gypsum areas

Records on site	0
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Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.15 Tin mining

Records on site	0
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Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

18.16 Clay mining

Records on site	0
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Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).



19 Ground cavities and sinkholes

19.1 Natural cavities

Records within 500m

0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

19.2 Mining cavities

Records within 1000m

0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

19.3 Reported recent incidents

Records within 500m

0

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

This data is sourced from Groundsure.

19.4 Historical incidents

Records within 500m

0

This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey mapping will necessarily be present within this dataset.



This data is sourced from Groundsure.

19.5 National karst database

Records within 500m

0

This is a comprehensive database of national karst information gathered from a wide range of sources. BGS have collected data on five main types of karst feature: Sinkholes, stream links, caves, springs, and incidences of associated damage to buildings, roads, bridges and other engineered works.

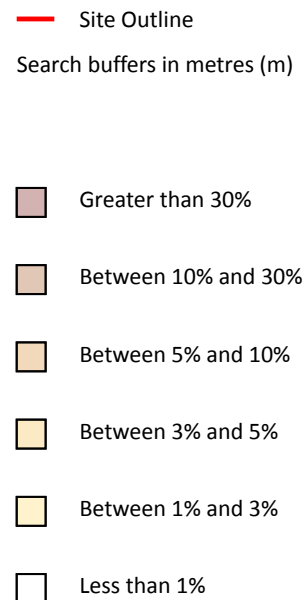
Since the database was set up in 2002 data covering most of the evaporite karst areas of the UK have now been added, along with data covering about 60% of the Chalk, and 35% of the Carboniferous Limestone outcrops. Many of the classic upland karst areas have yet to be included. Recorded so far are: Over 800 caves, 1300 stream sinks, 5600 springs, 10,000 sinkholes.

The database is not yet complete, and not all records have been verified. The absence of data does not mean that karst features are not present at a site. A reliability rating is included with each record.

This data is sourced from the British Geological Survey.



20 Radon



20.1 Radon

Records on site

1

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on [page 245](#) >

Location	Estimated properties affected	Radon Protection Measures required
On site	Less than 1%	None



This data is sourced from the British Geological Survey and UK Health Security Agency.



21 Soil chemistry

21.1 BGS Estimated Background Soil Chemistry

Records within 50m

88

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km². In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km²; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg



Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg



Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg



Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
On site	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
2m S	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg



Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
4m NW	35 - 45 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
4m SE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
6m SW	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
6m SW	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
7m SE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
14m SE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
15m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
16m SE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
22m SW	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
26m SE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
31m SW	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
32m E	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
34m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
35m SE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
35m SE	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
35m E	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
35m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
38m W	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg



Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
38m W	25 - 35 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
47m S	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
47m W	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg
48m N	15 - 25 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg

This data is sourced from the British Geological Survey.

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m

0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km²).

This data is sourced from the British Geological Survey.

21.3 BGS Measured Urban Soil Chemistry

Records within 50m

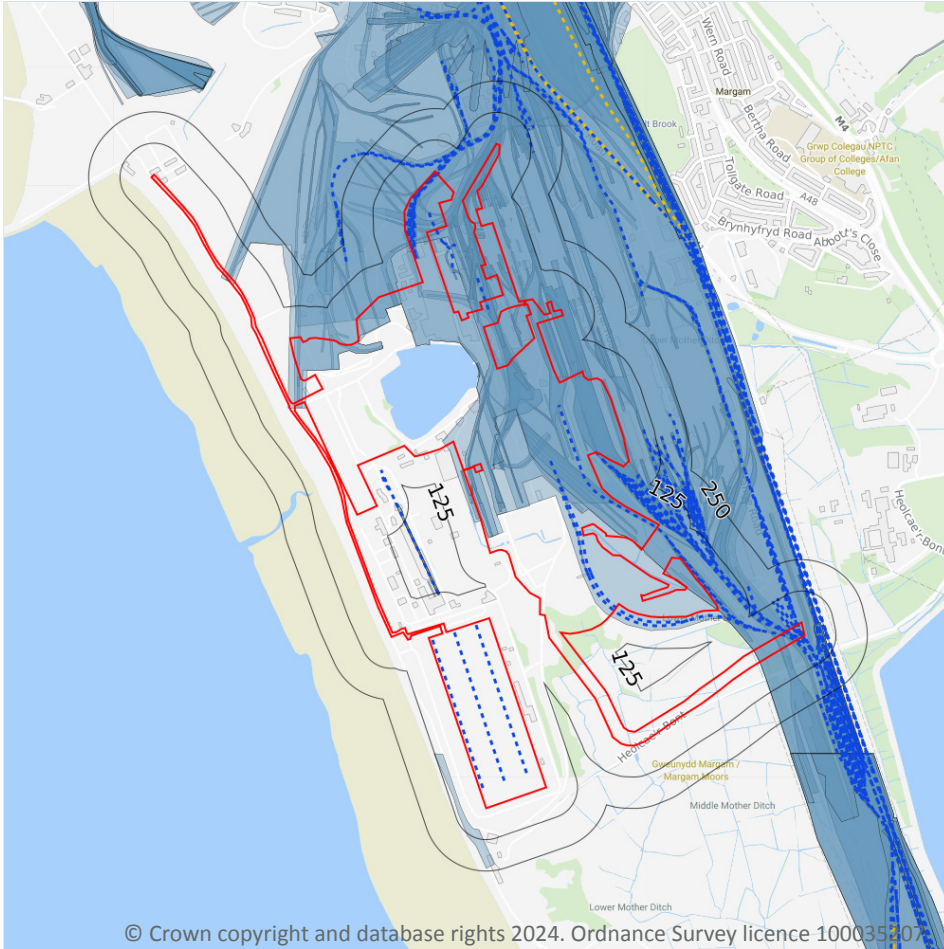
0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km².

This data is sourced from the British Geological Survey.



22 Railway infrastructure and projects



- Site Outline
- Search buffers in metres (m)
- C1 Crossrail 1 Stations
- Crossrail 1 Route
- C2 Crossrail 2 Stations
- Crossrail 2 Route
- Crossrail 2 Worksites
- Crossrail 2 Safeguarding
- Crossrail 2 Headhouses
- Railway stations
- Active railways
- Active tunnels
- Abandoned railways
- Historic railways
- Historic tunnels
- Underground stations
- Underground Lines
- Royal Mail tunnels
- HS2 optimised route
- HS2 Stations
- HS2 Depots
- HS2 Surface Safeguarding
- HS2 Subsurface Safeguarding

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22.1 Underground railways (London)

Records within 250m

0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

22.2 Underground railways (Non-London)

Records within 250m

0

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.



This data is sourced from publicly available information by Groundsure.

22.3 Railway tunnels

Records within 250m

0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

22.4 Historical railway and tunnel features

Records within 250m

177

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

Features are displayed on the Railway infrastructure and projects map on [page 253](#) >

Location	Land Use	Year of mapping	Mapping scale
On site	Railway Sidings	1995	1250
On site	Railway Sidings	1974	1250
On site	Railway Sidings	1983	1250
On site	Railway Sidings	1952	1250
On site	Railway Sidings	1962	1250
On site	Railway Sidings	1952	2500
On site	Railway Sidings	1963	2500
On site	Railway Sidings	1984	2500
On site	Railway Sidings	1980	2500
On site	Railway Sidings	1988	1250
On site	Railway Sidings	1990	2500
On site	Railway Sidings	1993	1250
On site	Railway Sidings	1995	2500
On site	Tramway Sidings	1878	2500
On site	Tramway Sidings	1899	2500
On site	Mineral Railway Sidings	1918	2500
On site	Railway Sidings	1900	10560



Location	Land Use	Year of mapping	Mapping scale
On site	Mineral Railway Sidings	1914	10560
On site	Mineral Railway Sidings	1921	10560
On site	Mineral Railway Sidings	1876	10560
On site	Mineral Railway Sidings	1938	10560
On site	Railway Sidings	1949	10560
On site	Railway Sidings	1875	10560
On site	Railway Sidings	1938	10560
On site	Railway Sidings	1991	10000
On site	Railway Sidings	1979	10000
On site	Railway Sidings	1965	10560
1m NW	Railway Sidings	1963	2500
3m NE	Railway Sidings	1974	1250
5m NE	Railway Sidings	1952	1250
5m SW	Railway Sidings	1984	2500
5m NW	Railway Sidings	1983	1250
7m N	Railway Sidings	1940	2500
7m N	Railway Sidings	1995	1250
8m NE	Railway Sidings	1974	1250
10m NW	Railway Sidings	1983	1250
10m N	Railway Sidings	1974	1250
10m N	Railway Sidings	1962	1250
10m E	Railway Sidings	1995	2500
16m N	Railway Sidings	1952	1250
17m N	Railway Sidings	1962	1250
30m N	Railway Sidings	1995	1250
31m NE	Railway Sidings	1962	1250
31m NE	Railway Sidings	1963	2500
31m N	Railway Sidings	1993	1250



Location	Land Use	Year of mapping	Mapping scale
32m N	Railway Sidings	1962	1250
35m NE	Railway Sidings	1993	1250
36m SE	Railway Sidings	1990	2500
36m NE	Railway Sidings	1974	1250
36m NE	Railway Sidings	1952	2500
36m NE	Railway Sidings	1952	1250
37m NE	Railway Sidings	1962	1250
37m NE	Railway Sidings	1974	1250
37m N	Railway Sidings	1995	1250
38m NE	Railway Sidings	1952	1250
39m E	Railway Sidings	1962	2500
40m E	Railway Sidings	1969	2500
40m E	Railway Sidings	1960	1250
40m E	Railway Sidings	1964	1250
40m E	Railway Sidings	1969	1250
41m SE	Railway Sidings	1947	10560
41m SE	Railway Sidings	1914	10560
41m SE	Railway Sidings	1897	10560
44m E	Railway Sidings	1991	1250
44m NE	Railway Sidings	1993	1250
45m E	Railway Sidings	1951	2500
46m E	Railway Sidings	1951	1250
46m N	Railway Sidings	1962	1250
47m NE	Railway Sidings	1974	1250
47m N	Railway Sidings	1962	1250
47m N	Railway Sidings	1974	1250
48m SE	Railway Sidings	1921	10560
50m N	Railway Sidings	1995	1250



Location	Land Use	Year of mapping	Mapping scale
51m SE	Railway Sidings	1995	2500
53m SE	Railway Sidings	1940	2500
55m N	Railway Sidings	1952	1250
57m E	Railway Sidings	1991	1250
59m SE	Railway Sidings	1899	2500
59m SE	Railway Sidings	1919	2500
67m N	Railway Sidings	1962	1250
69m N	Railway Sidings	1962	1250
69m N	Railway Sidings	1995	1250
70m N	Railway Sidings	1993	1250
71m N	Railway Sidings	1952	1250
71m N	Railway Sidings	1962	1250
72m N	Railway Sidings	1995	1250
72m N	Railway Sidings	1974	1250
73m W	Railway Sidings	1995	2500
74m N	Railway Sidings	1952	1250
75m NE	Railway Sidings	1962	2500
75m NE	Railway Sidings	1969	2500
76m NE	Railway Sidings	1951	2500
77m NE	Railway Sidings	1991	1250
78m NE	Railway Sidings	1960	1250
78m NE	Railway Sidings	1964	1250
78m NE	Railway Sidings	1969	1250
78m E	Railway Sidings	1951	1250
84m NE	Railway Sidings	1952	1250
85m NE	Railway Sidings	1974	1250
85m NE	Railway Sidings	1962	1250
85m E	Railway Sidings	1995	2500



Location	Land Use	Year of mapping	Mapping scale
89m NE	Railway Sidings	1993	1250
89m N	Railway Sidings	1961	1250
90m S	Railway Sidings	1989	10000
96m N	Railway Sidings	1952	1250
99m N	Railway Sidings	1978	1250
101m N	Railway Sidings	1962	1250
103m N	Railway Sidings	1995	1250
106m N	Railway Sidings	1962	1250
106m SE	Railway Sidings	1995	2500
107m N	Railway Sidings	1989	1250
108m N	Railway Sidings	1991	1250
109m N	Railway Sidings	1995	1250
112m NW	Railway Sidings	1978	1250
113m SW	Railway Sidings	1984	2500
113m N	Railway Sidings	1995	1250
113m N	Railway Sidings	1952	1250
114m N	Railway Sidings	1978	1250
114m E	Railway Sidings	1951	2500
115m E	Railway Sidings	1951	1250
116m N	Railway Sidings	1962	1250
116m SW	Railway Sidings	1984	2500
116m E	Railway Sidings	1991	1250
116m N	Railway Sidings	1995	1250
117m E	Railway Sidings	1960	1250
117m E	Railway Sidings	1964	1250
117m E	Railway Sidings	1969	1250
124m N	Railway Sidings	1999	1250
129m N	Railway Sidings	1993	1250



Location	Land Use	Year of mapping	Mapping scale
133m E	Railway Sidings	1960	1250
133m E	Railway Sidings	1964	1250
133m E	Railway Sidings	1969	1250
135m NW	Railway Sidings	1963	2500
137m N	Railway Sidings	1993	1250
138m N	Railway Sidings	1962	1250
140m NW	Railway Sidings	1983	1250
146m N	Railway Sidings	1974	1250
149m N	Railway Sidings	1995	1250
154m NE	Railway Sidings	1993	1250
155m N	Railway Sidings	1949	10560
156m N	Railway Sidings	1952	1250
162m N	Railway Sidings	1974	1250
162m N	Railway Sidings	1962	1250
165m N	Railway Sidings	1962	1250
169m N	Railway Sidings	1952	1250
171m N	Railway Sidings	1995	1250
183m NW	Railway Sidings	1999	1250
186m E	Railway Sidings	1951	2500
188m E	Railway Sidings	1951	1250
189m N	Railway Sidings	1978	1250
190m N	Railway Sidings	1974	1250
190m NW	Railway Sidings	1995	1250
193m SE	Railway Sidings	1990	2500
204m E	Railway Sidings	1962	2500
206m NW	Railway Sidings	1983	1250
206m E	Railway Sidings	1969	2500
207m E	Railway Sidings	1960	1250



Location	Land Use	Year of mapping	Mapping scale
207m E	Railway Sidings	1964	1250
207m E	Railway Sidings	1969	1250
214m N	Railway Sidings	1974	1250
214m N	Railway Sidings	1962	1250
217m N	Railway Sidings	1952	1250
225m SE	Railway Sidings	1995	2500
226m NW	Railway Sidings	1999	1250
229m NW	Railway Sidings	1999	1250
232m NE	Railway Sidings	1951	1250
233m N	Railway Sidings	1962	1250
237m N	Railway Sidings	1952	1250
238m NE	Railway Sidings	1993	1250
238m N	Railway Sidings	1999	1250
239m N	Railway Sidings	1991	1250
239m N	Railway Sidings	1995	1250
242m N	Railway Sidings	1962	1250
244m NW	Railway Sidings	1999	1250
250m NE	Railway Sidings	1974	1250
250m NE	Railway Sidings	1962	1250
250m NE	Railway Sidings	1952	1250

This data is sourced from Ordnance Survey/Groundsure.

22.5 Royal Mail tunnels

Records within 250m

0

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.

This data is sourced from Groundsure/the Postal Museum.



22.6 Historical railways

Records within 250m**0**

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

This data is sourced from OpenStreetMap.

22.7 Railways

Records within 250m**132**

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

Features are displayed on the Railway infrastructure and projects map on [page 253 >](#)

Location	Name	Type
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail



Location	Name	Type
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site		rail
On site	Port Talbot Steelworks Branch	rail
On site	Margam Knuckle Yard	rail
On site	Not given	Single Track
On site	Not given	Single Track
On site	Not given	Single Track
On site	Not given	Single Track
4m SE		rail
15m E		rail
16m E		rail
19m E		rail
20m E		rail
24m E		rail
25m SE		rail
31m N		rail
32m E		rail
35m E		rail



Location	Name	Type
37m SE		rail
37m N		rail
49m N		rail
53m SE		rail
53m W		rail
53m SE	Margam Knuckle Yard	rail
54m SE	Ogmore Vale Extension Railway	rail
54m SE	Ogmore Vale Extension Railway	rail
55m E		rail
56m E		rail
57m SE		rail
58m SE	Not given	Single Track
60m SE	Ogmore Vale Extension Railway	rail
61m SE	Not given	Single Track
62m E		rail
63m SE	Not given	Single Track
64m SE		rail
67m SE		rail
68m W		rail
72m E		rail
76m E		rail
76m SE	South Wales Main Line	rail
77m E		rail
79m SE	Not given	Multi Track
80m E		rail
81m SE	South Wales Main Line	rail
81m E		rail
83m E		rail



Location	Name	Type
84m E		rail
85m SE	Not given	Multi Track
89m SE	Not given	Multi Track
89m E		rail
89m E	Ogmore Vale Extension Railway	rail
90m SE		rail
90m E		rail
94m E		rail
96m E		rail
101m SE		rail
103m N		rail
103m SE		rail
104m N		rail
108m SE	Not given	Single Track
110m E		rail
111m SE	Margam Knuckle Yard	rail
112m SE	Not given	Single Track
114m E		rail
115m SE	Margam Knuckle Yard	rail
117m N		rail
119m N		rail
120m E		rail
120m E		rail
121m SE	Not given	Multi Track
126m E		rail
129m SE	Margam Knuckle Yard	rail
132m N		rail
134m E		rail



Location	Name	Type
136m E		rail
137m SE	Margam Knuckle Yard	rail
138m E		rail
145m E		rail
149m E		rail
152m N		rail
153m SE	Margam Knuckle Yard	rail
154m E		rail
158m E		rail
160m SE	Margam Knuckle Yard	rail
160m SE	Margam Knuckle Yard	rail
160m E		rail
170m N		rail
170m N		rail
171m N		rail
185m SE	Margam Knuckle Yard	rail
186m SE	Margam Knuckle Yard	rail
192m E		rail
201m E	Not given	Single Track
203m E		rail
213m SE	Margam Knuckle Yard	rail
224m SE	Margam Knuckle Yard	rail
228m SE	Margam Knuckle Yard	rail
229m SE	Margam Knuckle Yard	rail
231m N		rail
238m SE	Margam Knuckle Yard	rail
238m SE	Margam Knuckle Yard	rail
245m NW		rail



Location	Name	Type
246m SE	Margam Knuckle Yard	rail
247m SE	Margam Knuckle Yard	rail

This data is sourced from Ordnance Survey and OpenStreetMap.

22.8 Crossrail 1

Records within 500m

0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

22.9 Crossrail 2

Records within 500m

0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

22.10 HS2

Records within 500m

0

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 Ltd.



Data providers

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

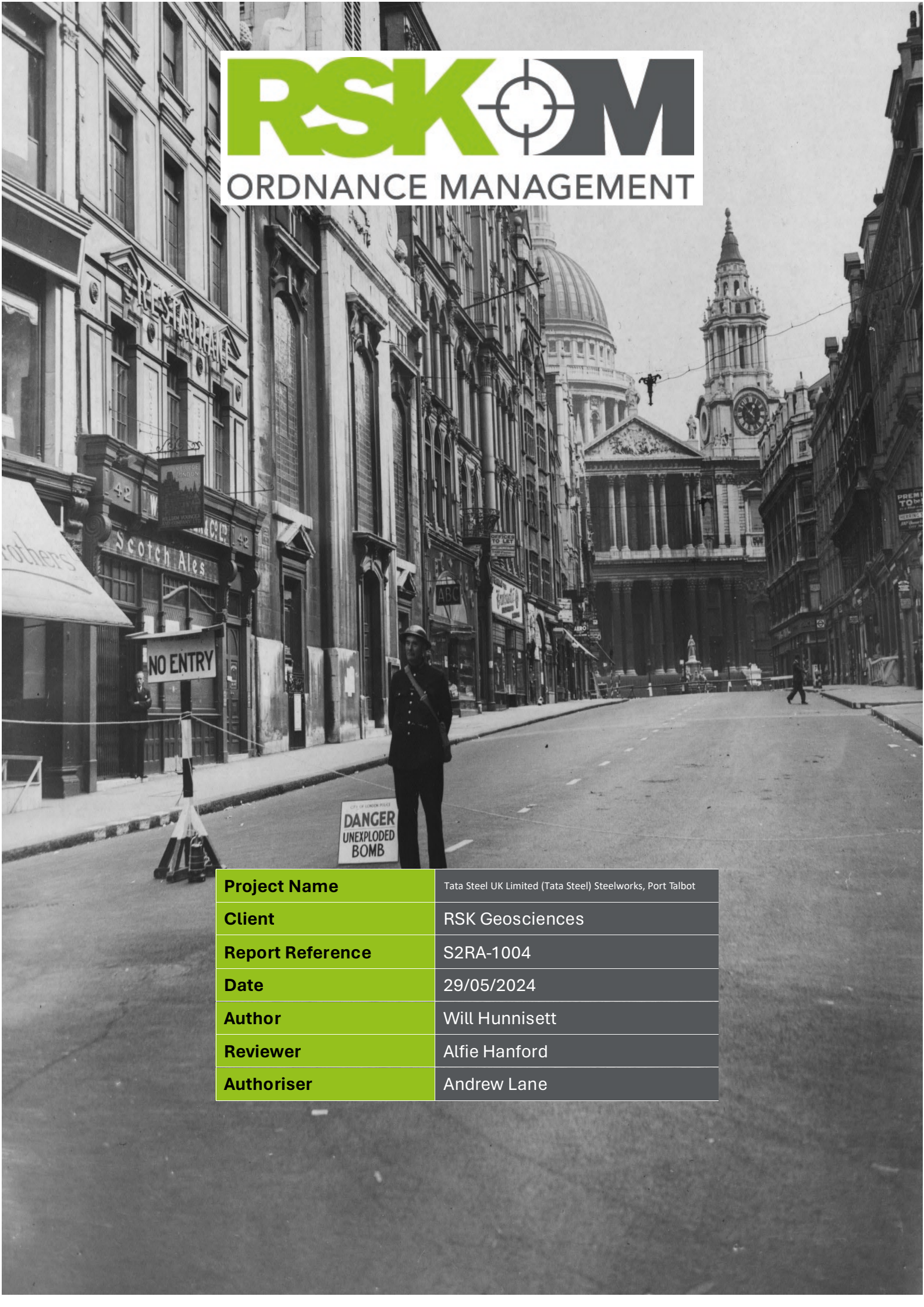
Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: www.groundsure.com/terms-and-conditions-april-2023/ ↗.



Appendix D

THIRD PARTY DATA



Project Name	Tata Steel UK Limited (Tata Steel) Steelworks, Port Talbot
Client	RSK Geosciences
Report Reference	S2RA-1004
Date	29/05/2024
Author	Will Hunnisett
Reviewer	Alfie Hanford
Authoriser	Andrew Lane

Executive Summary

Risk of Encounter	RSK OM believes there to be an overall MODERATE RISK from items of German UXO, with a zone of MODERATE RISK from items of Allied UXO.	
Risk of Harm	RSK OM believes there to an overall SEVERE risk of harm.	
Site Information	National Grid Reference	Region
	SS 7726 86519	Port Talbot, Glamorgan
	The site is located within Tata Steel UK Limited (Tata Steel) Steelworks, in the town of Port Talbot. Large sections of the site comprise open, undeveloped ground, as well as infrastructure of key importance to the steelworks. For example, a coal yard is situated in the south-west, while a concast and BOS plant are located centrally, alongside a blast furnace and gas holder. Railway sidings are visible in the north, with the western extent comprising a hard surfaced accessway. A greenfield section composes the southern boundary. It is bound to the north and east by further industrial structures in the steelworks complex, to the south by open, undeveloped ground, and to the west by Morfa Sands and the Bristol Channel.	
The Proposed Works	Site Investigation works are planned, comprising a series of boreholes to a maximum depth of 75m bgl, although most will only intrude to 30m bgl. Following these works, the site will be undergoing a large knock down and rebuild, most notably just north of the reservoir.	
German UXO Risk	- During WWII, the site was situated within the Municipal Borough of Port Talbot. Identified targets were situated within 1km, while two bombing decoys were situated within the south of the site. - Bombing incidents, possibly on site, occurred at Morfa beach and sidings; Morfa sidings were likely associated with Morfa colliery, on site at this point, while the western section of the site comprised a section of the beach. - Post-WWII aerial photography indicates that the vast majority of the site comprised open, undeveloped ground at the time of WWII. Large sections of this ground cover comprised saltings and mudflats, within which a UXB strike would have left no evidence of its occurrence. - The extensive post-WWII ground works will have mitigated a large degree of risk on site. These areas can be considered mitigated to the precise depths of previous post-WWII ground intrusions. Any intrusions beneath these depths would require active risk mitigation measures.	
British/Allied UXO Risk	- During WWII, a local Auxiliary Unit are known to have trained on sand dunes in the local area, potentially adjacent to the site. A partially submerged tank is also located here, thought to have been used in D-Day exercises. - A moving target range is located adjacent to the site; it is conceivable that LSA, as well as SAA, was expended here. - RSK OM have accessed an open-source database recording anti-aircraft positions in Britain; this records 13 HAA batteries within a 15km radius of the site, one of which may have been located on Morfa Beach.	
Recommended Risk Mitigation Measures	All Risk Areas - UXO Safety Awareness Briefings - Intrusive Magnetometer Survey - Non-Intrusive Magnetometer Survey in Risk Zone 2 - UXO Watching Brief	



Annexes and Appendices

Annexes		Appendices	
A	Site Locator Maps	i	Contextual Information Document
B	Contemporary Aerial Photography	ii	Examples of German ADWs
C	Historical OS Maps	iii	Examples of Allied UXO
D	Historical Aerial Photography	iv	Bibliography
E	Risk of Encounter Map		

Glossary

AA	Anti-Aircraft	TNT	Trinitrotoluene
ALARP	As Low As Reasonably Practicable	RNPF	Royal Navy Propellant Factory
AP	Armour Piercing	ROF	Royal Ordnance Factory
APBC	Armour Piercing Ballistic Cap	SAA	Small Arms Ammunition
APFSDS	Armour Piercing Fin Stabilised Discarding Sabot	SIP	Self-Igniting Phosphorous
AP	Anti-Personnel	UC	Unclassified Bomb
ARP	Air Raid Precautions	UP	Unrotated Projectile
AT	Anti-Tank	USAAF	United States Army Air Force
BL	Breech Loading	UXAA	Unexploded Anti-Aircraft
DA	Delayed Action	UXB	Unexploded Bomb
EOC	Explosive Ordnance Clearance	UXO	Unexploded Ordnance
EOD	Explosive Ordnance Disposal	V1	Flying Bomb
FP	Fire Pot	V2	Long Range Rocket
HAA	Heavy Anti-Aircraft	WAAF	Women's Auxiliary Air Force
HE	High Explosive	WWI	World War One
HEAT	High Explosive Anti-Tank	WWII	World War Two
HESH	High Explosive Squash Head		
HG	Home Guard		
IB	Incendiary Bomb		
LAA	Light Anti-Aircraft		
LCC	London County Council		
LSA	Land Service Ammunition		
ML	Muzzle Loading		
NFF	National Filling Factory		
PAC	Pilotless Aircraft		
PB	Phosphorous Bomb		
POW	Prisoner of War		
QF	Quick Firing		
RAF	Royal Air Force		
RFC	Royal Flying Corps		
RNAS	Royal Naval Air Service		

Contents

Executive Summary	i
Annexes and Appendices	iii
Glossary.....	iii
1 Introduction	1
1.1 The Client and Site	1
1.2 The UK Regulatory Framework	1
1.3 The Health and Safety at Work Act, 1974	1
1.4 Construction (Design and Management) Regulations, 2015.....	1
1.5 CIRIA.....	1
1.6 Control of Major Accident Hazards (COMAH), 2015.....	1
2 The Roles of the Public and Private Sectors.....	2
2.1 Public Sector	2
2.2 Private Sector	2
3 Methodology and This Report	3
3.1 Aims and Objectives	3
3.2 Methodology	3
3.3 Sources of Information.....	3
4 Background Information on Records	4
4.1 The Accuracy of WWII-era Records	4
5 The Site	4
5.1 Site Location and Description – Annex B.....	4
5.2 The Scope and Nature of Proposed Works	4
5.3 Ground Conditions	4
6 Site History.....	5
6.1 Introduction	5
6.2 Historical Mapping – Annex C	5
6.3 Historical Aerial Photography – Annex D	5
6.4 Supplementary Information.....	6
7 The Risk Posed by German Ordnance	6
7.1 Introduction	6
7.2 Target Areas/Bombing Decoys	7
7.3 Primary/Secondary Bombing Sources	8
7.3.1 WWII Home Office Bombing Statistics	8
7.3.2 Register of Civilian War Deaths due to War Operations.....	8
7.3.3 West Glamorgan Archives	8
7.3.4 Secondary Sources.....	8

7.3.5	Abandoned Bombs	9
7.4	Assessing the Likelihood of German UXO Contamination	9
7.5	Maximum Bomb Penetration Depth.....	9
8	The Risk Posed by British/Allied Ordnance	10
8.1.1	Introduction	10
8.2	Ordnance Manufacture	10
8.3	Military Training.....	10
8.4	Home Guard.....	10
8.5	Anti-Aircraft Batteries.....	11
9	The Likelihood that UXO Contaminated the Site	12
10	Post-WWII Risk Mitigation.....	13
10.1	Introduction	13
10.2	EOC Tasks	13
10.3	Post-WWII Redevelopment.....	13
11	Assessed Risk Level	14
12	Risk of Initiation.....	15
12.1	Introduction	15
12.2	Site Specific Risk of Initiation.....	15
13	Risk of Harm	15
13.1	Introduction	15
13.2	Risk of Harm on Site	15
14	Proposed Risk Mitigation Measures	16

1 Introduction

1.1 The Client and Site

RSK Ordnance Management have been commissioned by RSK Geosciences to complete a Stage 2 Detailed Risk Assessment for the Tata Steel UK Limited (Tata Steel) Steelworks, Port Talbot site. This report adheres to guidelines detailed in CIRIA C681, 'Unexploded Ordnance (UXO) A Guide for the Construction Industry'.

1.2 The UK Regulatory Framework

Unlike other industries, no legally binding regulations exist for the construction industry. Instead, industry best practice, alongside CIRIA C681 (published in 2009), guides construction projects. The aim of these regulations, which will be outlined below, is to make construction firms aware of their responsibility to, where possible, keep their workforce engaged in ground-breaking activities safe from any potential UXO risks.

1.3 The Health and Safety at Work Act, 1974

As detailed above, this seminal act in the UK legislature places a duty of care on employers to protect their workforce 'as far as reasonably practicable' from any reasonably foreseeable UXO risks. Of note is that the same duty of care has to be applied to the general public, as well as their own workforce.

1.4 Construction (Design and Management) Regulations, 2015

CDM 2015 ensures that health and safety within the construction industry is continually improved in many ways, including but not limited to, ensuring works are sensibly managed and planned in a way that risks are identified and managed suitable, while ensuring that any staff conducting works are able to complete their tasks safely. This is achieved by ensuring cooperation between all parties and ensuring clear channels of communication.

1.5 CIRIA

The Construction Industry Research and Information Association (CIRIA) provides guidelines to the UK construction industry regarding the risk posed by UXO. Written in 2009, C681 provides this in report format and focusses on land-based construction projects. Its sister report, C754, focuses on construction projects in the marine environment.

1.6 Control of Major Accident Hazards (COMAH), 2015

Contamination as a result of Allied military activity can sometimes result in a chemical hazard, as well as an explosive one. Alternatively, a detonation of an item of UXO may result in an unrelated major hazard. Substances used or stored at COMAH establishments can be dangerous, although the establishments are strictly regulated under the COMAH Regulations 2015. As a result, they have to manage their activities in a way which reduce risks to workers and the public, in line with the Health and Safety Act 1974. Operators must take all measures necessary to prevent major accidents and to limit their consequences for people and the environment. This is achieved through appropriate plant design, process control, mitigation measures and emergency procedures.

The regulations are enforced by a Competent Authority which comprises jointly the Health and Safety Executive in Great Britain and the relevant environment agency (the Environment Agency in England, Scottish Environment Protection Agency in Scotland and Natural Resources Body for Wales in Wales). Nuclear establishments are regulated by the Office for Nuclear Regulation and the relevant environment agency.

2 The Roles of the Public and Private Sectors

2.1 Public Sector

In the event of a possible UXO encounter on a construction site in the UK, the police will be called. They will then assess whether the find could potentially comprise an item of UXO, and place a safety cordon around the find if that is deemed to be a possible scenario. If so, the Joint Services Explosive Ordnance Disposal Operations Centre (JSEODOC) will be informed, who will arrange for the next steps in the process; this involves the investigation, and if necessary, the disposal of the find. The speed at which JSEODOC will be able to attend the site to conduct these next steps depends on the level of risk that they believe the find poses. This is influenced by many factors, such as the location of the find, the type of UXO that it may be, and the potential for risk of harm.

It is unlikely that the military will conduct multiple further investigations unless there are extenuating circumstances, such as high-risk situations. For example, where multiple ordnance finds are encountered on a site, due to limited funding and personnel issued to JSEODOC, it is likely that the construction project will be tasked with appointing a private sector firm to ensure that potential items of UXO are dealt with safely.

2.2 Private Sector

Both pro-active and reactive risk mitigation measures can be implemented by firms in the private sector. Whether these are required will first be assessed via a Stage 1, and if necessary a Stage 2, Risk Assessment. The exact type of support needed can be tailored to each construction project, considering factors such as the proposed works, number of ground intrusions, and how those ground intrusions are carried out (e.g. by hand or plant etc.).

A wide variety of risk mitigation measures can be enacted to ensure safety during the construction phase. Having a UXO Engineer on site conducting a Watching Brief ensures that timely delays can be avoided if a suspicious find can be safely declared not to be UXO, while an intrusive survey prior to piling can allow for amendments to the pile layout/design before deployment to site, if necessary. Furthermore, UXO Safety Briefings allow for a large number of staff to continue their CPD and be upskilled on potential hazards they may encounter on site.

3 Methodology and This Report

3.1 Aims and Objectives

This report will provide a comprehensive assessment of the potential risk from UXO at the proposed site. Located in the Executive Summary and at the end of the report are carefully considered and appropriate recommended work-specific risk mitigation measures to reduce the risk potentially posed by items of UXO during the proposed works to a level that is As Low As Reasonably Practicable (ALARP).

3.2 Methodology

In order to ensure that any recommended risk mitigation measures are appropriate and proportionate, the following factors key to our methodology will be assessed:

- The risk that the site became contaminated with unexploded ordnance.
- The risk that any such UXO remains on site.
- The risk that any such ordnance may be encountered during the proposed intrusive works.
- The risk that any such ordnance may be initiated during this process.
- The consequences of initiating or encountering any such ordnance.

To ensure the accuracy and completeness of our work when following the methodology detailed above, RSK Ordnance Management have carefully considered the following factors::

- An assessed maximum bomb penetration depth.
- The nature of UXO which may be found on a site.
- Post-WWII re-development works.
- Any evidence relating to German Air Dropped Weapons (ADWs) or items of Allied UXO. coming to contaminate the site area.
- UXO clearance tasks undertaken on site post-WWII.

3.3 Sources of Information

During the writing of this assessment, RSK Ordnance Management have collated and analysed wide ranging sources. Proportionate efforts have been made to access all relevant materials, most of which are held in the public domain. Below is an example of sources checked and analysed, although it is not exhaustive.

- The National Archives.
- Relevant local archives.
- The Defence of Britain Extended Database.
- Open-source Google Mapping Information.
- Historical Aerial Photography – Historic England, National Collection of Aerial Photography, Britain from Above.
- ProMap.
- Relevant books, journal/web articles.
- Extensive in-house knowledge and experience at RSK Group Limited.

4 Background Information on Records

4.1 The Accuracy of WWII-era Records

In cities that were heavily bombed, such as London or Plymouth, ARP Wardens (among other personnel) were tasked with accurately recording the date, time, nature and any other details regarding bomb strikes in their areas of operations. During periods of intense raids, this was often a difficult task and inevitably not all raids were accurately recorded.

Likewise, precise details regarding historical Allied activity in many areas around the UK were not typically well recorded. This leads to situations where it is difficult, and sometimes impossible, to accurately predict where associated items of UXO may be encountered. Not all defensive positions established in 1940 when the feared German invasion was anticipated were recorded. Also, maps of military training areas do not accurately record impact areas for weapon ranges. In addition to this, ad hoc training conducted by the Home Guard or British/Allied military units were often not recorded.

To ensure this report is as accurate and complete as possible, many sources have been cross referenced in an attempt to minimise any issues caused by incomplete/inaccurate record sets. However, RSK Ordnance Management cannot be held accountable for any errors/omissions in WWII-era records. The same applies to information that is released to the public domain or becomes newly available after the production of this report.

5 The Site

5.1 Site Location and Description – Annex B

The site is approximately centred on the grid reference SS 77726 86519.

The site is located within Tata Steel UK Limited (Tata Steel) Steelworks, in the town of Port Talbot. Large sections of the site comprise open, undeveloped ground, as well as infrastructure of key importance to the steelworks. For example, a coal yard is situated in the south-west, while a concast and BOS plant are located centrally, alongside a blast furnace and gas holder. Railway sidings are visible in the north, with the western extent comprising a hard surfaced accessway. A greenfield section composes the southern boundary.

It is bound to the north and east by further industrial structures in the steelworks complex, to the south by open, undeveloped ground, and to the west by Morfa Sands and the Bristol Channel.

5.2 The Scope and Nature of Proposed Works

Site Investigation works are planned, comprising a series of boreholes to a maximum depth of 75m bgl, although most will only intrude to 30m bgl. Following these works, the site will be undergoing a large knock down and rebuild, most notably just north of the reservoir.

5.3 Ground Conditions

Information sourced from the British Geological Survey confirms that the northern section of the site is underlain by the South Wales Middle Coal Measures Formation - mudstone, siltstone and sandstone, with the southern section underlain by the South Wales Lower Coal Measures Formation - mudstone, siltstone and sandstone. Superficial deposits of Tidal Flat Deposits - clay, silt and sand are present on site.

No relevant contemporary geological information for the site was found. However, a borehole log from the same geology and in close proximity to the site (BGS ID 370770) recorded the following conditions:

- 2.1m of sand
- 3.8m of wet sand
- 1.4m of brown CLAY
- 0.6m of black CLAY

- 1.5m of silty grey CLAY
- 0.9m of peat
- 1.8m of light blue-grey CLAY

6 Site History

6.1 Introduction

The historic make-up and usage of a site can be key in determining the risk that UXO may pose. Historic mapping editions, aerial photography, and any additional information (where possible) will be analysed to determine the likelihood that a site may have been accessed frequently, or that bomb damage may have been observed, among other factors. For more information, please see **Section 1** in the **Contextual Information Document**, presented in **Appendix i**.

6.2 Historical Mapping – Annex C

	Date	Scale	Observations
Pre-WWII	1921	1:25,000	This mapping edition indicates that the vast majority of the site comprised open, undeveloped ground. Morfa is noted in the central section. Railway sidings intrude into this area, with structures recorded as Pit Row, Overman's Row and Office Row are recorded adjacent to a Grange Pit. The moorland in this area is noted as Liable to Floods, with sand banks recorded in the northern section, adjacent to Saltings. The Port Talbot railway is situated to the east of the site.
Post-WWII	1946	1:54,000	Note, the scale of this mapping has impeded detailed analysis. However, it can be said that little to no development has occurred on site by this stage. Morfa Colliery (Disused) is recorded on site, as is a Pumping Station.

6.3 Historical Aerial Photography – Annex D

	Date	Observations
	18 th June & 19 th September 1948	These two oblique images provide a view of the northern section of the site in 1948, once works on the steelworks here were underway. Large scale development can be seen to the east, while the site itself largely comprises open, undeveloped ground with little evidence of groundworks at this stage, aside from a large funnel. Large bodies of water are present on site, while the ground cover does not look well maintained. The large pre-existing industrial facilities to the north of the site are clearly visible.
	1949	Note, the southernmost section of the site is not visible in this image, and the height that it was taken at hinders detailed analysis. However, the large development to the east is visible again, which appears to be further developed by this time. The saltings in the north are clearly visible. Clearly demarcated agricultural fields are observable in the southern section of the site.

6.4 Supplementary Information

The earliest known industrial history of the site dates to 1849 when Morfa Colliery was established by Vivian and Sons.¹ Four men were killed at the pit in an explosion in 1858, and by 1908, 302 men worked at the pit. The colliery was the most successful on the South Wales coalfield, and one of the few to successfully operate under the sea and navigate the difficult geology of the southern outcrop.² OS mapping from this period shows clusters of small structures and railway sidings at Morfa Colliery. The pit is recorded as closing in 1913.

Margam Iron and Steel Works, completed in the mid-1920s, established steelmaking at Port Talbot, closing in 1953.

The site is home to the Abbey Steelworks section of the larger Tata Steel UK Limited (Tata Steel) Steelworks; work began on this in 1947, with the name believed to be derived from the historic Margam Abbey that partially remains on site. Following WWII, several Welsh steel producing companies formed the Steel Company of Wales. The works opened in 1951 and became operational in 1953. By the 1960s, the works was the largest steelworks in Europe. In 1967, the company was nationalised and became a part of British Steel.³

By 2000, the works had been privatised under the control of Corus. Control was transferred to Tata Group in 2007, by which point output had reached 4.7 million tonnes of steel a year.

7 The Risk Posed by German Ordnance

7.1 Introduction

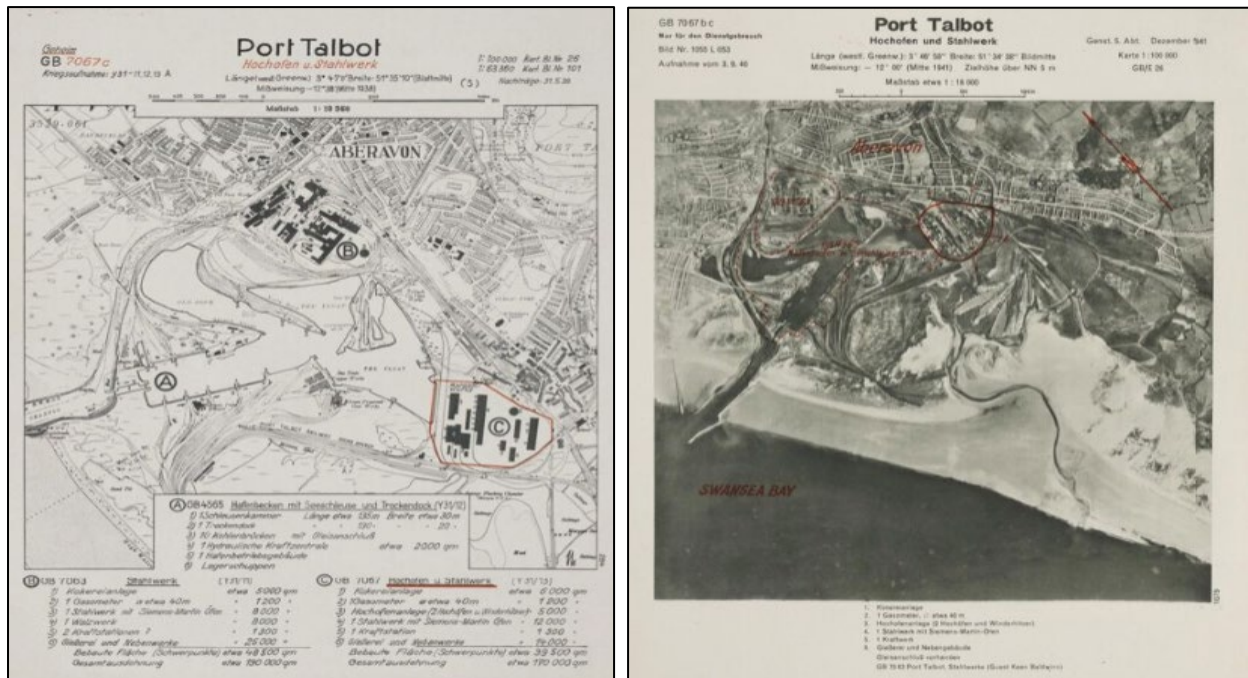
During WWI and WWII, Britain was subjected to aerial bombardment. This was mostly targeted at towns or cities with military or industrial importance, with many areas being subjected to their own 'Blitzes'. For further information, please see **Section 4** in the **Contextual Information Document**.

¹ <https://www.welshcoalmines.co.uk/GlamWest/Morfa.htm>

² <https://nmrs.org.uk/mines-map/coal-mining-in-the-british-isles/swales/llanelli-area/morfa-colliery/>

³ <https://cofilein.gov.uk/en/site/91392/#:~:text=The%20new%20Abbey%20Works%20was,works%20was%20part%20of%20>

Industry associated with Port Talbot steelworks and infrastructure in the dockland area were identified as primary targets by the Luftwaffe, approximately 750m north of the site. Furthermore, a Civil Starfish bombing decoy, intended to replicate the city of Swansea, was situated in the south of the site, alongside a QF decoy to draw bombs away from oil installations at Swansea harbour. Several sources, such as documents sourced from The National Archives and books relating to bombing decoys were analysed, although no evidence relating to the bombing decoys on site was found.



[7]

7.3 Primary/Secondary Bombing Sources

7.3.1 WWII Home Office Bombing Statistics

Amount of German Ordnance Dropped on the Municipal Borough of Port Talbot	
Size of Area (Acres)	23,444
High Explosive Bombs (all types)	87
Parachute Mines	1
Oil Bombs	3
Phosphorous Bombs	0
Fire Pots	0
V1 Pilotless Aircraft (Flying Bomb)	0
V2 Rocket	0
Total (discounting V weapons and 1/2kg IBs)	91
Average number of bombs per 1,000 acres	3.9

7.3.2 Register of Civilian War Deaths due to War Operations

RSK OM have obtained a book from West Glamorgan Archives which details the seven civilian deaths that occurred in Port Talbot in WWII as a result of war operations. These records record the place of death of each person. Although none were recorded in close proximity to the site, given the undeveloped nature of the site and its immediate surrounds, this is not thought to be a significant risk mitigating factor.

7.3.3 West Glamorgan Archives

During the production of this report, RSK OM visited West Glamorgan Archives and viewed a series of primary sources in an attempt to located a complete, or partial, record set relating to WWII bombing in the borough. After viewing records related to gas works, repairs to structures and roadways, and council minutes during WWII, no such references were located.

7.3.4 Secondary Sources

A history of Port Talbot, completed as part of a PhD and found online, steelworks stated that:

“A number of isolated bombs fell in the vicinity of Port Talbot/Margam Steelworks during the summer of 1940. One bomb hit Margam’s fitting shop but failed to explode. More serious was a stick of 9 bombs that fell outside Port Talbot’s General Offices on 29th June 1940 which smashed windows, dislodged slates and damaged some rails. The objective was probably Port Talbot’s gasholder which GKB had emptied earlier in the war.”

A local history website recounting bombing raids in Bridgend and the wider area recorded the following bombing incidents:

- 29th June 1940 - On the railway sidings near Port Talbot Steelworks and between Margam Coke Ovens and Richard Thomas Steelworks.
- 1st July – Railway sidings at Morfa Bank.
- 30th July 1940 – on Morfa Beach.

7.3.5 Abandoned Bombs

No abandoned bombs were recorded in the vicinity of the site.

7.4 Assessing the Likelihood of German UXO Contamination

UXO Risk Elevating Factor	Yes/No	Observations
Was there a high density of bombing in the wider area?	Yes	Although the wider district did not have an elevated bombing density, the site was situated in close proximity to identified Luftwaffe targets, with bombing decoys on site. Evidence suggests the latter may have been targeted twice, with the former repeatedly raided.
Was bomb damage sustained on or adjacent to the site?	Unknown	The poorly maintained nature of the ground cover in post-WWII aerial photography has hindered detailed analysis, and as such, it has not proved possible to confirm whether bomb damage occurred on site.
Was ground cover conducive to the observation of evidence of UXO?	Yes/No	Although small sections, such as those potentially occupied by structures, would have been conducive to the observation of UXO, the vast majority of the site would not. Large swathes were occupied by unmaintained vegetation, with others comprising saltings and river channels, within which evidence of a UXB would have been immediately lost.
Would the site have been accessed frequently?	Yes/No	It is not thought likely that the vast majority of the site would have been accessed at all. It is, however, thought likely that some sections may have been accessed more, such as the colliery or bombing decoys. The moving target range in this area would also likely have been utilised during WWII, also affording a degree of access. Furthermore, Morfa Colliery in the centre of the site would likely have seen extensive access.

7.5 Maximum Bomb Penetration Depth

Assessing the geological information provided in **Section 5.2**, RSK OM believe that clearance would be required to **14.25m bgl**. This calculation is derived from bomb penetration data for a 500kg HE bomb. This depth is only approximate, given the lack of site specific geological data, and the potential for a large HE UXB (heavier than 500kg) could potentially remaining underneath his depth. However, it is not thought in line with the ALARP principle to clear to these depths. For more information on how this number has been calculated, along with further details, please see **SECTION 4.6** of the **Contextual Information Document**.

8 The Risk Posed by British/Allied Ordnance

8.1.1 Introduction

RSK OM have found evidence indicating that the site may have become contaminated with items of British/Allied UXO. Relevant pathways of potential contamination will be discussed below.

To see an overview of the most common types of Allied/British UXO encountered on sites today, please see Section 3 of the Contextual Information Document.

8.2 Ordnance Manufacture

During WWI, Port Talbot Steelworks, located to the north of the site, produced steel shell billets up to 12” in diameter, as well as other steel features for warships, among other military materiel. No evidence of the filling of these shells occurring on site has been found, and one such empty shell was found to the north of the site in 2020.⁴ It is thought prudent to make the reader aware of the possibility of encountering such an item, and all should be treated as filled with explosives and fully functioning until proven otherwise.

8.3 Military Training

An open-source geo-data set recording military features notes a moving target range immediately south of the site. Contemporary aerial photography confirms the presence of infrastructure in this area, likely related to the target pulling machinery observed at other WWII-era firing ranges. The orientation of this infrastructure, as confirmed by OS mapping from 1947, indicates that firing occurred in a south-east to north-west orientation, with two sets of butts recorded in front of a firing point. A large wall, to capture any ordnance fired on the range, is situated behind the butts.

It is entirely conceivable that military activity on this range led to UXO contamination in the wider area. This could have occurred for a number of reasons; the range may have had temporary stores nearby, with ordnance improperly disposed of in the surrounds. Troops may also have conducted fire and move manoeuvres outside the official boundaries of the range, potentially on site. At this stage, OS mapping indicates that this range was used for rifle practise. It must be noted that the possibility that LSA was used on this range, as is known to have occurred before and during WWII, cannot be ruled out at a desktop stage.

Furthermore, reference has been found online to the wreck of British Cavalier tank on the beach at Morfa, immediately west of the site. The relevant post states that this tank may have been involved in exercises related to D-Day and became beached, although no corroborating evidence has been found. It is, however, thought to be indicative of military activity in the wider area.

This likelihood is thought to be compounded by the presence of a D-Day marshalling camp for the US 28th Division based at Margam, approximately 3.3km north-east of the site. The presence of these troops, stationed there from 8th October 1943 until 22nd July 1944, likely resulted in them accessing military ranges present in the wider area, such as those detailed above.

8.4 Home Guard

Soldiers of the 20th Glamorganshire (Port Talbot) battalion would have been responsible for guarding the area. Evidence has been found confirming that the steelworks had its own Home Guard unit, although it is not known whether this was separate from the above mentioned one. Bombing decoys were often operated by Home Guard troops, likely resulting in them accessing the site, while they may also have conducted training on the moving target range to the south. The possibility Home Guard activity resulted in UXO contamination on site cannot be completely ruled out at a desktop stage.

An Auxiliary Unit, covert groups tasked with sabotage should an enemy invasion occur, was stationed at Cymmer during WWII, approximately 11.5km north-east. Recollections from troops in this unit involved

⁴ <https://www.bbc.co.uk/news/uk-wales-51229924>

training in the sand dunes, potentially immediately adjacent to the site. Exact details of such training are not known, although it is understood that the unit possessed sticky bombs and Thompson submachine guns.

8.5 Anti-Aircraft Batteries

RSK OM have accessed an open-source database recording anti-aircraft gun positions in Britain during WWII; this record 13 HAA batteries within a 15km radius of the site. Additional defences, such as LAA guns defending the industrial works to the north, were likely present at points. Indeed, photographic evidence of a 'gun tower' being cleared from Morfa beach, on Tata Steel UK Limited (Tata Steel) owned land, has been found. This may have been a control tower, or could potentially have housed an HAA or LAA gun atop it. It has not proved possible to locate the exact location that this feature occupied, although it may have been adjacent to the site.

An AA shell which did not explode at the correct altitude could have come to contaminate the site.

9 The Likelihood that UXO Contaminated the Site

The previously discussed factors regarding UXO contamination will now be summarised in this table. A discussion on the likelihood that UXO may remain, in conjunction with the likelihood that it may be discovered and subsequently initiated, will follow.

German Ordnance
• During WWII, the site was situated within the Municipal Borough of Port Talbot, which was subject to an average of 3.9 bombs per 1,000 acres, a very low bombing density. However, identified targets were situated within 1km, while two bombing decoys were situated within the south of the site. • No complete set of bombing records exist for the site area; however, a secondary source noting bombing incidents in the region indicates that the site may have been subject to at least two bombing incidents. These occurred on Morfa beach and sidings; Morfa sidings were likely associated with Morfa colliery, on site at this point, while the western section of the site comprised a section of the beach. It is thought likely that these bomb strikes were either the result of mistargeted bombs aimed at the identified targets to the north, jettisoned after a raid on these targets, or aimed at the bombing decoys in the south of the site. • Post-WWII aerial photography indicates that the vast majority of the site comprised open, undeveloped ground at the time of WWII. Large sections of this ground cover comprised saltings and mudflats, within which a UXB strike would have left no evidence of its occurrence. It is thought highly unlikely that a UXB strike across these sections of the site would have been observed. • It must be noted that sections of the site may have been accessed more frequently, such as Morfa Colliery. In these locations, access throughout WWII was likely more frequent. In conjunction with the hard surfaced roadways and small structures, it is considered less likely that a UXB strike would have gone unnoticed here, although the possibility cannot be ruled out at a desktop stage. • In conclusion, although the site was situated within a district with a low bombing density, two bombing decoys on site, or identified targets to the north, resulted in at least two bombing incidents which likely occurred on site. As abovementioned, the ground cover across the vast majority of the site is not thought to have been conducive to the observation of a UXB strike, with this risk compounded in areas occupied by saltings and the inter-tidal zone. The lack of access to the majority of the site is also considered to elevate the risk on site, and as such, a Moderate risk has been assessed. • Due to the size of the site, a macro approach has been taken when assessing risk. While it may prove possible to zone areas of differing risk if smaller sections were assessed individually, the scale of this size has prohibited such a possibility.

Allied Ordnance

- During WWII, a local Auxiliary Unit are known to have trained on sand dunes in the local area, potentially adjacent to the site. They are known to have used sub-machine guns and explosives during their training. A partially submerged tank is also located here, thought to have been used in D-Day exercises. Alternatively, it may have been used in firing exercises, potentially linked to a moving target range situated in this area, immediately south of the main body of the site. OS mapping indicates that SAA would have been the main type of ordnance expended here, although it is conceivable that LSA was also fired here.
- These activities occurred in an area that does not appear to have been subject to any significant groundworks; therefore, it is conceivable that any items of LSA or SAA buried under the surface may remain in-situ, undisturbed by the extensive groundworks that have occurred elsewhere on site. A Moderate risk of encounter with items of Allied UXO has been assessed in this area.
- RSK OM have accessed an open-source database recording anti-aircraft positions in Britain; this records 13 HAA batteries within a 15km radius of the site, one of which may have been located on Morfa Beach.

10 Post-WWII Risk Mitigation

10.1 Introduction

Although an item of UXO may have come to contaminate the site in WWII, this does not necessarily mean that it will remain today. For example, should extensive post-WWII development have occurred on site, these may have discovered an item of UXO. Furthermore, an Explosive Ordnance Clearance (EOC) task, which are typically carried out on military land but can also occur in civilian areas, would have searched for items of UXO. For more information, please see **Section 5** of the **Contextual Information Document**.

10.2 EOC Tasks

There is no evidence to suggest that the site has been subject to EOC tasks.

10.3 Post-WWII Redevelopment

The site has seen extensive post-WWII redevelopment. Construction on Abbey Steelworks began in 1947. By 1965, a degree of land reclamation had occurred in the western section of the site, with railway sidings serving the large works immediately east interspersed throughout the site; construction on the coal yard in the south-west appears to have been completed by this point. The site appears to have almost assumed its current layout by 2005, minus the laying of small sections of hard standing accessways.

It is thought likely that at least some structures on site are founded on deep foundations owing to the reclamation that has occurred. Bulk excavations have almost certainly occurred in areas, mitigating large areas of risk to the maximum depth of intrusions. It must be noted that the southernmost section of the site does not appear to appear to have been subject to any significant groundworks.

Please note that it is possible for UXO to be present even in areas of post-WWII redevelopment. For example, the rubble/debris created by bombing was utilised as fill in certain cities such as Liverpool and London. If items of UXO had fallen within the debris prior to its clearance and potential use elsewhere, it could have been transported, unnoticed, alongside it. Such UXO has been encountered by RSK OM staff previously, such as a possible AA or rocket warhead found in Bermondsey in October 2023, which was discovered within post-WWII fill and fell out of the side wall of a shallow excavation. While such an incident is not considered to be a likely scenario, it highlights the unpredictable locations within which items of UXO can be encountered, and why the risk can never be wholly ruled out before breaking ground.

11 Assessed Risk Level

As demonstrated, RSK OM have diligently and proportionately assessed the factors considered in our assessment, detailed in **Section 5.2**. We have therefore assessed varied risk throughout the site, split into risk zones, detailed in the table below.

Type of UXO	Risk Zone 1 - Assessed Risk Rating				
	Low	Low-Moderate	Moderate	Moderate-High	High
German HE Bombs			×		
German 1/2kg Incendiary Bombs		×			
Anti-Aircraft Shells			×		
Allied Land Service Ammunition	×				
Allied Small Arms Ammunition	×				

Type of UXO	Risk Zone 2 - Assessed Risk Rating				
	Low	Low-Moderate	Moderate	Moderate-High	High
German HE Bombs			×		
German 1/2kg Incendiary Bombs		×			
Anti-Aircraft Shells			×		
Allied Land Service Ammunition			×		
Allied Small Arms Ammunition			×		

12 Risk of Initiation

12.1 Introduction

The risk of UXO initiation on site will largely depend on the type and condition of the item, as well as the nature of the proposed works. For more information, please see **Section 7** of the **Contextual Information Document**.

12.2 Site Specific Risk of Initiation

Boreholes are not an inherently risky groundwork methodology. Although intrusions are carried out blind, any impact with an item of UXO will be far less dangerous than an impact that a piling rig would cause. That being said, direct impact with the fuze pocket or body of a HE UXB could result in initiation, and given the likelihood that bomb strikes impacted the site, pro-active risk mitigation measures are recommended.

13 Risk of Harm

13.1 Introduction

Although there may be an elevated risk from UXO on site, this does not necessarily mean that there will also be a risk of harm. For more information, please see **Section 8** of the **Contextual Information Document**.

13.2 Risk of Harm on Site

There is considered to be an elevated risk of encountering HE UXBs on site. The most likely of these to be encountered is considered to be a 50kg HE bomb, which possessed approximately 25kg of TNT/amato/trialen, posing a **Severe** risk of harm.

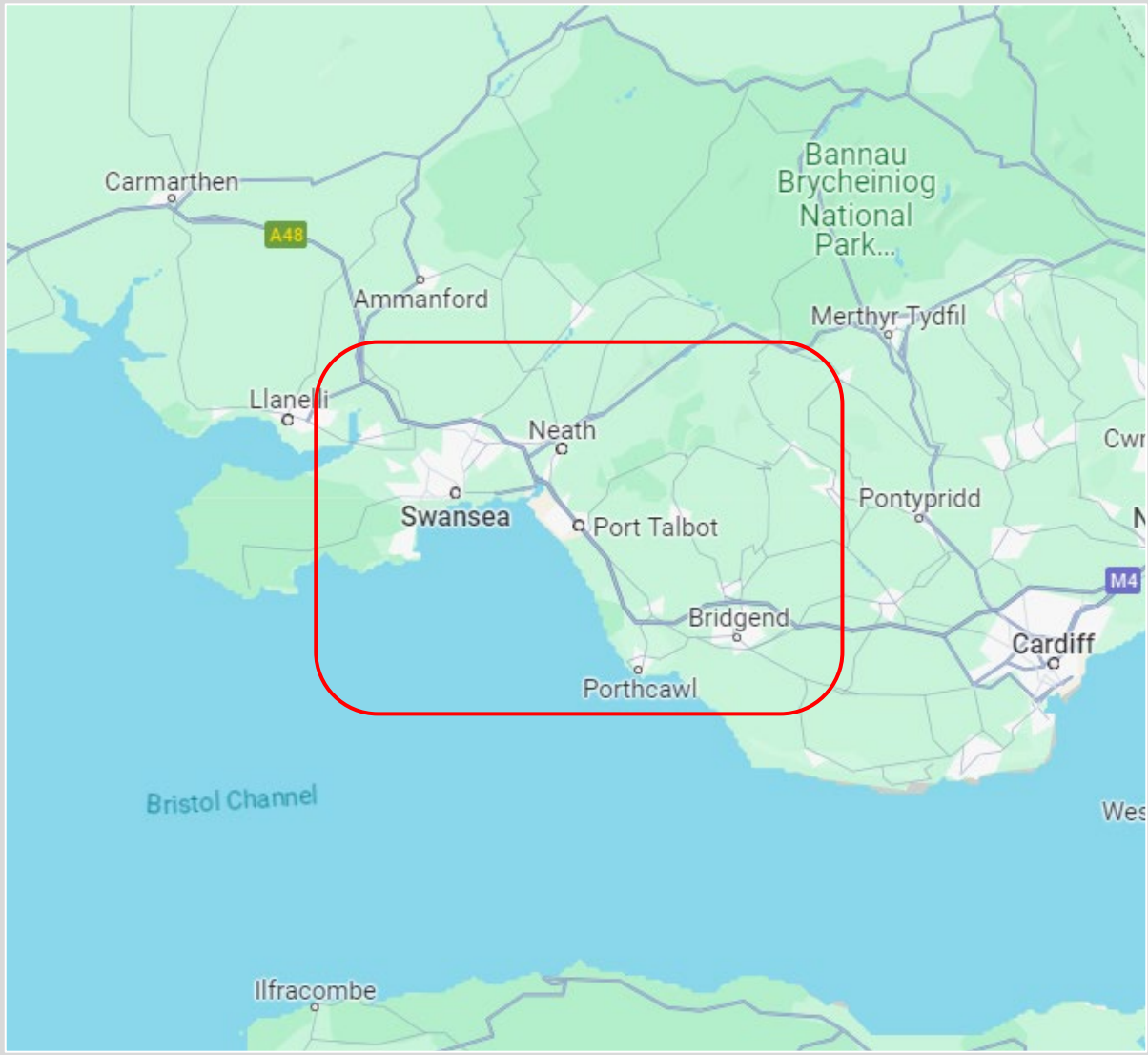
The Moderate UXO risk in the southernmost section means that an encounter with items of unexploded LSA is possible. The local Auxiliary Unit reference training with explosives (type unknown), and the presence of the beached tank in the proximity to a firing range raises the possibility that anti-tank ammunition, such as 2, 6 and 17-pounder rounds, as well as PIATs, were expended in the vicinity. All of these items of UXO also pose a **Severe** risk of harm.

14 Proposed Risk Mitigation Measures

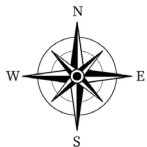
The below risk mitigation measures are recommended to support the upcoming works.

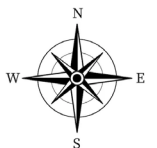
Type of Work
All Works
UXO Safety Awareness Briefings Recommended for all personnel working on site. The briefings will provide a basic level of knowledge regarding UXO, ensuring workers know what to do when they suspect they may have found an item of UXO. Delivered by a UXO specialist with refresher courses offered at intervals. Intrusive Magnetometer Survey RSK OM can deliver an intrusive magnetometer survey in a variety of ways. This survey will successfully clear pile positions to the required bomb penetration depth. Discussion with our Operations team will dictate the best method to deliver this survey once factors such as the site specific geological conditions have been considered. Non-Intrusive Magnetometer Survey RSK OM have the capability to deliver non-intrusive surveys via a number of methods; contact our Operations department for specific requirements. A portable magnetometer probe collects data from your site which is then interpreted for evidence of ferrous anomalies. The final stage in this process is a Target Investigation, where any anomalies found can be investigated on site. Note, this survey is only applicable for magnetically clean (i.e. greenfield) ground. UXO Watching Brief An alternative method to ensure safety on site for when conditions are not appropriate for a non-intrusive survey. A UXO Engineer with a man-portable magnetometer can provide assurances during open excavations to avoid unnecessary timely delays. Allows for borehole clearance.

Note, when making these recommendations, RSK OM have strived to ensure proportionality based on the client provided scope of works. Should these change, RSK OM should be notified immediately to ensure safety and proportionality on site.



Project Name	Client	Report Reference
Tata Steel UK Limited (Tata Steel) Steelworks, Port Talbot	RSK Geosciences	S2RA-1004

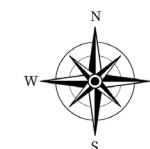
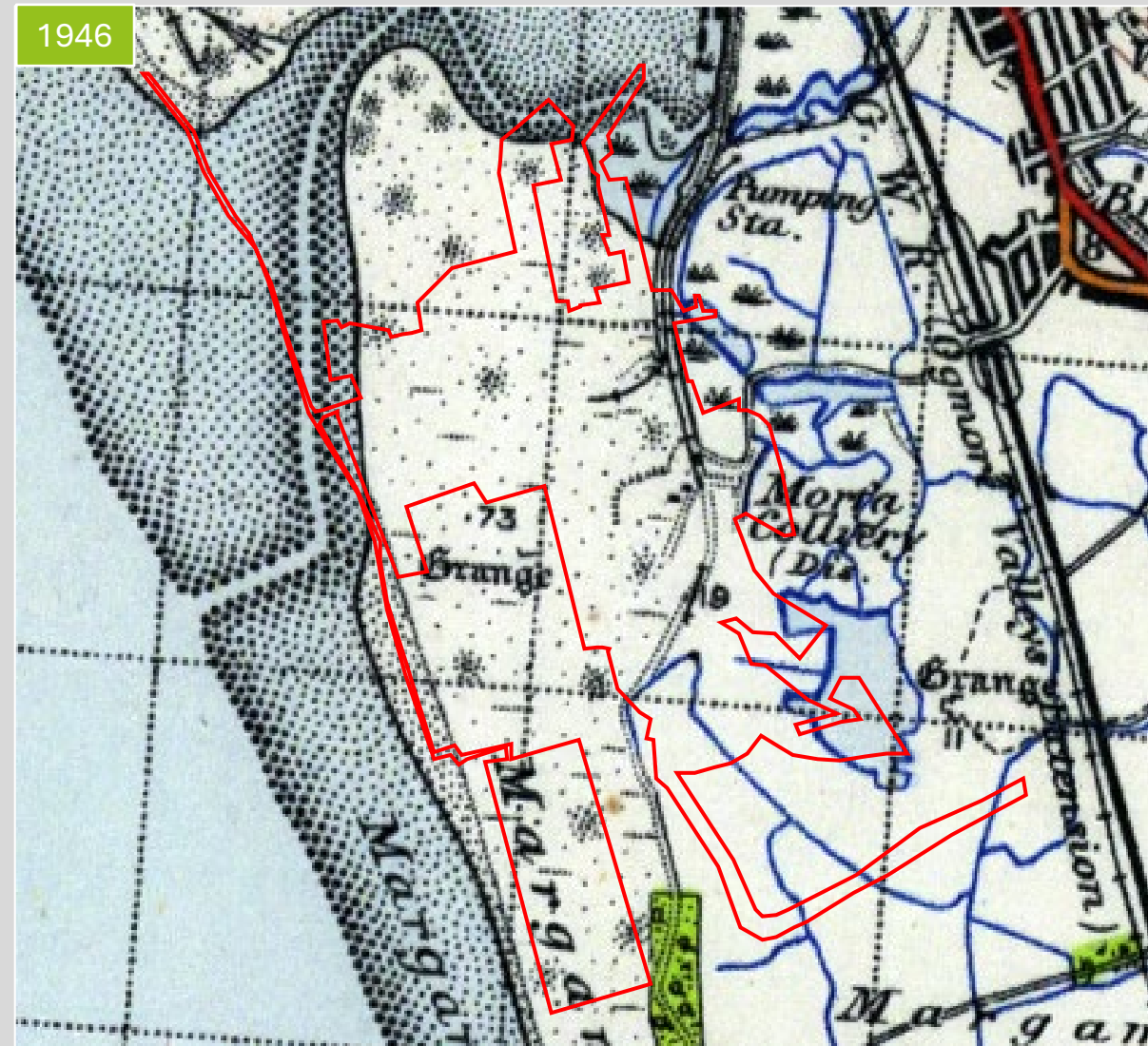


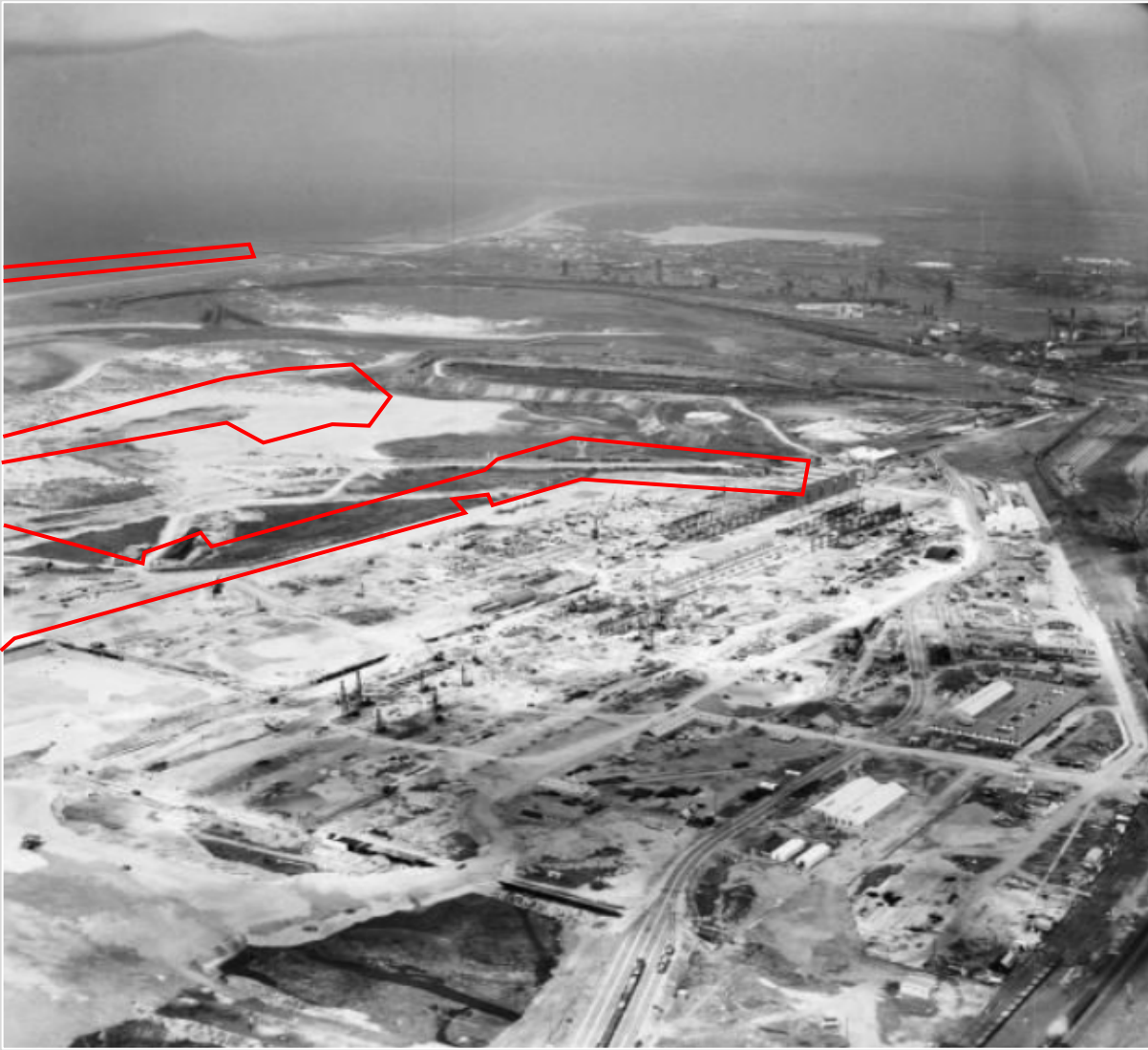


1921



1946





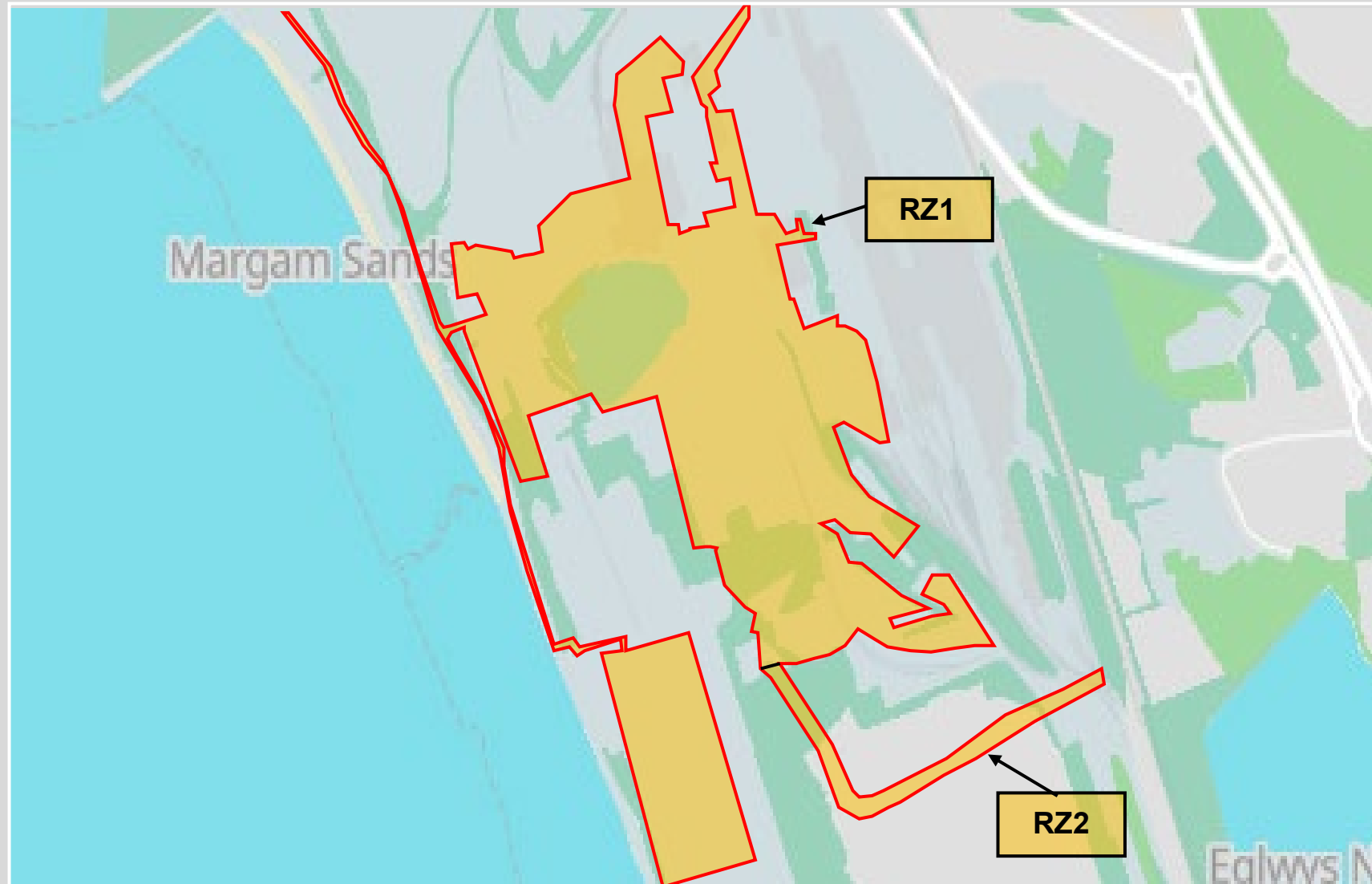




Risk Mapping Key

RZ1	Moderate Risk from German UXO
RZ2	Moderate Risk from Allied and German UXO

Please refer to **Section 11** of the S2RA for a more detailed breakdown of UXO risk and RSK OM’s recommended risk mitigation measures (**Section 14**).

**Risk Mapping Key****RZ1****Moderate Risk** from German UXO**RZ2****Moderate Risk** from Allied and German UXO

Please refer to **Section 11** of the S2RA for a more detailed breakdown of UXO risk and RSK OM's recommended risk mitigation measures (**Section 14**).



Appendix i - Contextual Information Document

Contents

Glossary	2
1 Background Site Information	3
1.1 OS Mapping	3
1.2 Historical Aerial Photography	3
2 Introduction to German Air Delivered Weapons	4
2.1 Background to German Bombing Campaigns over Britain	4
2.2 Most Common German Air Delivered Weapons	5
2.3 German ADW Failure Rate	5
2.4 German ADW Failure Rate	6
2.5 The 'J-Curve' Effect	6
2.6 Bomb Penetration Depth	6
3 Most Common British Ordnance	7
3.1 Mortars	7
3.2 Grenades	7
3.3 SAA	7
3.4 AA Shells	7
3.5 Artillery Shells	7
4 UXO Risk Mitigation	8
4.1 Clearance of Items of UXO	8
4.2 Post-WWII Construction Works	8
5 UXO Encounter	8
5.1 Pathways	8
5.2 Encounter Depths	8
6 UXO Initiation	9
6.1 German UXO Initiation	9
6.2 British/Allied UXO Initiation	9
6.3 Consequences	9
7 Risk of Harm	9
7.1 Introduction	9
7.2 Assessed Risk Levels	9
8 Risk Mitigation Methodology	10

Glossary

AA	Anti-Aircraft	POW	Prisoner of War
ALARP	As Low As Reasonably Practicable	QF	Quick Firing
AP	Armour Piercing	RAF	Royal Air Force
APBC	Armour Piercing Ballistic Cap	RFC	Royal Flying Corps
APFSDS	Armour Piercing Fin Stabilised Discarding Sabot	RNAS	Royal Naval Air Service
AP	Anti-Personnel	TNT	Trinitrotoluene
ARP	Air Raid Precautions	RNPF	Royal Navy Propellant Factory
AT	Anti-Tank	ROF	Royal Ordnance Factory
BL	Breech Loading	SAA	Small Arms Ammunition
DA	Delayed Action	SIP	Self-Igniting Phosphorous
EOC	Explosive Ordnance Clearance	UC	Unclassified Bomb
EOD	Explosive Ordnance Disposal	UP	Unrotated Projectile
FP	Fire Pot	USAAF	United States Army Air Force
HAA	Heavy Anti-Aircraft	UXAA	Unexploded Anti-Aircraft
HE	High Explosive	UXB	Unexploded Bomb
HEAT	High Explosive Anti-Tank	UXO	Unexploded Ordnance
PB	Phosphorous Bomb	V1	Flying Bomb
POW	Prisoner of War	V2	Long Range Rocket
QF	Quick Firing	WAAF	Women's Auxiliary Air Force
RAF	Royal Air Force	WWI	World War One
RFC	Royal Flying Corps	WWII	World War Two
RNAS	Royal Naval Air Service	TNT	Trinitrotoluene
PB	Phosphorous Bomb		

1 Background Site Information

1.1 OS Mapping

The ability to determine whether a site may have suffered bomb damage necessarily depends on the makeup of the site during WWII. For example, if the site comprised an area of open, undeveloped ground, damage would not be noticeable within this source. However, if the site was composed of a section of terraced structures, a bomb strike which caused significant damage may result in the clearance of structures, resulting in easily identifiable evidence. Alternatively, a significantly damaged structure may be marked as a 'ruin'.

Every effort has been made to analyse as many large-scale maps as possible, providing the best possible details through which to assess the potential UXO risk on site. Of note is military censorship of military training grounds or airfields, where relevant features will not be identified.

1.2 Historical Aerial Photography

This source is often more useful in identifying potential bomb damage. Like OS mapping, this can often be more difficult in areas of open, undeveloped ground. Dense vegetation growth or ploughed soil may conceal evidence of a UXB strike, although craters with lipped edges, caused by exploded bombs or larger UXBs, can be clearly visible. Alternatively, evidence of minor damage to structures, in the form of light-coloured roofing repairs, can be immediately identifiable, with large areas of structural clearance obvious. Where vertical images may obscure internal damage in a structure, oblique photography, if available, will also be consulted to attempt to gain a more complete view of the site.

Of note is that this source can also be very illuminating when assessing potential Allied/British risk. For example, trench systems not recorded on OS mapping can be more easily identifiable in this source, even if recently infilled. Likewise, an impact area from a mortar/artillery range often leaves clear evidence of its presence in the form of impact craters of varying sizes. Other evidence of military activity, such as scrape marks from an anti-tank range, are also observable in imagery. When paired with LiDAR imagery, a wealth of information can be gleaned from these sources.

2 Introduction to German Air Delivered Weapons

2.1 Background to German Bombing Campaigns over Britain

Timeline of Luftwaffe Campaigns over Britain					
1940	1940-1941	1942	1943	1944	1944-1945
Battle of Britain fought to deny the Luftwaffe air supremacy required prior to Operation Sealion.	London, and other major cities, subjected to Blitzes of indiscriminate bombing.	Baedeker Raids target cultural and historic sites throughout Britain. Bath and Exeter badly damaged.	'Tip and Run' raids launched which utilise low-flying high-speed aircraft. Southern coastal towns targeted.	Operation Steinboch targets southern England and London with 31 raids. Last raids on the capital.	V weapon campaign launched against Britain. V1 launch sites overrun following D-Day.

Knowing that they would require air supremacy before launching Operation Sealion (the planned German invasion of Britain), in the summer and autumn of 1940, the Luftwaffe set about targeting RAF airfields (as well as radar stations and other supporting infrastructure). Many of RAF Fighter Command's key airfields, such as RAF Biggin Hill, were raided repeatedly, with the south-east of England suffering the heaviest raids during this period. Once the Luftwaffe realised that they had failed to achieve air supremacy, their attention turned to the indiscriminate 'Blitz' against London.

In the hope of destroying civilian morale and causing the collapse of the government from within, the heaviest raid of this period marked the end of the London Blitz on 12th May 1941. From 7th September 1940, London had been subject to repeated and intense raids, centred on the City of London and eastern boroughs, where the majority of industry in the city was located. This method was mirrored in other large cities across Britain, such as Glasgow, Plymouth and Liverpool. Notably, the Clydebank Blitz of 13th – 15th March 1941 was targeted at the key shipbuilding and ordnance production areas of Glasgow. Bombing of other areas also occurred during this period, likely due to them being identified as targets of opportunity (if aircraft could not locate their target, or did not jettison their entire bombload over it, secondary targets such as transport infrastructure or industrial structures were identified). Furthermore, anti-aircraft fire and the lack of accurate targeting mechanisms in aircraft at the start of WWII led to many bombs missing their intended targets, sometimes by many miles. Landing with live ordnance on board was also dangerous, so aircraft would often jettison any remaining ordnance over Britain before they flew back to mainland Europe. This resulted in rural, and seemingly insignificant areas, being subject to bomb strikes.

In contrast to the raids targeted at military installations during the Battle of Britain, and to an extent those aimed at industrial areas during the Blitzes, the Baedeker Raids of 1942 targeted areas of cultural importance in some of Britain's most historic cities, such as Canterbury and Exeter. These were followed in 1943 by an identification of British weakness to raids carried out by fighter bomber aircraft conducting high-speed low-level raids which would evade radar; the aircraft would pop up when they reached their target, drop their bombs and return home. The raids were therefore named 'Tip and Run'. Notably, by this time, large amounts of American and Canadian troops were stationed in southern Britain. Utilising their LAA guns, as well as repurposing some British ones located around previously heavily bombed cities, an interlocking series of defences were established on the south coast to deter these raiders.

Switching back to targeting London for the first concentrated raids since the London Blitz, Operation Steinboch comprised 31 large-scale raids over southern England in 1944. However, as aforementioned, the massing of anti-aircraft defences in southern England, coupled with significant rates of attrition of pilots in the Luftwaffe meant that these raids were not successful. As a result, the final concentrated Luftwaffe raid over London occurred in May 1944.

Knowing that they could no longer successfully bomb Britain using piloted aircraft, the V1 pilotless aircraft offered an opportunity to inflict casualties in southern England. Equipped with a 850kg HE warhead, the blast wave was lethal. The same was true of the V2 rocket, with an even larger warhead at just over a ton of HE. These weapons were very large and often garnered public attention. Furthermore, a three fuze system in the V1 was designed so that they would never be examined by British forces. As such, the UXO risk that these items pose is typically very low.

2.2 Most Common German Air Delivered Weapons

It is important that the different characteristics and defining features of WWII-era German air delivered weapons (ADWs) are understood. This allows for an accurate assessment of the hazards that each item poses, which feeds into the assessed UXO risk in this report. The table below outlines the most common types of ordnance dropped on Britain. For a visual representation of the types of ordnance described below, please see **APPENDIX iii**.

Type of ADW	Penetrative Ability	Explosive Hazard	Background Information
HE Bomb	High. Their aerodynamics and weight (sometimes up to 2,000kg) greatly aided ground penetration.	General Purpose variant higher at around 50%. For the semi-armour piercing variant, this could drop to around 30% as a cap was added.	The most commonly dropped by weight over Britain. RSK OM's experience proves that large HE UXB entry holes were sometimes assumed to be caused by the detonation of smaller HE bombs. These ADWs pose the greatest risk to sites nowadays.
Mines	Low. The blast power was derived from their air or ground burst ability.	High explosive hazard, with variants possessing approximately 700kg of explosive fill.	Known to have caused significant damage when employed effectively. Due to their slow descent, they do not pose a significant risk to current construction sites.
Incendiary bombs	1/2kg incendiary bombs had very limited penetrative ability. Larger ones could penetrate to shallow depths in soft soil.	Small bursting charge in small IBs. Large variants, such as the Flam 500, had larger bursting charges.	1/2kg IBs were dropped in quantities often too large to accurately record over wide areas. Small items so could go overlooked in vegetated areas. Bursting charges to increases anti-personnel effect could be a hazard during intrusive works.
Anti-personnel bombs	Very low due to their low weight.	Approximate 225g HE charge.	Like small IBs, these were dropped in containers in batches of up to 108. Descent slowed by design, many were encountered during post-raid checks If they did not explode. Still encountered on construction sites today.

2.3 German ADW Failure Rate

During WWII, Bomb Disposal Units (BDUs) accurately recorded all aspects of their work. Based off of this, it is generally accepted that 10% of bombs dropped by the Luftwaffe failed to explode. There are many reasons for this, including:

- Release of bombs at a low altitude, not allowing enough time for the bombs to arm successfully.
- Failure to successfully arm the bombs in the aircraft, likely due to either human or mechanical error.