HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

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Wylfa Newydd Project

Horizon Nuclear Power Limited

Soils and Geology Baseline Conditions Report

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Contents

Executive Summary

This report presents the baseline conditions of soils and geology which may be potentially affected by the activities which Horizon Nuclear Power Wylfa Limited (Horizon) proposes to undertake during construction, operation and decommissioning of a park and ride facility at Dalar Hir, hereafter referred to as 'Park and Ride'. It has been prepared to provide a detailed technical appendix on soils and geology to support the Environmental Statement.

Soils of the Brickfield 2 association are mapped for the site, which indicates slowly permeable, seasonally waterlogged soils with low natural fertility. The site comprises Agricultural Land Classification (ALC) Subgrade 3b (moderate quality) land.

Superficial deposits, where present, comprise Devensian glacial till which is recorded as sandy clay with gravel bands in the area of the site. The majority of the site is underlain by rocks belonging to the New Harbour Group, comprising mica schist and psammite derived from metamorphism of sea floor sediments. Two lenticular igneous bodies bisect the central section of the site, trending from northeast to southwest, and are mapped as lava units within the New Harbour Group. The eastern portion of the site is underlain by undifferentiated Ordovician Rocks, recorded as interbedded sandstone and conglomerate.

A Category 2 (local importance) Aggregates Safeguarding Area has been identified for sandstone in the east of the site, but if historical mining has occurred, it is considered likely to have been limited to small-scale surface quarries.

A review of historical maps and archive information resulted in the identification of several limited sources of potential contamination associated with potentially infilled pits, ponds, quarries and construction of the adjacent roads, historical farm activities and the construction and operation of a Driver and Vehicle Standards Agency (DVSA) centre and the Cartio Môn Go-Karting centre. The conceptual site model indicated that the risks to receptors were predominantly low or very low. The only moderate/low-risk outcomes are attributed to the risks to human health from potential made ground and farming activities on-site, and ground gases, for which moderate/low is the lowest possible risk outcome based on the severity of the risk.

1. Introduction

1.1 Background to Wylfa Newydd Project

Chapter A2 (project overview and introduction to the developments) (Application Reference Number: 6.1.2) provides an overview of the Wylfa Newydd Project (the Project), with more detailed information on the Park and Ride in Chapter F1 (proposed development) (Application Reference Number: 6.6.1).

1.2 The Park and Ride

Dalar Hir is the preferred location for the Park and Ride, the provision of which is a proposed measure to mitigate the potential effects of construction-worker transport on Anglesey's highway network. The Park and Ride would be temporary and in use throughout construction of the Wylfa Newydd Power Station.

The Park and Ride would:

- provide parking for approximately 1,900 vehicles;
- bus waiting, pick-up and drop-off zone for up to 15 buses with additional parking for up to eight buses;
- include a central bus transport facility with a waiting area and welfare facilities; and
- operate for approximately 10 years.

1.3 Study area

The potential effects on receptors from the proposed activities relevant to soils and geology are likely to be associated with direct disturbance of ground conditions on site or the migration of contaminants to/from areas immediately adjacent to the site. As a result, the study area has been limited to a 250m buffer around the site as shown on Figure 1.

1.4 Report purpose

This report has been prepared to provide a detailed technical appendix on soils and geology to support the Environmental Statement for the Development Consent Order application for the proposed activities at the Park and Ride. Although the Environmental Statement is aimed at a wide audience, this report is primarily aimed at stakeholders requiring a detailed, technical understanding of the baseline conditions for soils and geology.

1.5 Report scope

This report considers the baseline conditions relating to soils and geology in the study area.

For the purpose of this report, 'soils' should be taken to mean Holocene/recent unconsolidated deposits and artificial geology (e.g. made ground, filled ground and worked ground). 'Geology' means both superficial deposits and bedrock geology that may be affected by the development, including both designated and non-designated sites of geological importance and mineral resources/reserves.

2. Information sources

2.1 Previous assessments

No known previous assessments are available which are relevant to baseline soil and geology conditions at the site.

2.2 Publicly and commercially available literature

The following sources of publicly or commercially available information have been consulted during the preparation of this report.

- *1:50,000 Scale 'Solid and Drift Geology' Geological Map of Anglesey (Special Sheet 092)* (British Geological Survey (BGS), 1974).
- *Geology of Britain Viewer* (BGS, 2017a).
- *North West Wales Mineral Resource Map* (BGS and Welsh Assembly Government, 2010).
- *North West Wales Aggregates Safeguarding Map* (BGS and Welsh Assembly Government, 2012).
- *What's In Your Backyard? Online Mapping* (Environment Agency, 2017).
- *1:250,000 Series Agricultural Land Classification: Wales* (Ministry of Agriculture, Fisheries and Food, 1977).
- *Soils of England and Wales – Sheet 2: Wales. Scale 1:250,000* (Soil Survey of England and Wales, 1984).
- *Flood Risk Map* (Natural Resources Wales (NRW), 2017).
- *Regional Unexploded Bomb Risk: Isle of Anglesey* (Zetica, 2015).

2.3 Site-specific information

The following site-specific reports/data were sourced for the site:

- *Preliminary Unexploded Ordnance Risk Assessment. GS-2753074 (BACTEC, 2016);*
- *Enviroinsight, Geoinsight and Large and Small Scale Historical Mapping (Groundsure, 2015); and*
- *Full Soils Site Report for location 232670E, 388793N, 5km x 5km (National Soil Resources Institute, 2015).*

2.4 Technical consultations

Consultation with regard to soils and geology (including land contamination) has been undertaken with NRW, the IACC and GeoMôn[1], as set out below in Table 2.1.

Table 2.1: Stakeholder consultations for soils and geology

Date	Stakeholder	Description	Response
April 2016	GeoMôn	Information regarding non-listed geological features which may be affected	There are no geological Sites of Special Scientific Interest, Geological Conservation Review sites or Regionally Important Geodiversity within or close to the study area. GeoMôn is not aware of any other non-listed (non-designated) geological features within the study area. Should the construction go ahead, the

[1] GeoMôn is the organisation that oversees the GeoMôn Geopark, which covers the whole of the Isle of Anglesey.

Date	Stakeholder	Description	Response
			excavations might produce temporary exposures of interest for geologists to study. GeoMôn (and potentially other geologists) would therefore be grateful to have notice of the construction and access to study any such temporary exposures if they are created.
April 2016	IACC	Information regarding mineral resources, potential sources of contamination and any other desk-study information held	The IACC confirmed that there are no statutory areas of contaminated land within the study area, no known landfill sites and no *Pollution Prevention and Control Act 1999* permit holders. The IACC identified a former quarry/pond between the A5 (Holyhead Road) and A55 within the site boundary, which may be infilled.
April 2016	NRW	Information regarding potential sources of contamination and any other desk-study information held	NRW stated that they had no additional comments.

2.5 Site surveys

On 20 January 2016, site reconnaissance was undertaken to further inform the baseline assessment of soils and geology; selected photographs can be found in Appendix A.

In March 2016, a detailed ALC survey was undertaken at the site (Reading Agricultural Consultants Limited, 2016). Reference should be made to Section 3.2 for further details.

3. Soil types and quality

3.1 Soil type

The National Soil Resources Institute (2015) report (which provides partial coverage of the site – see Appendix B) and national soil mapping for Wales (Soil Survey of England and Wales, 1984) identify Brickfield 2 as the only soil association (type) present within the study area. Table 3.1 details the characteristics of this soil association.

Table 3.1 : Characteristics of Brickfield 2 soil association

Characteristic	Description
Source	Drift from Palaeozoic and Mesozoic sandstone and shale.
Composition	Slowly permeable, seasonally waterlogged fine loamy soil with low natural soil fertility.
Hydrology	Hydrology of soil type class 24: Slowly permeable, seasonally waterlogged soils over slowly permeable substrates with negligible storage capacity; minor risk of flooding.
Pollutant leaching potential	Soils in which pollutants are unlikely to penetrate the soil layer either because water movement is largely horizontal or because they have a large ability to attenuate diffuse source pollutants.
Land use	Seasonally wet pastures and woodlands. Dairying and stock rearing on permanent or short-term grassland; some cereals in drier areas.

3.2 Soil quality

The economic resource value of soil is measured primarily by its ability to support agricultural uses. This is quantified by its ALC grade, which is determined through climatic, topographical and interactive soil limitations. Best and most versatile agricultural land equates to Grades 1 and 2 and Subgrade 3a of the ALC system and is the most flexible land in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining yield. *Planning Policy Wales* (Edition 9) states that best and most versatile land should be conserved as a finite resource for future use wherever possible, and considerable weight should be given to protecting it because of its special importance (Welsh Government, 2016).

According to Provisional ALC data for Wales (Ministry of Agriculture, Fisheries and Food, 1977), the study area mainly comprises Grade 4 (poor quality) agricultural land, with Grade 3 (good to moderate quality) land located across the southwest of the site and study area. However, these data only provide a high-level indication of land quality for the purposes of strategic assessment; they are not suitable for the evaluation of individual sites.

A detailed ALC survey was undertaken at the site in March 2016 (Reading Agricultural Consultants, 2016 – Appendix C). The assessment of ALC was completed in accordance with the guidance presented in the *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land* (Ministry of Agriculture, Fisheries and Food, 1988).

Local agro-climatic conditions were interpreted from Meteorological Office data, and the area was found to be wet and moderately warm, with moderate crop moisture deficits and a relatively high number of field capacity days.

Ten auger observations and one observation pit were located in the survey area. The location of the survey points and the grading assigned for the site are presented in Appendix C. At each observation point, soil texture, significant stoniness, colour, consistency, structural condition, free carbonate and depth were assessed. Soil wetness class was also inferred from matrix colour, mottling and low permeability layers; and soil droughtiness calculated through moisture balance equations. Subsoil structures were examined at the

observation pit. One topsoil sample was sent to the laboratory for the determination of soil texture, pH, phosphorous, potassium and magnesium.

The topsoil is mostly either medium clay loam or sandy clay loam, of an average depth of 33cm; a heavy clay loam texture is present in the east of the site. Two types of subsoil are present; the first is a poorly permeable clay and the second is a sandy clay loam. Mottles, indicative of gleying, are common throughout the subsoil, which indicates poor permeability. The whole site is limited to Subgrade 3b on this basis due to a wetness and workability limitation.

The site boundary has extended since the survey was undertaken, but the vast majority of the additional land is covered by hardstanding, thus natural soils would not be present.

Information regarding potential soil chemical quality is detailed in Section 8.

4. Geology

Information has been obtained from the Groundsure reports presented in Appendix D (Groundsure, 2015) and BGS mapping (BGS, 1974; 2017a) unless otherwise stated.

4.1 Made ground

Published geological mapping does not indicate the presence of artificial/made ground and it is considered unlikely that made ground is present beneath the majority of the site due to its agricultural and pastoral nature. However, there is the potential for small areas of made ground associated with the Dalar Hir farmstead.

Within the wider study area, artificial/made ground is not anticipated to be abundant but would be expected to be present associated with the roads, nearby land uses (e.g. the Cartio Môn Go-Karting centre) and small areas of infilled ground associated with surface ground workings (refer to Section 8 for further details).

A number of historical borehole and trial pit records are available from the BGS, associated with construction of the A55 road, which runs through the south of the site. The closest trial pits and boreholes are approximately 30m from the southern boundary of the site. The records do not indicate the presence of artificial/made ground (BGS, 2017a).

4.2 Superficial geology

The study area is underlain by Late Devensian glacial till, with the exception of a small area towards the centre of the southern boundary of the site in which no superficial deposits are shown on the available mapping (BGS, 1974).

The historical borehole and trial pit records available for the route of the A55 (BGS, 2017a) to the south of the main body of the site generally record the glacial till in this area as firm to stiff sandy silty clay with subangular gravel of mixed lithologies. It is likely that these deposits originated from seasonal and post-glacial meltwater streams. The trial pits and boreholes for the A55 indicate that the upper boundary of the glacial till is between 0.20m and 0.45m below ground level (mbgl) and the thickness of the glacial till is variable; bedrock was encountered at depths as shallow as 1.80m (SH37NW55), whereas another hole (SH37NW39) was drilled to 7.85m without hitting bedrock (BGS, 2017a).

4.3 Bedrock geology

The regional geological setting of the area comprises the Precambrian to Cambrian Monian Supergroup and undifferentiated Ordovician conglomerates and sandstones. The Monian Supergroup, a 7km thick sequence of sedimentary, metamorphic and igneous rocks, can be subdivided into the Gwna Group, the New Harbour Group and the South Stack Formation.

The majority of the study area is underlain by rocks belonging to the New Harbour Group, comprising mica schist and psammite derived from metamorphism of sea floor sediments. Two lenticular igneous bodies bisect the central section of the site, trending from northeast to southwest, and are mapped as lava units within the New Harbour Group. The feature to the west is approximately 30m wide, and the feature to the east is approximately 120m wide. Undifferentiated Ordovician Rocks, recorded as interbedded sandstone and conglomerate, underlie the eastern portions of the site and study area. There are no recorded faults within the study area (BGS, 1974).

Bedrock was encountered in a number of boreholes drilled along the alignment of the A55 (BGS, 2017a). Borehole SH37NW38, 60m south of the main body of the site, encountered the New Harbour Group from 2.10mbgl. It was described as green, slightly weathered mica schist. Borehole SH37NW56, approximately 50m south of the site, encountered Ordovician breccia from 2.50mbgl. This was described as blueish, highly fractured, iron-stained slightly to moderately weathered breccia. Borehole SH37NW55, approximately 40m south of the eastern end of the site, records Ordovician sandstone from 1.80mbgl. This was described as grey

fine- to coarse-grained thickly laminated to thinly bedded sandstone interbedded with thin to thick laminae of siltstone and mudstone.

5. Hydrology and hydrogeology

The Groundsure Geoinsight and Enviroinsight reports have been used to inform this section (Groundsure, 2015).

The Nant Dalar Hir flows approximately north to south through the eastern portion of the site. There are a number of other small watercourses and ponds on land surrounding the site and on-site in ditches. No part of the study area is located within a groundwater Source Protection Zone.

The superficial deposits (refer to Section 4.2) across the entire study area have been classified by NRW as a Secondary Undifferentiated Aquifer. This classification is assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type (Environment Agency 2017). The bedrock (refer to Section 4.3) across the entire study area has been classified by NRW as a Secondary B aquifer. These are predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering (Environment Agency 2017).

However, NRW considers groundwater present in glacial till and bedrock to be a single groundwater body and as such, they are hereafter considered together and referred to as the 'Secondary aquifers'.

There are no licensed groundwater or surface water abstractions within 1km of the site, although there is the potential for small unlicensed abstractions. There are several small land drains, which cross the site, generally on a north-south orientation, and which are classified as 'tertiary rivers'.

Refer to Chapter F8 (Surface water and groundwater) (Application Reference Number: 6.6.8) for further details on the surface water and groundwater bodies present in the vicinity of the Park and Ride.

6. Sites of geological importance

6.1 The GeoMôn Geopark

The Isle of Anglesey was included in the European Geopark Network in 2009 as a result of its outstanding geodiversity and geological heritage. The Anglesey Geopark (called the 'GeoMôn Geopark') covers the 720km^2 of the Isle of Anglesey and has approximately 200km of coastline.

The European Geopark Network aims to protect geodiversity, promote geological heritage to the general public and support sustainable economic development of Geopark territories through the development of geological tourism. As a member of the European Geopark Network, it is also included in the Global Geopark Network.

In November 2015, the GeoMôn Geopark was designated as a United Nations Educational, Scientific and Cultural Organisation (UNESCO) Global Geopark at UNESCO's 38th General Conference (UNESCO, 2016). The new designation is intended to raise awareness and promote respect for the environment and integrity of the landscape. The status also expresses governmental recognition of the importance of holistic management of the Geoparks. The designation is not legislative, but the key heritage sites within the Geoparks should be protected under local, regional or national legislation as appropriate. The UNESCO Global Geopark designation is not permanent. A revalidation process exists whereby a thorough re-examination of the Geopark is undertaken every four years, after which the status is either renewed for a further four years, or the management body will be allowed two years to fulfil certain criteria. Should these still not be met after the prescribed period, the park would lose the UNESCO Global Geopark status (UNESCO, 2016).

Both NRW and GeoMôn have responsibilities for protecting geosites. NRW has a statutory responsibility to protect areas notified as geological Sites of Special Scientific Interest and GeoMôn leads on the conservation of Regionally Important Geodiversity Sites within the GeoMôn Geopark. Both organisations work together to protect and promote the sustainable use of Anglesey's geoheritage.

6.2 Sites of geological importance

There are no Regionally Important Geodiversity Sites or geologically designated Sites of Special Scientific Interest within the study area, and no sites have been identified that are likely to be affected by the proposed Park and Ride (Natural England, 2017; Wood, 2007). Consultation undertaken with GeoMôn, outlined in Table 2.1, has confirmed this.

7. Geological resources

7.1 Minerals

The following sources of information have been used to identify mineral resources within the study area:

- *Mineral Resource Map of Wales* (BGS and Welsh Assembly Government, 2010);
- *North West Wales Aggregates Safeguarding Map* (BGS and Welsh Assembly Government, 2012);
- *Hard Rock and Sand & Gravel Safeguarding Areas in Ynys Môn* (Capita Symonds, 2010); and
- extract from *BritPits* (BGS, 2017b), provided by the North Wales Minerals and Waste Planning Service.

None of the Mineral Safeguarding Areas identified within the *Hard Rock and Sand & Gravel Safeguarding Areas in Ynys Môn* report or the quarries identified within the BritPits extract are located within the study area. BritPits is a database of surface and underground mineral workings produced by the BGS – BritPits is an abbreviation of British Pits.

The eastern portion of the site and study area, corresponding with the area of Ordovician bedrock geology, has been identified as a Category 2 Aggregates Safeguarding Area for sandstone (BGS and Welsh Assembly Government, 2012).

7.2 Mining

According to the Groundsure report (Groundsure, 2015) the site is not located in an area directly affected by underground coal mining. No evidence of historical mining/mineral extraction has been identified.

8. Land contamination

8.1 Introduction

The preliminary land contamination risk assessment presented below is based on the information sources referenced in Section 2.

8.2 Approach

The process of contamination risk assessment is defined within *Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 (CLR11)* (Department for Environment, Food and Rural Affairs (Defra) and Environment Agency, 2004). A summary of the approach which has been adopted within this report is outlined below.

- Hazard identification, which involves establishing contaminant sources and hazard assessment, by way of identifying pathways (a route or means by which a receptor can be exposed to, or affected by, a contaminant) and receptors, and identifying where a potential pollutant linkage (PPL) exists. Both hazard identification and assessment stages conclude in development of the conceptual site model.
- Risk estimation, which predicts the likelihood of harm or pollution occurring (probability assessment) and the degree of harm or pollution occurring (consequence assessment). Risk estimation is only undertaken when a PPL exists and has two components:
    1) probability assessment which relates to whether pollution/harm could occur in the short- and/or long-term; and
    2) consequence assessment which relates to the magnitude of harm that could occur because of the PPL, that is, the degree of harm or pollution considering the sensitivity of the receptor.
- Risk evaluation, which is the process of deciding whether a risk is acceptable or not, entails the application of evaluation criteria, which may be absolute standards or recommended limit values, for example, a health criterion for the intake of a substance.

8.3 Sources

A summary of information relevant to potential contamination sources within the study area is presented below.

8.3.1 Historical map review

The historical land use was determined from large and small-scale historical ordnance survey maps (Groundsure, 2015) and is summarised in Table 8.1.

Table 8.1: Historical map review

Date	Scale	Site description	Remainder of study area
1887	1:10,560	The majority of the site is shown as undeveloped agricultural land. Dalar Hir farmstead is shown. A field to the north of Dalar Hir farmstead is marked to have furze (shrub) present within. A small track is shown leading from the farmstead to Holyhead Road, which lies within the southern boundary of the site (although it is not named at this time). An unnamed road running from north to south intersects the site in its northwestern and southwestern extents. There are several small circular features shown, primarily in the south of the site. A land drain/river is marked flowing north to south through the eastern portion of the site (on a similar alignment to present day).	The majority of the study area also comprises undeveloped agricultural land, with isolated farmsteads to the south, east and north. There are ponds shown in the far northwestern portion of the study area, approximately 200m from the site boundary.
1888	1:2,500	The small circular features are marked as pits. An old quarry is marked to the south of Holyhead Road (still unnamed).	No significant changes to the study area.
1899	1:10,560	An extra building and a well are shown at Dalar Hir farmstead.	No significant changes to the study area.
1900	1:2,500	A small pond is shown adjacent to the southern boundary in the eastern portion of the site.	No significant changes to the study area.
1924	1:2,500	The small circular pits are no longer marked, suggesting they have been infilled.	No significant changes to the study area.
1926	1:10,560	No significant changes to the site.	No significant changes to the study area.
1949	1:10,560	No significant changes to the site.	No significant changes to the study area.
1959	1:10,560	No significant changes to the site.	No significant changes to the study area.
1973	1:2,500	Dalar Hir farmstead is shown to have been further developed slightly. The old quarry is now marked as a pond.	A transmitting station is shown approximately 180m south of the site. The road layout to the southwest of the site has been amended slightly to include a trunk road and Holyhead Road is now labelled. Several further small ponds are marked between 100m and 250m from the site boundary in the southern portion of the study area.
1977	1:10,000	No significant changes to the site.	No significant changes to the study area.

Date	Scale	Site description	Remainder of study area
1995	1:2,500	No significant changes to the site.	The ponds in the northwestern portion of the study area are no longer shown and are presumably infilled.
2002	1:10,000	There have been significant changes to the road layout within the southwest of the site, with two roundabouts visible and a slight realignment of the original Holyhead Road (A5).	The construction of the A55 has resulted in significant off-site road layout changes, including associated junctions.
2010	1:10,000	No significant changes to the site.	The Cartio Môn Go-Karting centre is shown in the eastern portion of the study area, adjacent to the eastern site boundary. The DVSA vehicle checkpoint area (not labelled) is shown in the western portion of the study area, adjacent to the western site boundary. A scrap yard is shown in the far southeastern portion of the study area.
2014	1:10,000	No significant changes to the site.	No significant changes to the study area.

8.3.2 Summary of historical land use

On-site

The majority of the site has remained undeveloped agricultural land, although the Dalar Hir farmstead and road infrastructure have been developed on site. Activities associated with farming are a potential (but minor) contamination source, as is made ground associated with the roads. There are several small old pits in the central southern portion of the site, which were no longer shown on mapping from 1924, suggesting they may have been infilled. A quarry (later annotated as a pond) was mapped within the south of the site, which may have been infilled, as indicated through consultation with the IACC (refer to Table 2.1).

A small gas governor station is identified within the western extent of the site by the Groundsure report (Groundsure, 2015), although it is not clear when this was constructed.

Off-site

The land surrounding the site within the study area has also remained largely undeveloped agricultural land – the most significant development being construction of the A55. Other nearby development within the study area has included the Cartio Môn Go-Karting centre to the east of the site and the DVSA vehicle checkpoint area to the west.

At a greater distance, a transmitting station is present to the south and a scrap yard to the southeast, approximately 180m and 230m from the site respectively. Ponds (northwest of site) were also present but may have been infilled.

8.3.3 Contemporary land use

The features below were identified during the site walkover which may be of relevance to land contamination.

On-site

- Soil heap with waste material inclusions (tyres, plastic, bricks, stone and concrete were visible) in yard around Dalar Hir farmhouse –.

- Possible burnt material (ash) in field adjacent to the south of the farmhouse.

Off-site

- No additional features of relevance were identified during the site walkover.

8.3.4 Regulatory and archive information

Unless otherwise stated, the information below has been obtained from the Groundsure report (Groundsure, 2015).

(a) Discharge consents

No discharge consents have been reported within the study area.

(b) Pollution incidents to controlled waters

No pollution incidents to controlled waters have been recorded within the study area.

(c) Landfill and waste sites

There are no landfills within the study area. A waste transfer station and scrap yard is present in the far southeastern extent of the study area, approximately 200m from the site boundary at its closest point. Given the distance and the low permeability strata, this site is not considered further as a potential source of contamination.

(d) Potentially contaminative industries and land uses

The only current potentially contaminative industry and land use listed within the Groundsure report (Appendix D) is a gas governor station, located within the west of the site. Given this feature is modern infrastructure, it is assumed not to represent a source of contamination.

(e) Petrol/fuel stations

There are no petrol/fuel stations within the study area.

(f) National gas and electricity supply pipelines

The National Grid records do not indicate the presence of high-voltage/pressure electricity or gas pipelines within the study area. However, gas supply pipes are present in the vicinity of the London Road leading to/from the gas governor station as evidenced by the presence of service marker posts adjacent to the site (Google, 2017).

(g) Radon

The site is not located within an area affected by radon, as less than 1% of the properties in the area are above the action level.

(h) Unexploded ordnance

The *Regional Unexploded Bomb Risk: Isle of Anglesey* (Zetica, 2015) identifies that the study area is within a moderate risk area for encountering unexploded ordnance. Moderate risk regions are those that show a bomb density of 11 to 50 bombs per 1,000 acres and may contain potential World War II targets.

As a result, a site-specific *Preliminary Unexploded Ordnance Risk Assessment* was ordered for the site (BACTEC, 2016), which is presented in Appendix E. The report advised that the risk of unexploded ordnance at the site is negligible and that no further action is considered necessary.

8.3.5 Potential contaminants of concern

Based upon the above identified potential sources of contamination, the contaminants of concern listed below may be present on-site and off-site.

On-site

- Roads and potentially infilled pits, ponds and quarries (potential made ground), pre-1887 to 2002: heavy metals, hydrocarbons, asbestos and ground gas.
- Farm activities (historical farm activities, could include cesspits and sheep dips), pre-1887 to present: heavy metals, hydrocarbons pesticides/herbicides and insecticides, ground gases.
- Soil heap with waste material inclusions (e.g. tyres, plastic, bricks, stone and concrete) in yard around Dalar Hir farmhouse, identified during site reconnaissance: heavy metals, hydrocarbons and asbestos.
- Possible burnt material (ash) in field adjacent to the south of the farmhouse, identified during site reconnaissance: heavy metals and hydrocarbons.

Off-site

- Made ground (potential for made ground associated with infilled quarries, ponds and construction of roads adjacent): heavy metals, hydrocarbons, ground gas.
- DVSA centre (potential made ground, fuels, lubricating oils etc. associated with vehicular use) 2010 to present: heavy metals, hydrocarbons.
- Cartio Môn Go-Karting centre (potential made ground, fuels, paints, lubricating oils etc. associated with vehicle use and repair) 2010 to present: heavy metals, hydrocarbons, volatile organic compounds.

8.4 Receptors

The key receptors located within the study area and their nature, typical activity and exposure routes are described in the tables below.

8.4.1 Human health

The human health receptors relevant to the proposed development are described in Table 8.2.

Table 8.2: Human health receptors

Receptor	Typical activity
Construction/maintenance worker	All activities involved with the construction of the Park and Ride. High likelihood of contact with site soils and likely contact with groundwater during earthworks.
Maintenance workers	Routine maintenance work. Likely contact with site soils and low likelihood with groundwater.
Future site workers	Future workers at the Park and Ride. Unlikely contact with site soils (due to abundance of hardstanding cover) and groundwater. Low (as opposed to very low) likelihood of inhalation/risk from vapours/ground gases given that workers will likely use buildings at the Park and Ride.
Future site users	Future users of the Park and Ride. Unlikely contact with site soils (due to abundance of hardstanding cover) and groundwater. Unlikely inhalation of vapours/ground gases given low likelihood of significant ground gas generation and the anticipated short occupancy of indoor spaces by site users.
Adjacent land users	Primarily agricultural land use. Low likelihood of inhalation of wind-blown dusts and contaminants from site.

8.4.2 Controlled waters

The relevant environmental receptors in terms of controlled waters and sensitive environmental sites are set out in Table 8.3.

Table 8.3: Controlled waters receptors

Receptor	Description
Groundwater	Secondary aquifers
Surface water	Small (tertiary) drainage networks and ponds on-site and within the study area.

8.4.3 Property

The relevant property receptors are set out in Table 8.4. Given the proposed use of the Park and Ride, other property receptors (crops and livestock) are not considered relevant and are not discussed further.

Table 8.4: Property receptors

Receptor	Description
Buildings/services (future site use)	Park and Ride facilities to be constructed on-site (including buildings).

8.5 Pathways

Potential pathways by which the on-site contaminants may affect identified human health receptors at the site are:

- inhalation of contaminated soil dusts and/or vapours;
- ingestion of contaminated soil or groundwater; and
- dermal contact with contaminants.

Pathways relevant to controlled waters receptors are:

- leaching of contaminants to groundwater; and
- migration of contaminants via surface runoff.

Pathways relevant to property receptors are:

- direct contact with contaminated soils and groundwater; and
- migration of ground gases and vapours into voids within buildings followed by build-up and potential explosion and/or asphyxiation.

Pathways relevant to contaminants once they have entered surface water and groundwater are considered within Chapter F8 (Application Reference Number: 6.6.8) and will not be discussed further herein.

8.6 PPLs and risk assessment

Based on the contaminant sources, receptors and pathways outlined above, a small number of PPLs have been identified and a conceptual site model has been developed. Using guidance within CLR11 (Environment Agency and Department for Environment, Food and Rural Affairs, 2004) and *Contaminated Land Risk Assessment – A Guide to Good Practice (C552)* (Rudland *et al.*, 2001), a qualitative risk assessment has been undertaken to assess the significance of each contaminant linkage using the criteria set out in Tables 8.5 to 8.8.

Within the risk assessment, the consequence of occurrence (severity) takes into consideration the likely concentrations of contaminants which may be present and their abundance.

The conceptual site model and risk assessment are presented in Table 8.9.

Table 8.5: Consequence of occurrence/severity

Classification	Human health	Controlled Waters	Property
Severe	Short-term (acute) risk to human health. Concentrations present are likely to result in "*significant harm*" as defined by Part 2A of the *Environmental Protection Act 1990*.	Substantial pollution of water resources such that 'significant pollution' or 'significant possibility of pollution' of controlled waters as defined by Part 2A of the *Environmental Protection Act 1990* is being caused.	Catastrophic damage to buildings, structures or the environment, including building collapse.
Medium	Chronic damage to human health. Concentrations present that could result in significant harm.	Pollution of water resources such that there is a measurable (but not significant) reduction in water resources compared to the water quality standards.	Significant damage to buildings, structures or the environment making it unsafe to occupy, or damage that may impair a scheduled ancient monument.
Mild	Slight short-term health effects to humans. Exposure to human health is unlikely to lead to significant harm.	Measureable reduction in water quality compared to baseline.	Minor damage to sensitive buildings, structures, services or the environment.
Minor	Non-permanent effects to human health (easily prevented by means such as personal protective clothing, etc.)	Insubstantial pollution to water resources compared to baseline.	Easily repairable effects of damage to buildings or structures.

Table 8.6: Estimation of probability (likelihood)

Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period that such an event would take place, and is even less likely in the shorter term.

Classification	Definition
Unlikely	There is a pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Table 8.7: Risk ratings

Risk matrix		Consequence of occurrence (severity)			
		Severe	Medium	Mild	Minor
Probability (likelihood)	High likelihood	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Table 8.8: Risk definition

Risk	Risk description
Very high	There is a high likelihood of the event occurring and having severe consequences. If the risk is realised it is likely to result in a substantial liability.
High	It is likely that an event with medium or even severe consequences could arise. If the risk is realised it may result in a substantial liability.
Moderate	It is possible that an event could occur and it is either unlikely and consequences may be severe or if it were to occur it is likely that consequences would be relatively mild. Investigation would normally be required to clarify the risk and determine the potential liability.
Low	It is possible that an event could occur but it is likely that the consequences would be mild at worst.
Very low	It is unlikely that an event could occur, and the consequences are likely to be mild at worst.

Table 8.9: PPLs

Source	Potential contaminants	Pathway	Receptor	Consequence of occurrence	Likelihood of occurrence	Potential risk	Comments
On-site							
Soils and groundwater: Made ground (from roads, small areas of potentially infilled ground, a soil heap with waste material inclusions) and possible burnt material (ash) in field adjacent to farmhouse	Heavy metals Hydrocarbons Asbestos	Ingestion, inhalation, dermal contact with contaminated soil/groundwater within potential made ground	Construction workers Maintenance workers	Medium	Low likelihood	Moderate/low	The infilling of features is not proven and the areas are small. Most features were no longer shown on mapping from 1924, whilst the quarry was marked as a pond from 1973; if infilled, the material has been present a relatively long time – any significant environmental impact would likely have occurred already (i.e. leaching to controlled waters). The soil heap and burnt material were localised, small in extent and appeared to be limited to the surface, such that effects on groundwater and surface waters are unlikely.
		Ingestion, inhalation, dermal contact with contaminated soil within potential made ground	Future site workers Future site users	Medium	Unlikely	Low	
		Inhalation of wind-blown dust and contaminants from contaminated soil within potential made ground	Adjacent land users	Mild	Unlikely	Very low	
		Leaching of contaminants through superficial deposits to the aquifer/migration of contaminants to surface waters	Secondary aquifers Surface waters	Mild	Unlikely	Very low	
	Ground Gases	Accumulation of ground gases within enclosed spaces leading to potential risk of asphyxiation and/or explosion.	Construction workers Maintenance workers Future site workers Future site users Buildings	Severe	Unlikely	Moderate/low	Given the age and small size of the potentially infilled areas, significant (if any) ground gas generation is considered only a low likelihood.
Soils and groundwater: Farming activities (including potential isolated sheep dips, cess pits, etc. if present)	Heavy metals Hydrocarbons Pesticides/herbicides and insecticides	Ingestion, inhalation, dermal contact with contaminated soil/groundwater	Construction workers Maintenance workers	Medium	Low likelihood	Moderate/low	There is unlikely to be significant contamination present as a result of the farming activities, although isolated and localised areas may be present as a result of spillages/leakages of fuels, etc.
		Ingestion, inhalation, dermal contact with contaminated soil	Future site workers Future site users	Medium	Low likelihood	Low	
		Inhalation of wind-blown dust and contaminants from contaminated soil within affected areas	Adjacent land users	Mild	Unlikely	Very low	
		Leaching of contaminants through superficial deposits to the aquifers/migration of contaminants to surface waters	Secondary aquifers	Mild	Low likelihood	Low	
	Ground Gases	Accumulation of ground gases within enclosed spaces leading to potential risk of asphyxiation and/or explosion.	Construction workers Maintenance workers Future site workers Future site users Buildings	Severe	Unlikely	Moderate/low	Significant (if any) ground gas generation is considered unlikely.

Source	Potential contaminants	Pathway	Receptor	Consequence of occurrence	Likelihood of occurrence	Potential risk	Comments
Off-site							
Made ground associated with construction of roads and potentially infilled ponds/quarries in vicinity of the site.	Heavy metals Hydrocarbons	Migration of contaminants on-site via groundwater and ingestion, inhalation, dermal contact with contaminated soil/groundwater	Construction workers Maintenance workers	Medium	Unlikely	Low	It is unlikely that these sources would introduce significant contamination into the area and migration onto site of contaminants and ground gases via the superficial and bedrock geology would be greatly reduced by these strata's low permeability.
		Migration of contaminants on-site via groundwater and ingestion, inhalation, dermal contact with contaminated soil/groundwater	Future site workers Future site users	Medium	Unlikely	Low	
		Migration of contaminants to aquifer beneath site/surface waters	Secondary aquifers Surface waters	Mild	Unlikely	Very low	
	Ground gases	Migration onto site followed by accumulation of ground gases within enclosed spaces leading to potential risk of asphyxiation and/or explosion.	Human health Buildings	Severe	Unlikely	Moderate/low	
Contamination associated with operation of DVSA vehicle check centre and Cartio Môn Go-Karting centre.	Heavy metals Hydrocarbons Solvents	Migration of contaminants on-site via groundwater and ingestion, inhalation, dermal contact with contaminated soil/groundwater	Construction workers Maintenance workers	Medium	Unlikely	Low	It is unlikely that these sources would introduce significant contamination into the area and migration onto site of contaminants, and ground gases via the superficial and bedrock geology would be greatly reduced by these strata's low permeability.
		Migration of contaminants on-site via groundwater and ingestion, inhalation, dermal contact with contaminated soil/groundwater	Future site workers Future site users	Medium	Unlikely	Low	
		Migration of contaminants to aquifer beneath site/ surface waters	Secondary aquifers Surface waters	Mild	Unlikely	Very low	
	Ground gases	Migration onto site followed by accumulation of ground gases within enclosed spaces leading to potential risk of asphyxiation and/or explosion.	Human health Buildings	Severe	Unlikely	Moderate/low	

8.7 Discussion

The findings of the desk-based assessment and site reconnaissance indicate that there are unlikely to be any significant contamination sources present across the site, due to the limited and generally non-contaminative previous land uses.

The risks associated with any complete pollutant linkages are considered to be low or very low, with the exception of risks to construction workers and maintenance workers who have increased likelihood of contact with soils and groundwater, for whom moderate/low risks were identified from on-site sources. The presence of hardstanding across much of the site would prevent future site users from coming into contact with site soils. Moderate/low risks were also identified for ground gases; however, this is the lowest possible risk outcome based on the severity of the risk. Based upon the sources identified, ground gas generation rates (if present) are likely to be very low.

8.8 Uncertainty analysis

An uncertainty evaluation has been undertaken to inform the requirement for further assessment.

8.8.1 Source uncertainties

No Ground Investigation data are available for the site and thus the sources identified represent those which can be identified from a desk-based review. There remains the potential for additional contamination sources to be present which have not been identified herein.

8.8.2 Pathway uncertainties

Without Ground Investigation data, it is not possible to accurately assess the potential for the exposure of human health or property receptors (either on or off-site) to contaminants or to consider the likelihood migration of contaminants to underlying groundwater.

8.9 Next steps

A Ground Investigation would be undertaken prior to the development of the Park and Ride, and this should include provision to investigate the potential presence of made ground and contamination. If the need for remediation is identified, a remediation strategy, followed by a remediation implementation plan, would be prepared in accordance with the requirements of CLR11 (Defra and Environment Agency, 2004). Any remediation would be designed to mitigate risks from contamination and reduce effects to receptors during construction and operation.

9. Glossary

Acronym	Definition
ALC	Agricultural Land Classification
BGS	British Geological Survey
CLR11	Contaminated Land Report 11
Defra	Department for Environment, Food and Rural Affairs
DVSA	Driver and Vehicle Standards Agency
IACC	Isle of Anglesey County Council
NRW	Natural Resources Wales
PPL	Potential pollutant linkage
UNESCO	United Nations Educational, Scientific and Cultural Organisation

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11. Limitations

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There is no warranty, expressed or implied, that the work reported herein has uncovered all potential environmental liabilities associated with the site. The findings of this report were developed in a manner consistent with a level of care and skill normally exercised by members of the environmental science and engineering profession currently practising under similar conditions.

A number of the findings and conclusions presented in this report are based on information provided by third parties and/or historical records, which Horizon Nuclear Power Wylfa Limited has relied on in good faith. Jacobs accepts no responsibility for any deficiency, misstatements, or inaccuracy contained in this report as a result of errors, omissions or misstatements of said third parties or from information obtained from these.

If new information is obtained or developed during future work (which may include excavations, borings or other studies), Jacobs should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

Figures

FIGURE 1

N
W E
S

Legend

- Park and Ready
- Study area

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	AUG 17	Initial Issue	AD	CC	KY	RB

Client

HORIZON NUCLEAR POWER

Project

WYLFA NEWYDD PROPOSED NUCLEAR POWER STATION
BASELINE CONDITION REPORT

Drawing Title

APPENDIX F7-1
SOILS AND GEOLOGY STUDY AREA

Scale @ A3	1:4,500	DO NOT SCALE
Jacobs No.	60PO8077	
Client No.		

Drawing No.

60PO8077_DCO_VOL_F_APP_07_01

0 25 50 100 150 200 250 metres

Appendix A. Site reconnaissance photographs

Photograph 1: View of farm from southeast of the Park and Ride looking to the north-west-west

Photograph 2: Rubble in yard within the northwest of the Park and Ride

Appendix B. National Soil Resources Institute report

National Soil Resources Institute

Cranfield UNIVERSITY

Soils Site Report

Full Soil Report

National Grid Reference: SH3057680287
Easting: 230576
Northing: 380287
Site Area: 5km x 5km

Prepared by
authorised user:
Joanne Jeffreys
Jacobs

2 March 2015

Citations

Citations to this report should be made as follows:

National Soil Resources Institute (2015) Full Soils Site Report for location 230576E, 380287N, 5km x 5km, National Soil Resources Institute, Cranfield University. Accessed via https://www.landis.org.uk/sitereporter/.

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About this report

This Soils Site Report identifies and describes the properties and capacities of the soil at your specified location as recorded in the 1:250,000 scale National Soil Map for England and Wales. It has been produced by Cranfield University's National Soil Resources Institute.

The National Soil Map represents the most accurate comprehensive source of information about the soil at the national coverage in England and Wales. It maps the distribution of soil mapping units (termed soil associations) which are defined in terms of the main soil types (or soil series) that were recorded for each soil association during field soil survey. Each soil association is named after its principal soil series and these bear the location name from where they were first described (e.g. Windsor). Each of these soil associations have differing environmental characteristics (physical, chemical and biological) and it is by mapping these properties that the range of thematic maps in this report have been produced.

Soil types and properties vary locally, as well as at the landscape scale. It is not possible to identify precisely the soil conditions at a specific location without first making a site visit. We have therefore provided you with information about the range of soil types we have identified at and around your selected location. Schematic diagrams are also provided to aid accurate identification of the soil series at your site.

Whilst an eight-figure national grid reference should be accurate to within 100m, a single rural Postcode can cover a relatively large geographical area. Postcodes can therefore be a less precise basis for specifying a location. The maps indicate the bounded area the reports relate to.

Your Soils Site Report will enable you to:

- identify the soils most likely to be present at and immediately around your specified location;
- understand the patterns of soil variation around your location and how these correlate with changes in landscape;
- identify the nature and properties of each soil type present within the area;
- understand the relevant capacities and limitations of each of the soils and how these might impact on a range of factors such as surface water quality.

For more information visit www.landis.org.uk/reports

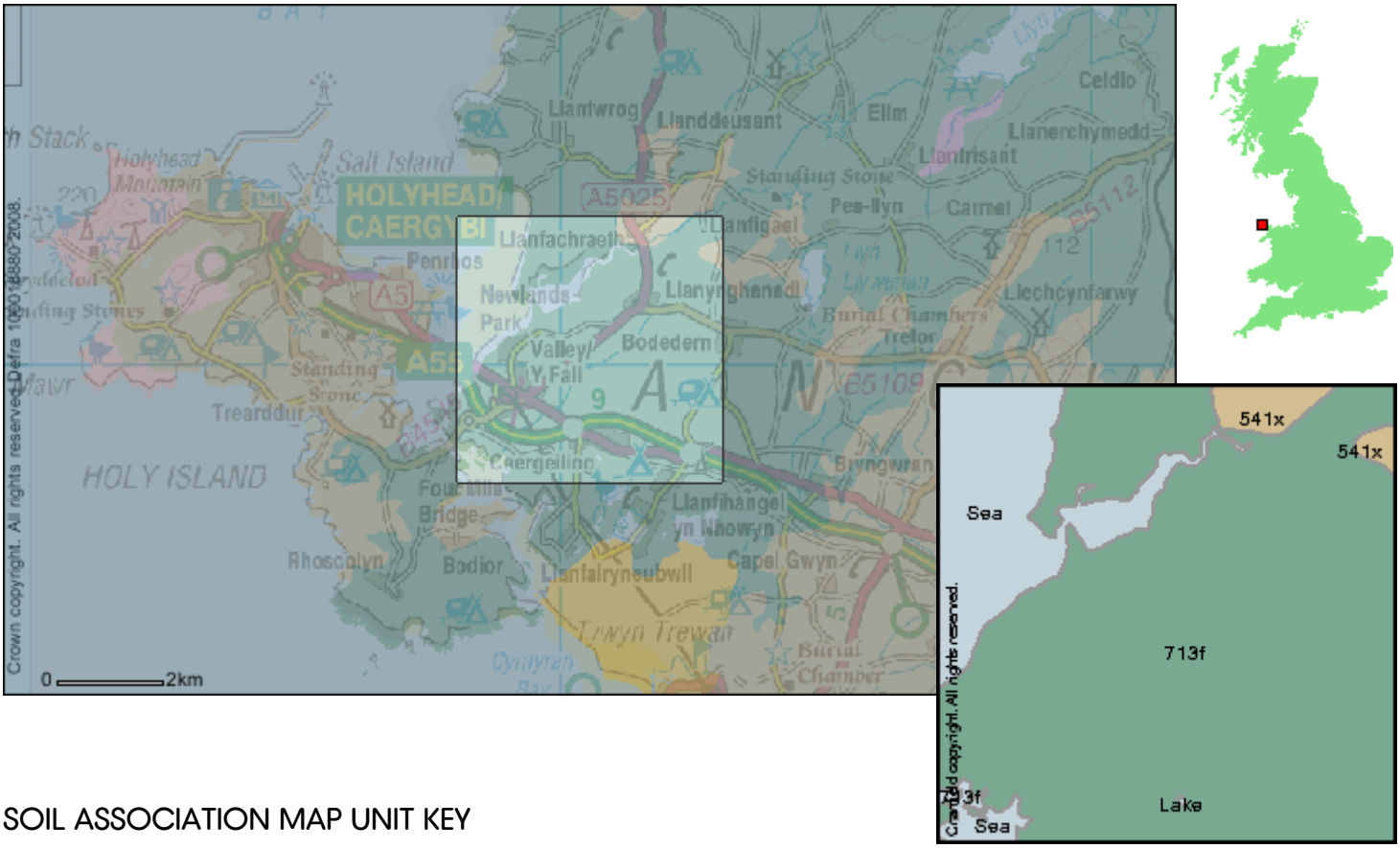
Table of Contents

1. SOIL THEMATIC MAPS

This section contains a series of maps of the area surrounding your selected location, based on the 1:250,000 scale National Soil Map, presenting a number of thematic maps relating to the characteristics of the soils. These provide an overview of the nature and condition of the local soil conditions. It is these conditions that may be used to infer the response of an area to certain events (with the soil as a receptor), such as pollution contamination from a chemical spill, or an inappropriate pesticide application and the likelihood of these materials passing though the soil to groundwater. Other assessments provide an insight into the way a location may impact, by corrosive attack or ground movement, upon structures or assets within the ground, for example building or engineering foundations or pipes and street furniture.

Soil is a dynamic environment with many intersecting processes, chemical, physical and biological at play. Even soils 'sealed' over by concrete and bitumen are not completely dormant. The way soils respond to events and actions can vary considerably according to the properties of the soil as well as other related factors such as land-use, vegetation, topography and climate. There are many threats facing our national soil resource today and forthcoming legislation such as the proposed Soil Framework Directive (SFD) (COM(2006) 232) will seek to identify measures aimed towards soil protection and ensuring the usage of soils in the most sustainable way. This report is therefore a useful snapshot of the soil properties for your given area, providing a summary of a broad range of ground conditions.

1a. SOILS - SPATIAL DISTRIBUTION



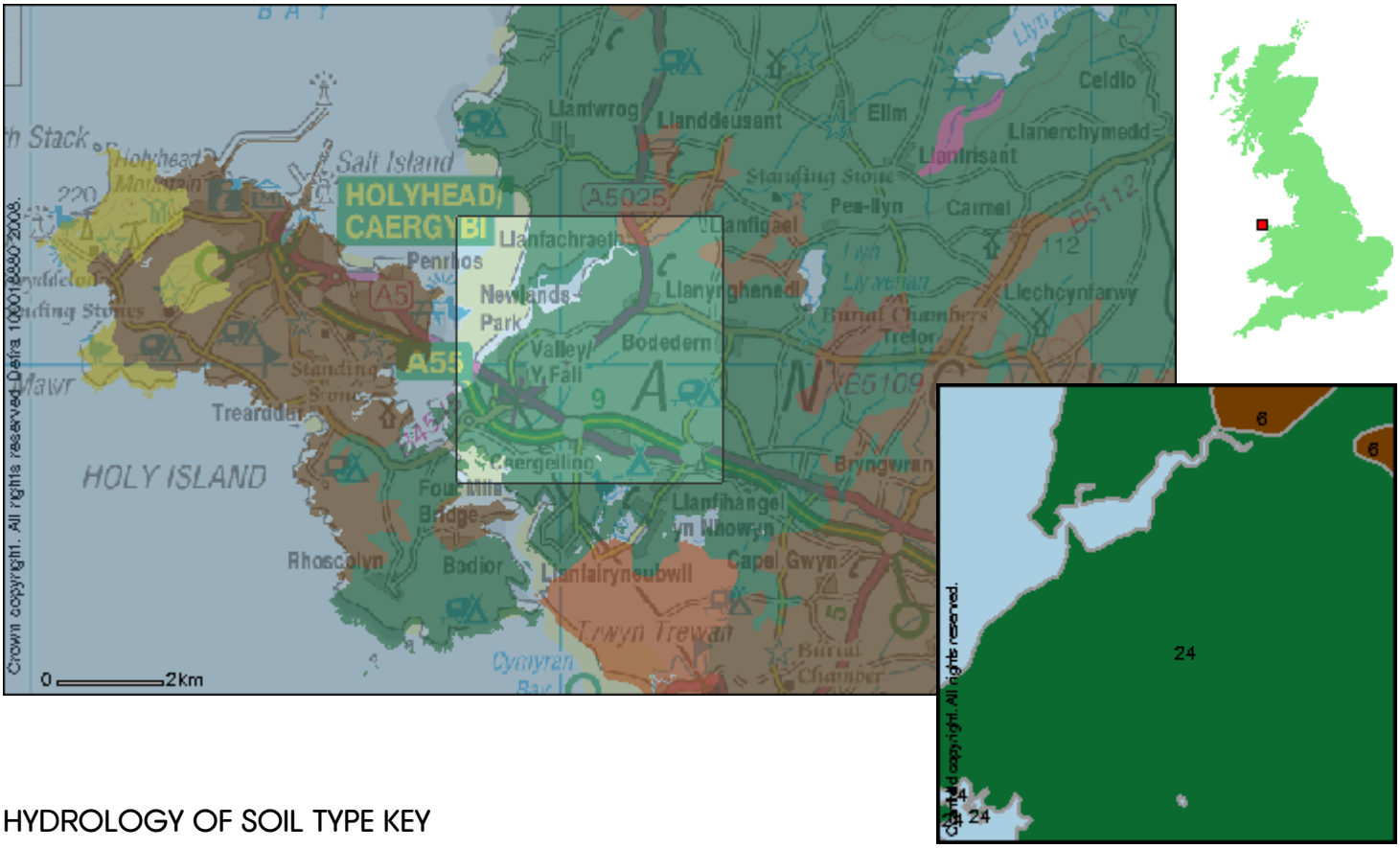
SOIL ASSOCIATION MAP UNIT KEY

EAST KESWICK 1 541x
Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

BRICKFIELD 2 713f
Slowly permeable seasonally waterlogged fine loamy soils.

Soil associations represent a group of soil series (soil types) which are typically found occurring together, associated in the landscape (Avery, 1973; 1980; Clayden and Hollis, 1984). Soil associations may occur in many geographical locations around the country where the environmental conditions are comparable. For each of these soil associations, a collection of soil types (or soil series) are recorded together with their approximate proportions within the association. Soil associations have codes as well as textual names, thus code '554a' refers to the 'Frilford' association. Where a code is prefixed with 'U', the area is predominantly urbanised (e.g. 'U571v'). The soil associations for your location, as mapped above, are described in more detail in Section 2: Soil Association Descriptions.

1b. HYDROLOGY OF SOIL TYPE (HOST)



HYDROLOGY OF SOIL TYPE KEY

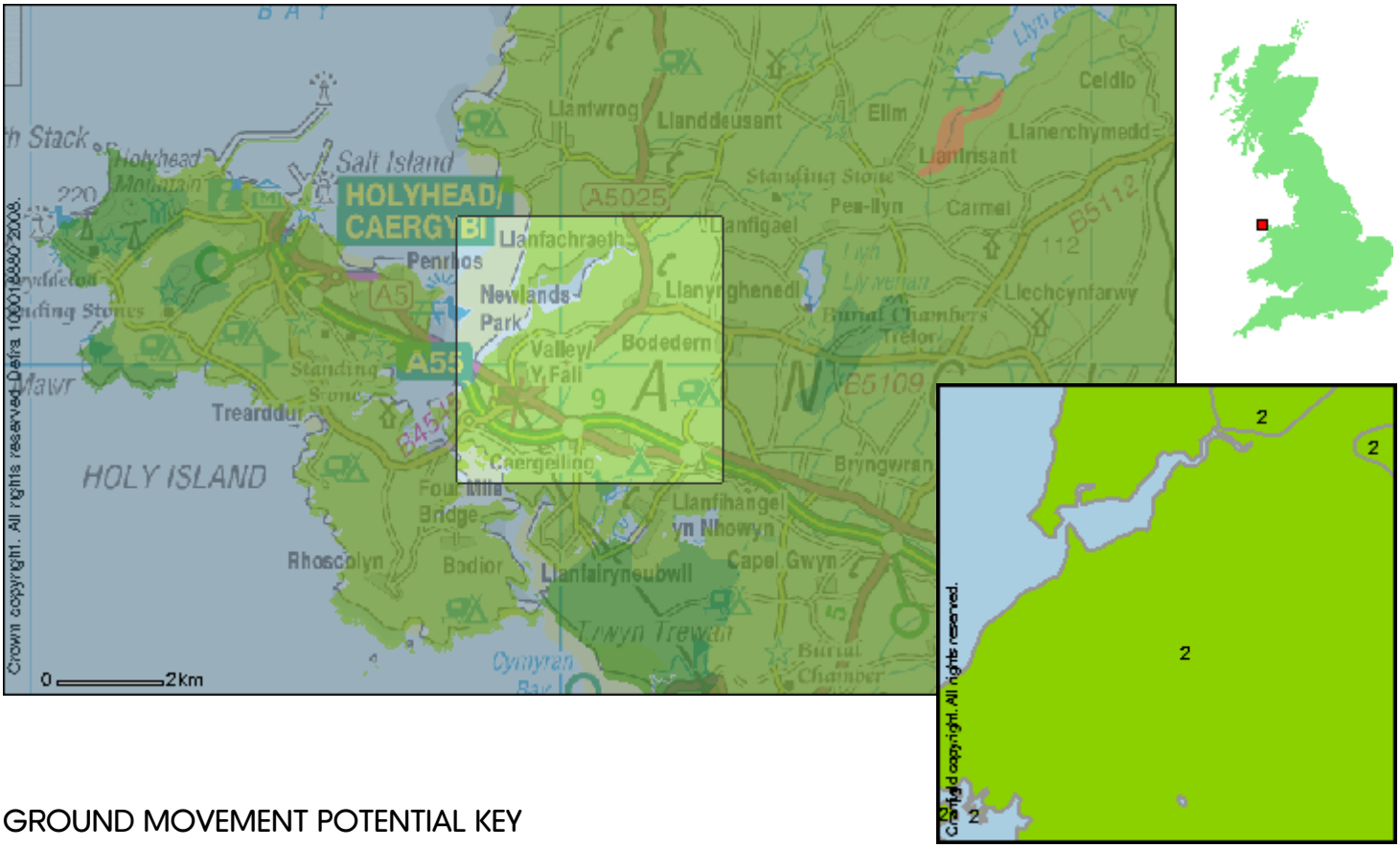
24 - *Slowly permeable, seasonally waterlogged soils over slowly permeable substrates with negligible storage capacity*

6 - *Free draining permeable soils in unconsolidated loams or clays with low permeability and storage capacity*

HOST CLASS DESCRIPTION

The Hydrology of Soil Types (HOST) classification describes the dominant pathways of water movement through the soil and, where appropriate, the underlying substrate. Eleven drainage models are defined according to the permeability of the soil and its substrate and the depth to a groundwater table, where one is present (Boorman et al,1995). These are further subdivided into 29 HOST classes to which all soil series have been assigned. These classes identify the way soil water flows are partitioned, with water passing over, laterally through, or vertically down the soil column. Analysis of the river hydrograph and the extent of soil series for several hundred gauged catchments allowed mean values for catchment hydrological variables to be identified for each HOST class, The HOST classification is widely used to predict river flows and the frequency and severity of flood events and also to model the behaviour of diffuse pollutants (Hollis et al, 1995).

1c. GROUND MOVEMENT POTENTIAL



GROUND MOVEMENT POTENTIAL KEY

- 1 - *Very low*
- 2 - *Low*
- 3 - *Moderate*
- 4 - *High*
- 5 - *Very high*

* If a High class is starred, a 'Very High' ground movement potential is likely to be achieved if these soils are drained to an effective depth of at least two metres.

GROUND MOVEMENT POTENTIAL DESCRIPTION

Clay-related ground movement is the most widespread cause of foundation failure in the UK and is linked to seasonal swelling and shrinkage of the clay. The content of clay within the soils of your selected area has therefore a direct bearing upon the likelihood of ground movement.

Among the inorganic particles that constitute the solid component of any soil, clay particles are the smallest and defined as being <0.002 mm - equivalent spherical diameter (esd) in size. Clay particles occur in most kinds of soil but they only begin to exert a predominant influence on the behaviour of the whole soil where there is more than 35 per cent (by weight) of clay-sized material present.

Because clay particles are very small and commonly platy in shape they have an immense surface area onto which water can be attracted, relative to the total volume of the soil material. In addition to surface attraction or inter-crystalline absorption of water, some clay minerals, those with three layers of atoms (most other kinds of clay have only two layers of atoms) are able to absorb and hold additional water between these layers. It is these types of clay mineral, which are widespread in British soils and commonly known as *smectites* that have the greatest capacity to shrink and swell.

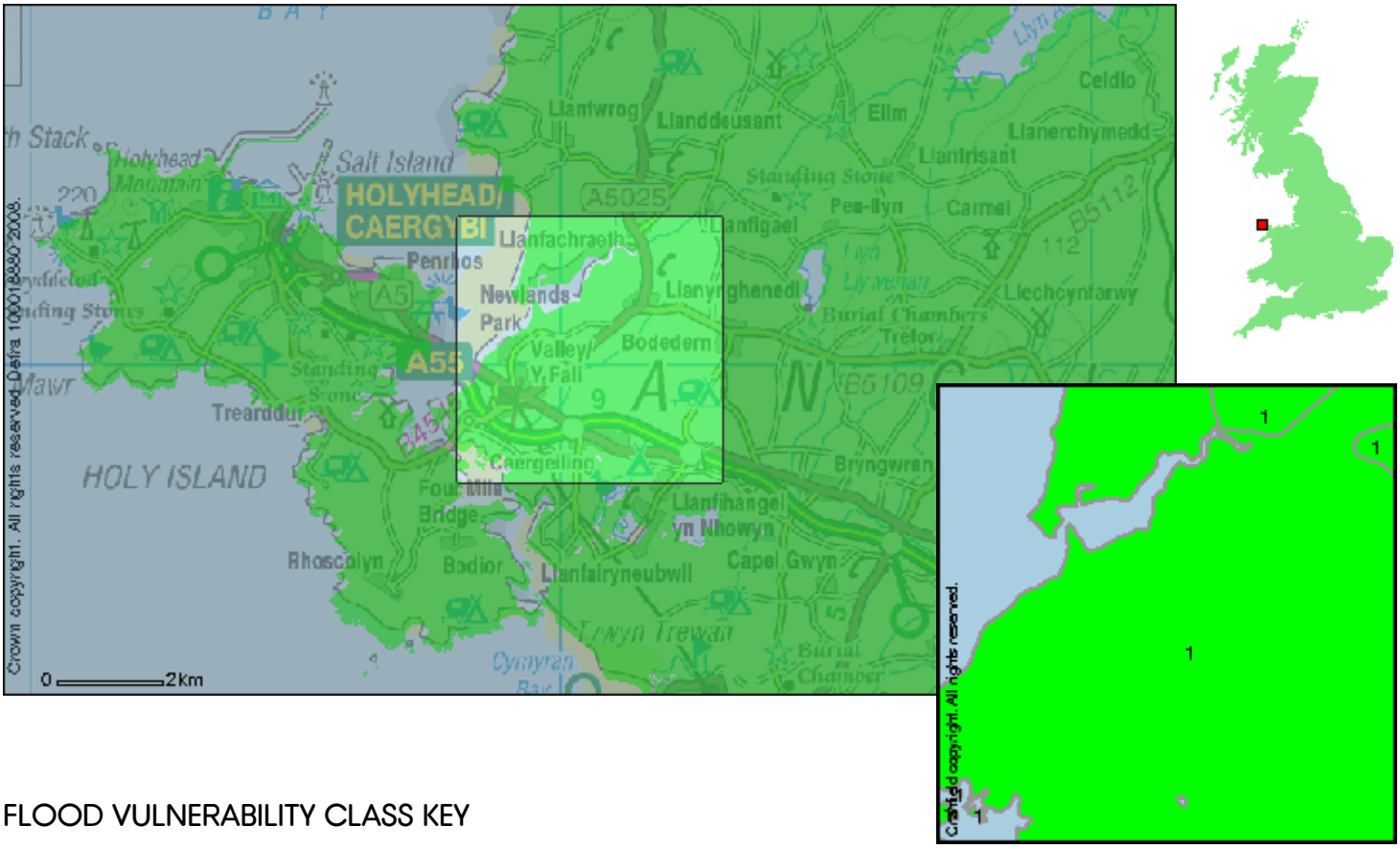
In a natural undisturbed condition, the moisture content of deep subsoil clay does not change greatly through the year and consequently there are no changes in volume leading to shrinkage and swelling. However, when clays are exposed at or near the ground surface and especially when vegetation is rooting in them seasonal moisture and volume changes can be dramatic. Plants and trees transpire moisture from the soil to support their growth and transfer necessary nutrients into their structures. Surface evaporation

also takes place from soil and plant structures, and the combination of evaporation from surfaces and transpiration by plants and trees is termed *evapotranspiration*. Thus, the layer of soil material down to 2m depth into which plants will root is critical when assessing the vulnerability of land to subsidence.

Whenever soil moisture is continuously being replenished by rainfall, the soil moisture reserves will be unaffected by the removal of moisture by plants as there is no net loss. However, in many parts of Britain, particularly in the south and east, summer rainfall is small and is exceeded by evapotranspiration. Water reserves are then not sufficiently replenished by rainfall and so a soil moisture deficit develops. The water removed from a clayey soil by evapotranspiration leads to a reduction in soil volume and the consequent shrinkage causes stress in the soil materials leading in turn to stress on building foundations that are resting in the soil (Hallett, et al, 1994).

The foundations themselves may then move and thus cause damage to building structures. This problem can be exacerbated by the fact that the soil beneath the structure may not dry out uniformly, so that any lateral pressure exerted on the building foundation is made effectively greater. This assessment identifies the likelihood of soil conditions being prone to ground movement given these other factors.

1d. FLOOD VULNERABILITY



FLOOD VULNERABILITY CLASS KEY

0 - *Major risk*

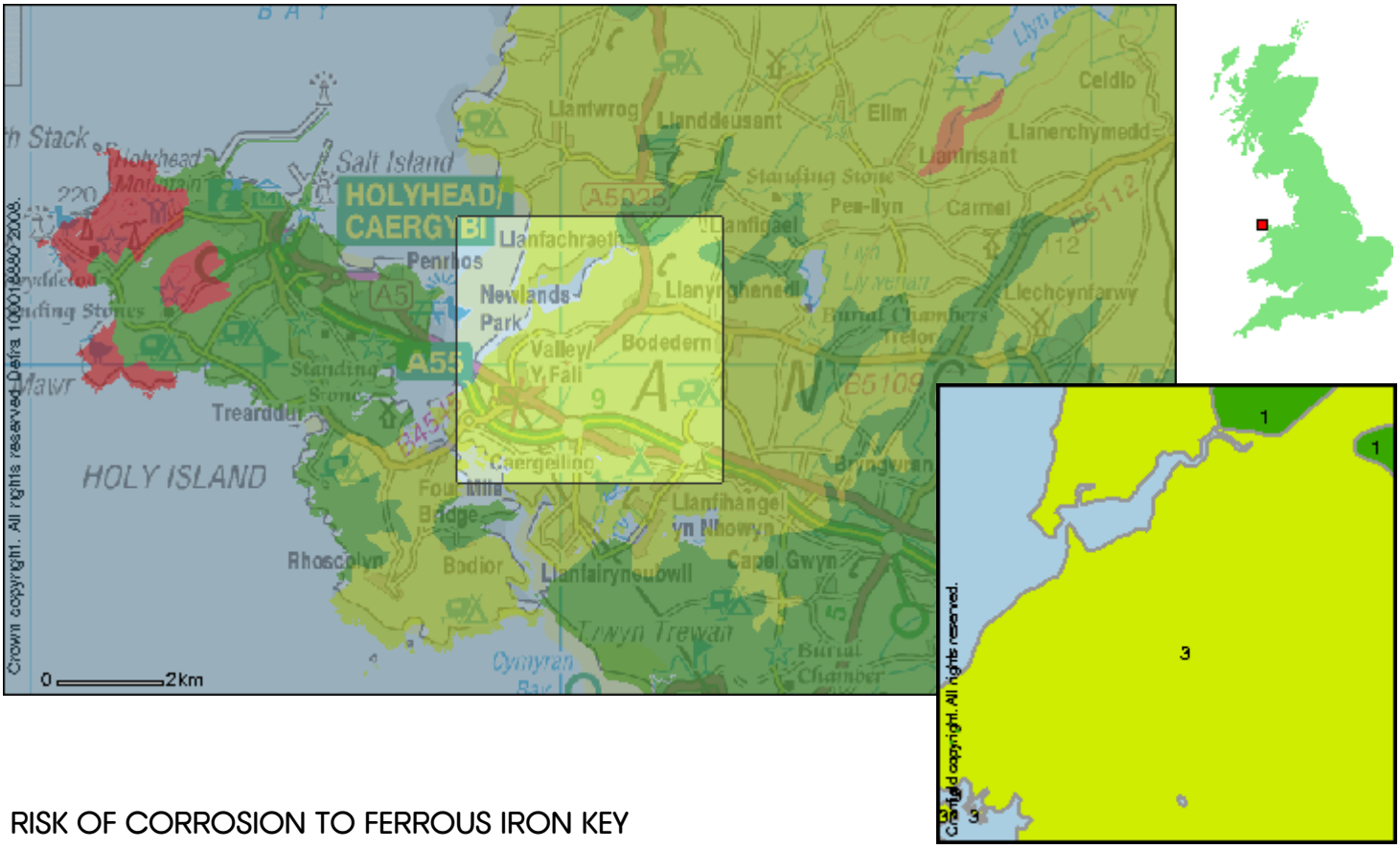
1 - *Minor risk*

FLOOD VULNERABILITY DESCRIPTION

The inundation of properties by flood water can occur in a number of circumstances. Surface run-off can collect on low-lying land from upslope following heavy rainfall. More commonly rivers, lakes and/or the sea extend beyond their normal limits as a result of prolonged or intense rainfall, unusually high tides and/or extreme wind events. Water damage to properties and their contents is compounded by the deposition of sediment suspended in the flood waters. The spatial distribution of such waterborne sediment (or alluvium as defined in soil science) is one basis upon which land that has been subject to historical flooding can be mapped, and this forms a basis for present-day flooding risk assessment.

Both riverine and marine alluvium are identified as distinct soil parent materials within the British soil classifications. Combining soil map units that are dominated by soil series developed in alluvium across Great Britain identifies most of the land that is vulnerable to flooding. This assessment does not account for man-made flood defence measures, showing instead the areas where once water has stood.

1e. RISK OF CORROSION TO FERROUS IRON



RISK OF CORROSION TO FERROUS IRON KEY

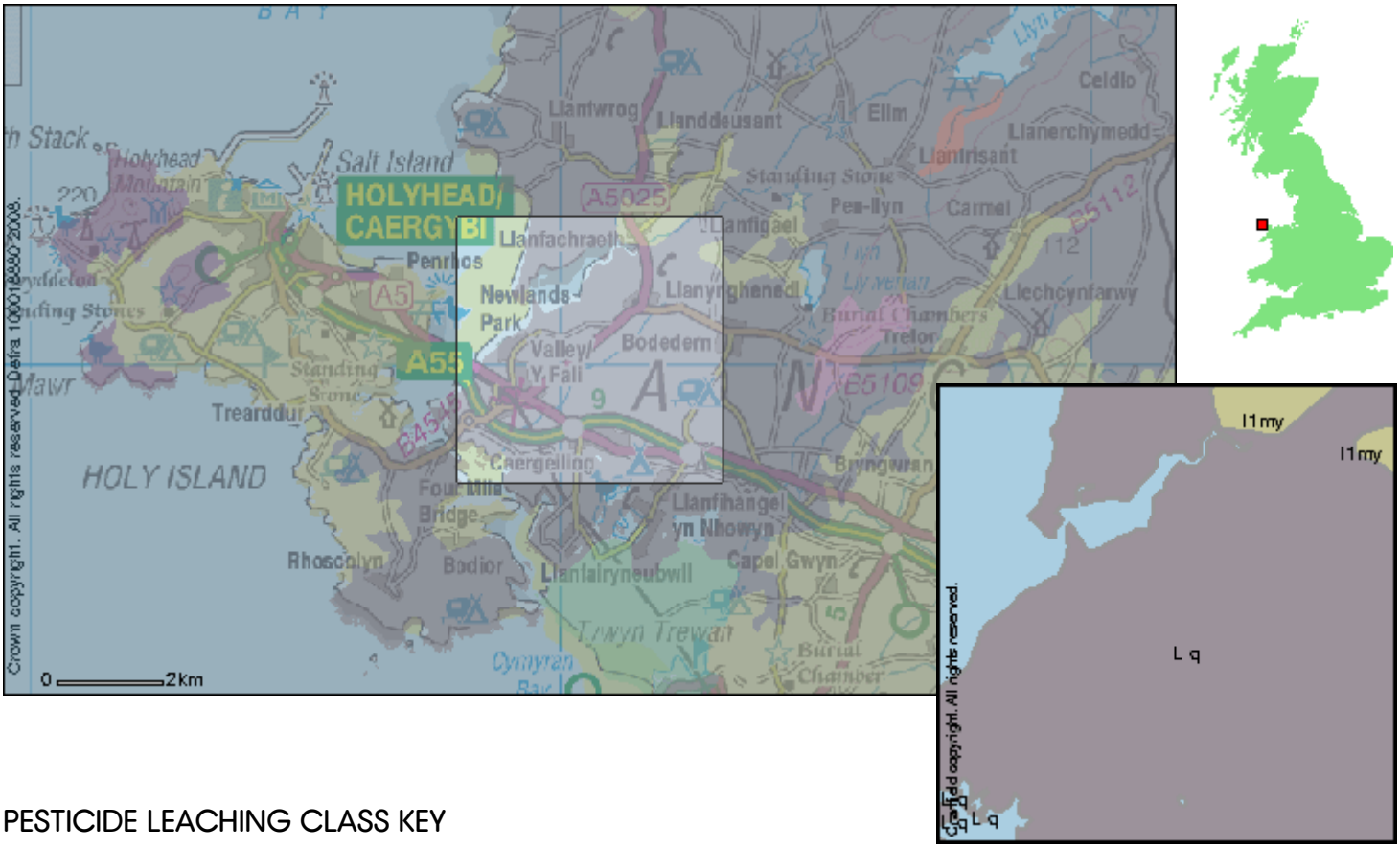
- 1 - *Non-aggressive*
- 2 - *Slightly Aggressive*
- 3 - *Moderately Aggressive*
- 4 - *Highly Aggressive*
- 5 - *Very highly Aggressive*
- 6 - *Impermeable Rock*

* If a class is starred, it is assumed that there are moderate amounts of sulphate in the soil. If there is abundant sulphate present, the soil may be one class more aggressive. Conversely, if there is very little sulphate, the soil may be one class less aggressive to buried ferrous iron.

RISK OF CORROSION TO FERROUS IRON DESCRIPTION

Buried iron pipes and other infrastructure corrode at rates that are influenced by soil conditions (Jarvis and Hedges, 1994). Soil acidity, sulphide content, aeration and wetness all influence the corrosivity of the soil. These factors are used to map 5 major classes of relative corrosivity.

1f. PESTICIDE LEACHING RISK



PESTICIDE LEACHING CLASS KEY

l1my - *Deep loamy soil; groundwater at moderate depth*

L q - *Impermeable soils over soft substrates of low or negligible storage capacity that sometimes conceal groundwater bearing rocks at depth*

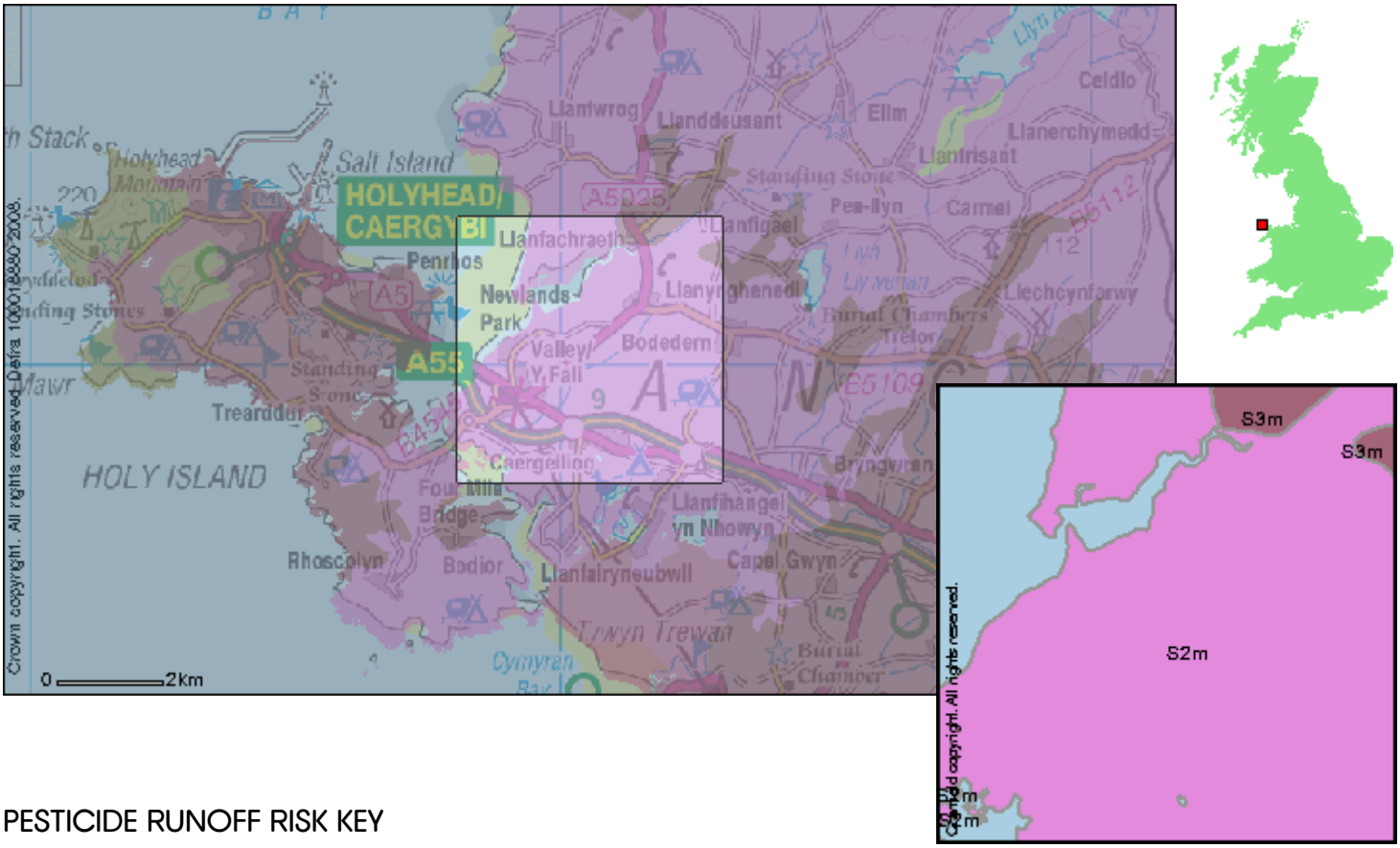
PESTICIDE LEACHING CLASS DESCRIPTION

The natural permeability and water regime of soils are influential in determining the fate and behaviour of pesticides applied to the crop and soil surface (Hollis et al, 1995). A system of vulnerability assessment was devised as part of the national system for Policy and Practice for the Protection of Groundwater. This divided soils into three primary vulnerability classes.

H - Soils of high leaching capacity with little ability to attenuate non-adsorbed pesticide leaching which leave underlying groundwater vulnerable to pesticide contamination.
I – Soils of intermediate leaching capacity with a moderate ability to attenuate pesticide leaching.
L - Soils of low leaching capacity through which pesticides are unlikely to leach.

The primary classes have been further subdivided into nearly forty subclasses. These subclasses, with their descriptions, are mapped above. These classes do not account for differences in land cultivation, which can also have a significant impact on pesticide behaviour.

1g. PESTICIDE RUNOFF RISK



PESTICIDE RUNOFF RISK KEY

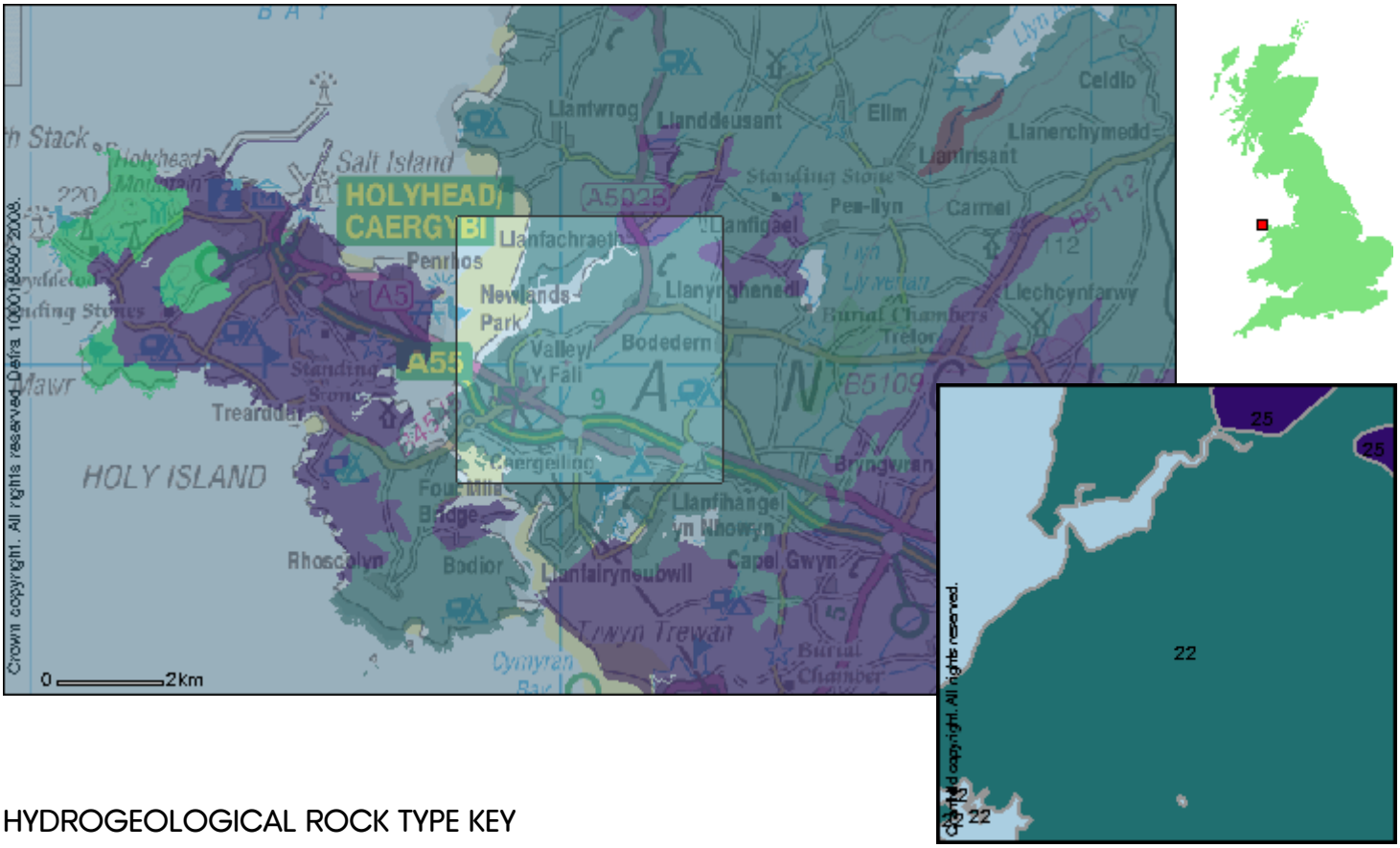
S2m - *Soils with high run-off potential but moderate adsorption potential*

S3m - *Soils with moderate run-off potential and moderate adsorption potential*

PESTICIDE RUNOFF RISK DESCRIPTION

The physical properties and natural water regime of soils influence the speed and extent of lateral water movement over and through the soil at different depths (Hollis et al, 1995). At as result, soils can be classed according to the potential for pesticide run-off. Five runoff potential classes are identified for mineral soils and a further two for peat soils. The mineral soil classes are further subdivided according to the potential for pesticide adsorption.

1h. HYDROGEOLOGICAL ROCK TYPE



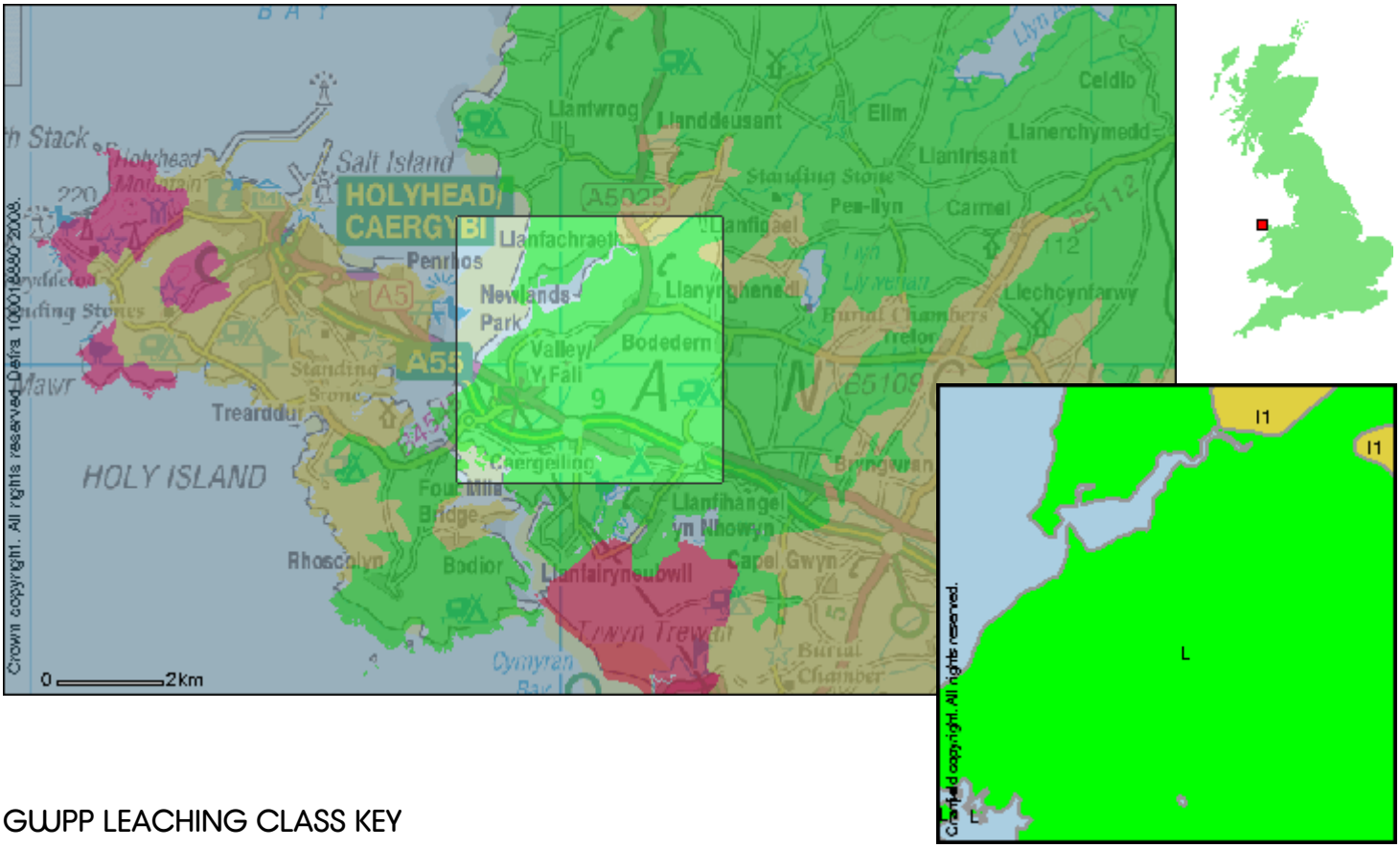
HYDROGEOLOGICAL ROCK TYPE KEY

- 22 - *till and compact Head*
- 25 - *loamy drift*

HYDROGEOLOGICAL ROCK TYPE DESCRIPTION

The hydrogeological classification of the soil parent materials provides a framework for distinguishing between soil substrates according to their general permeability and whether they are likely to overlie an aquifer. Every soil series has been assigned one of the 32 substrate classes and each of these is characterised according to its permeability (being characterised as permeable, slowly permeable or impermeable). For further information, see Boorman et al (1995).

1i. GROUND WATER PROTECTION POLICY (GWPP) LEACHING



GWPP LEACHING CLASS KEY

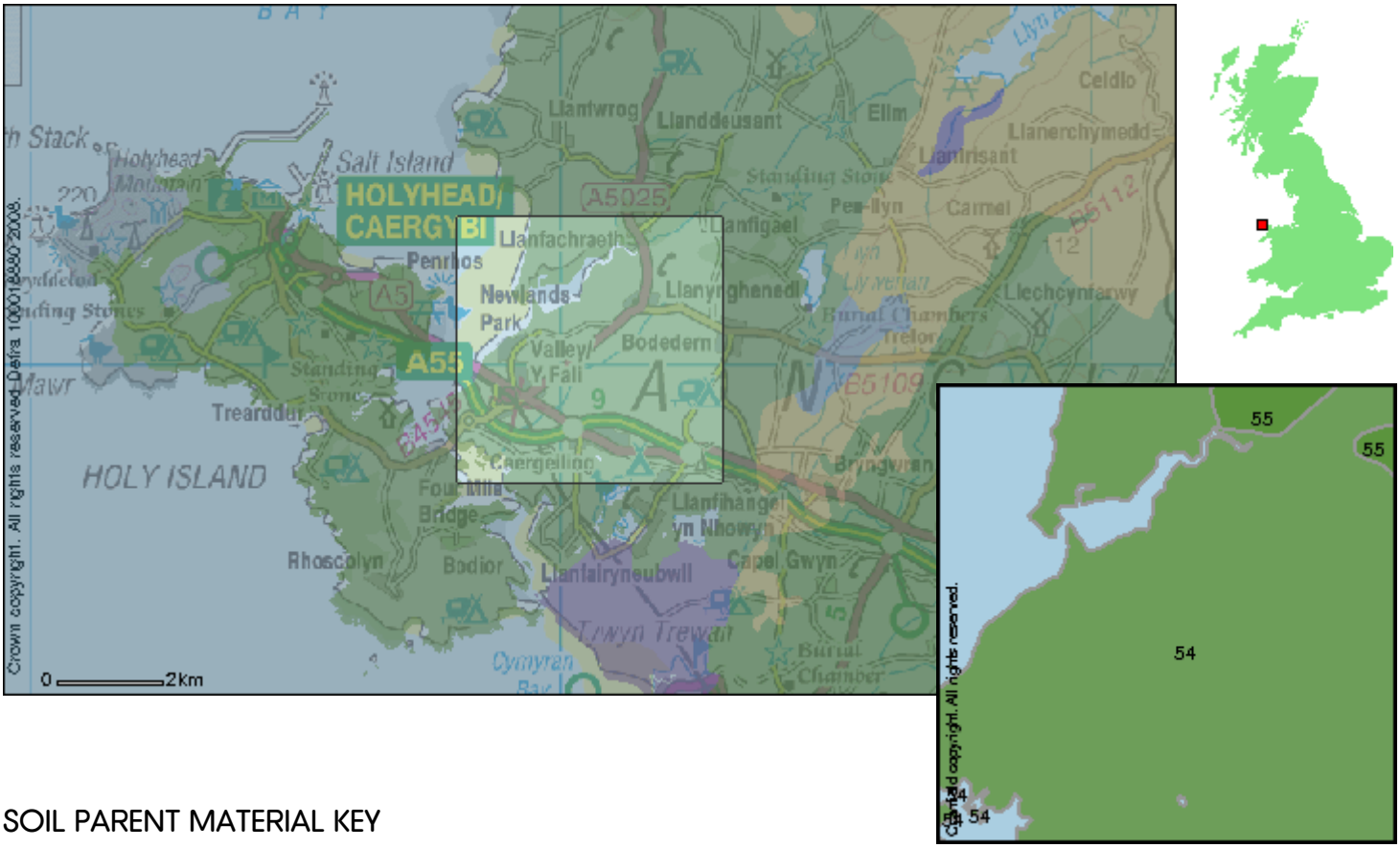
I1 - *Soils of intermediate leaching potential which have a moderate ability to attenuate a wide range of diffuse source pollutants but in which it is possible that some non-adsorbed diffuse source pollutants and liquid discharges could penetrate the soil layer*

L - *Soils in which pollutants are unlikely to penetrate the soil layer either because water movement is largely horizontal or because they have a large ability to attenuate diffuse source pollutants*

GWPP LEACHING CLASS DESCRIPTION

The Ground Water Protection Policy classes describe the leaching potential of pollutants through the soil (Hollis, 1991; Palmer et al, 1995). The likelihood of pollutants reaching ground water is described. Different classes of pollutants are described, including liquid discharges adsorbed and non-adsorbed pollutants.

1j. SOIL PARENT MATERIAL



SOIL PARENT MATERIAL KEY

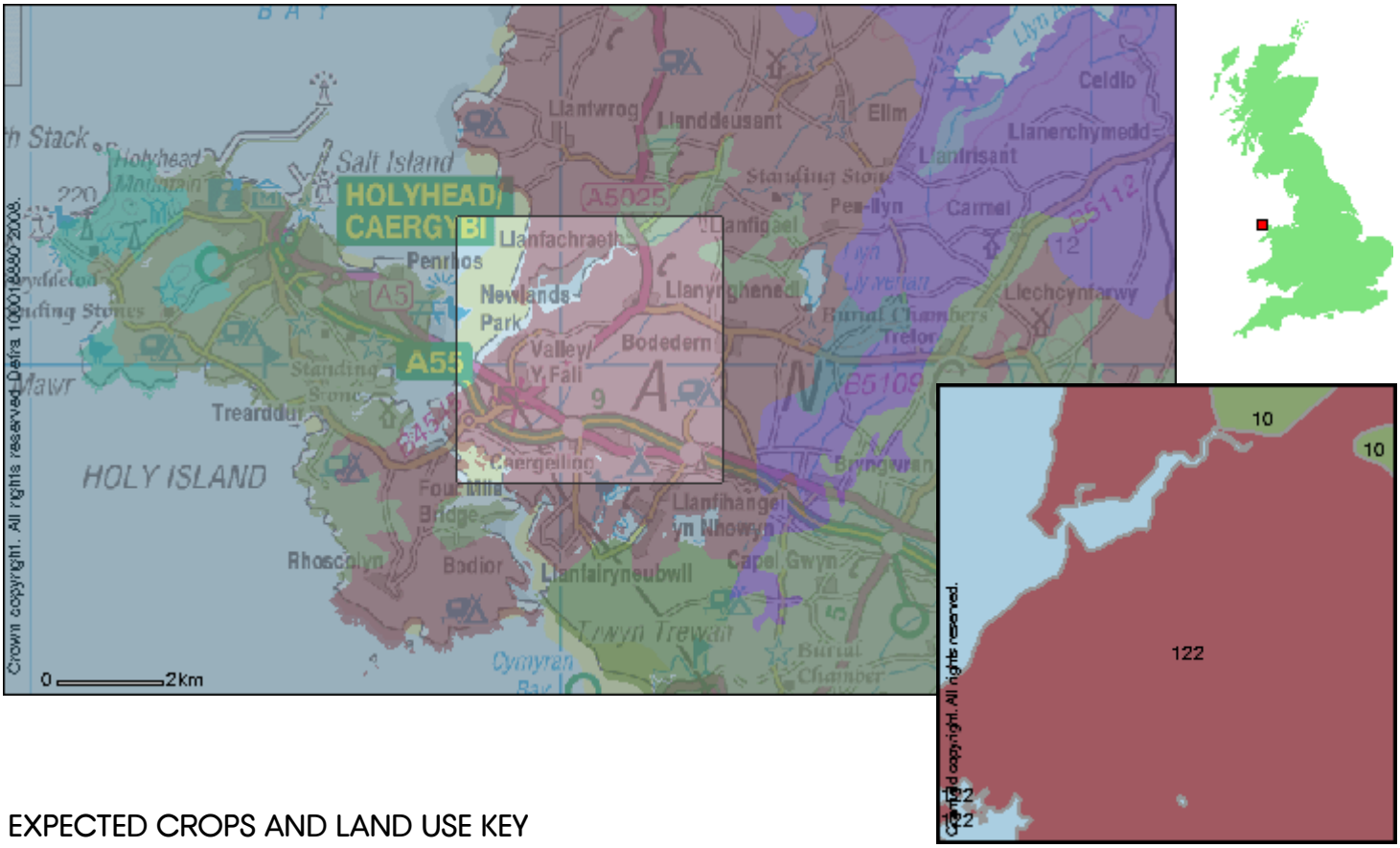
54 - *Drift from Palaeozoic and Mesozoic sandstone and shale*

55 - *Drift from Palaeozoic sandstone and shale*

SOIL PARENT MATERIAL DESCRIPTION

Along with the effects of climate, relief, organisms and time, the underlying geology or 'parent material' has a very strong influence on the development of the soils of England and Wales. Through weathering, rocks contribute inorganic mineral grains to the soils and thus exhibit control on the soil texture. During the course of the creation of the national soil map, soil surveyors noted the parent material underlying each soil in England and Wales. It is these general descriptions of the regional geology which is provided in this map.

1k. EXPECTED CROPS AND LAND USE



EXPECTED CROPS AND LAND USE KEY

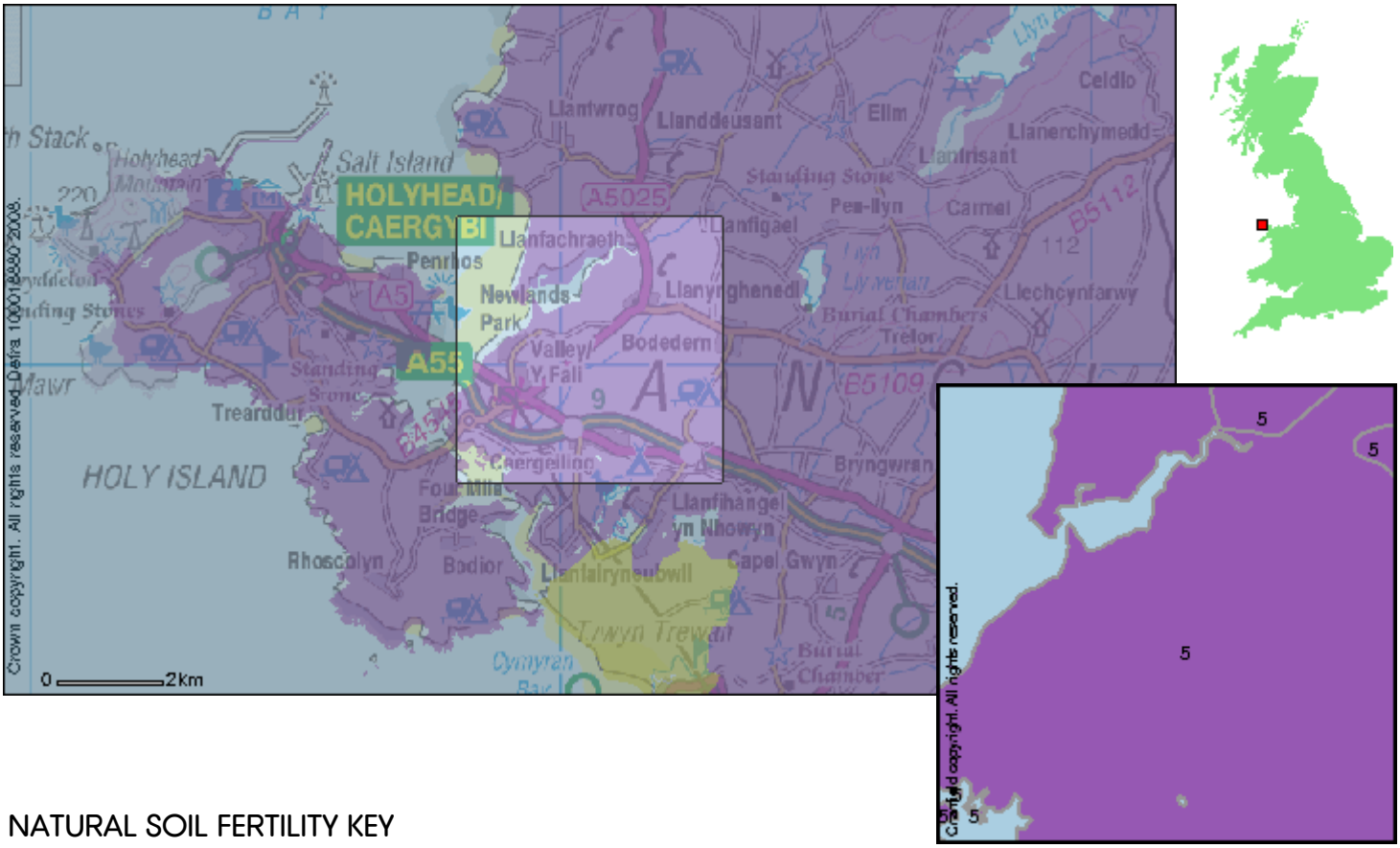
10 - *Cereals and grassland in the Northern Region; stock rearing on permanent grassland in Wales.*

122 - *Dairying and stock rearing on permanent or short term grassland; some cereals in drier areas.*

EXPECTED CROPS AND LAND USE DESCRIPTION

Individual soils are commonly associated with particular forms of land cover and land use. Whilst the soil surveyors were mapping the whole of England and Wales, they took careful note of the range of use to which the land was being put. This map shows the most common forms of land use found on each soil unit.

11. NATURAL SOIL FERTILITY



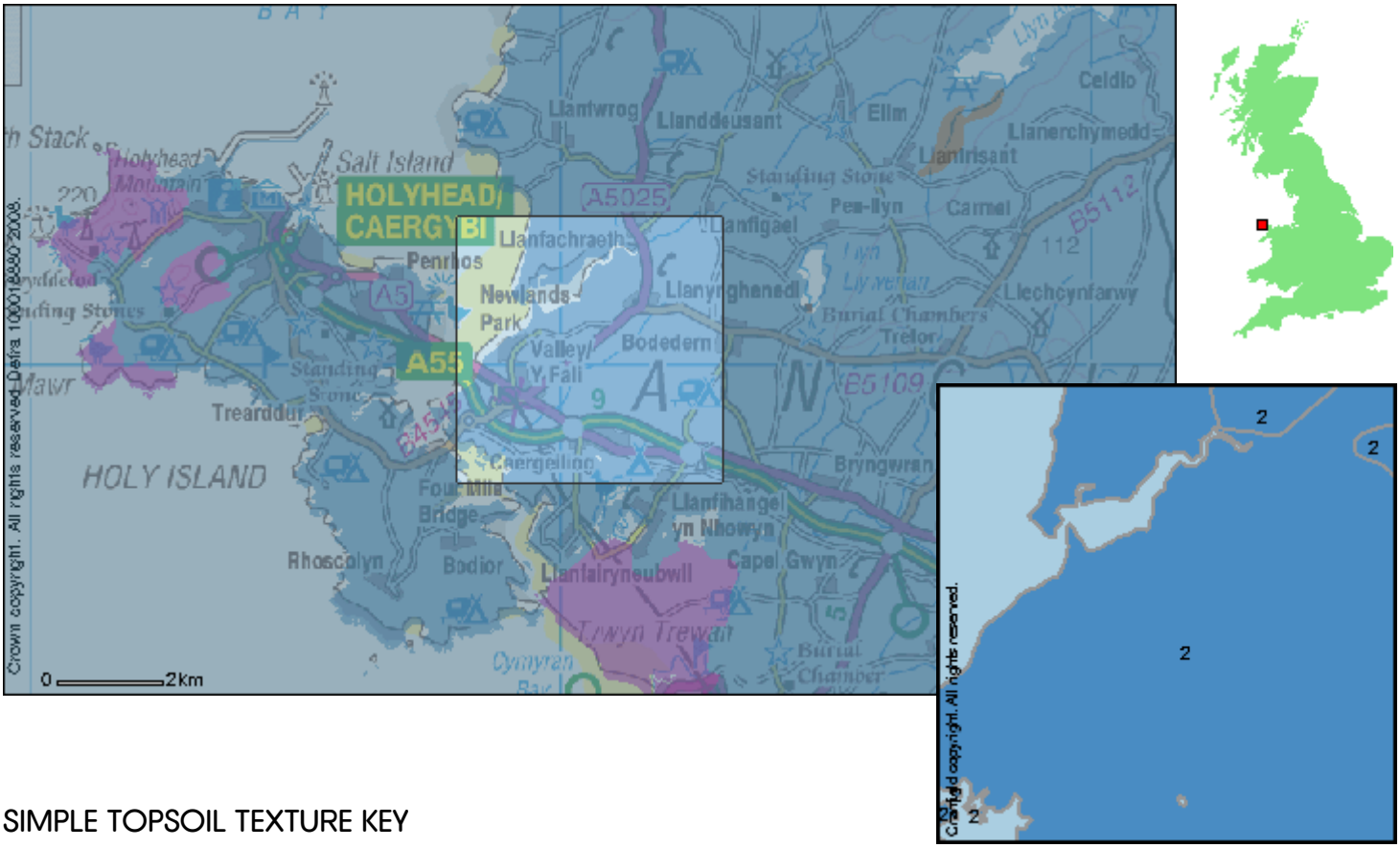
NATURAL SOIL FERTILITY KEY

5 - *Low*

NATURAL SOIL FERTILITY DESCRIPTION

Soil fertility can be greatly altered by land management especially through the application of manures, lime and mineral fertilisers. What is shown in this map, however, is the likely natural fertility of each soil type. Soils that are very acid have low numbers of soil-living organisms and support heathland and acid woodland habitats. These are shown as of very low natural fertility. Soils identified as of low natural fertility are usually acid in reaction and are associated with a wide range of habitat types. The moderate class contains neutral to slightly acid soils, again with a wide range of potential habitats. Soil of high natural fertility are both naturally productive and able to support the base-rich pastures and woodlands that are now rarely encountered. Lime-rich soils contain chalk and limestone in excess, and are associated with downland, herb-rich pastures and chalk and limestone woodlands.

1m. SIMPLE TOPSOIL TEXTURE



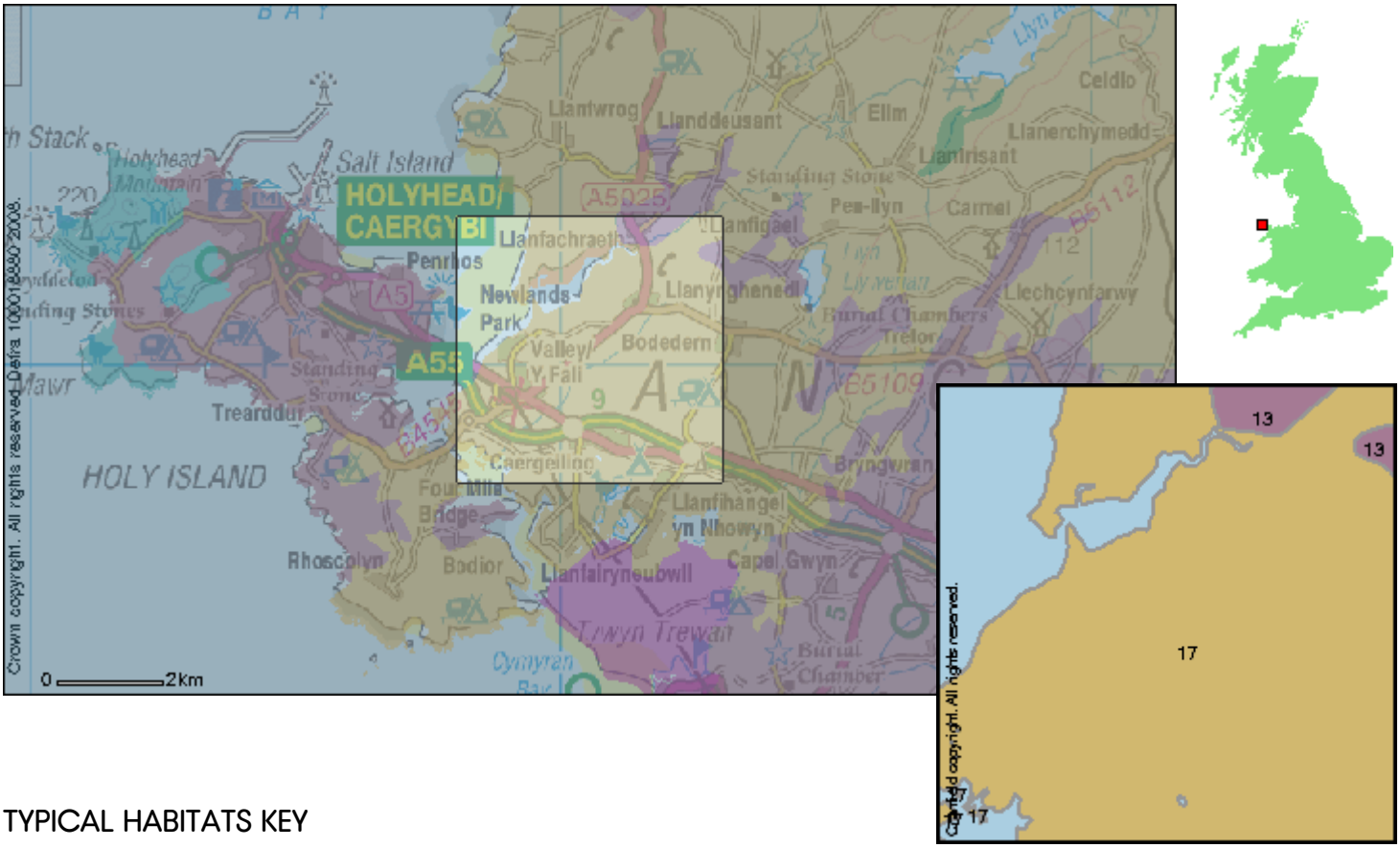
SIMPLE TOPSOIL TEXTURE KEY

- 1 - *Clayey*
- 2 - *Loamy*
- 3 - *Peaty*
- 4 - *Sandy*

SIMPLE TOPSOIL TEXTURE DESCRIPTION

Soil texture is a term used in soil science to describe the physical composition of the soil in terms of the size of mineral particles in the soil. Specifically, we are concerned with the relative proportions of sand, silt and clay. Soil texture can vary between each soil layer or horizon as one moves down the profile. This map indicates the soil texture group of the upper 30 cm of the soil. 'Light' soils have more sand grains and are described as sandy, while 'heavy' soils have few sand grains but a lot of extremely small particles and are described as clayey. Loamy soils have a mix of sand, silt and clay-sized particles and are intermediate in character. Soils with a surface layer that is dominantly organic are described as Peaty. A good understanding of soil texture can enable better land management.

1n. TYPICAL HABITATS



TYPICAL HABITATS KEY

13 - *Neutral and acid pastures and deciduous woodlands; acid communities such as bracken and gorse in the uplands*

17 - *Seasonally wet pastures and woodlands*

TYPICAL HABITATS DESCRIPTION

There is a close relationship between vegetation and the underlying soil. Information about the types of broad habitat associated with each soil type is provided in this map. Soil fertility, pH, drainage and texture are important factors in determining the types of habitats which can be established. Elevation above sea level and sometimes even the aspect - the orientation of a hillslope - can affect the species present. This map does not take into account the recent land management or any urban development, but provides the likely natural habitats assuming good management has been carried out.

2. SOIL ASSOCIATION DESCRIPTIONS

The following pages describe the following soil map units, (soil associations), in more detail.

EAST KESWICK 1 541x

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

BRICKFIELD 2 713f

Slowly permeable seasonally waterlogged fine loamy soils.

The soil associations are described in terms of their texture and drainage properties and potential risks may be identified. The distribution of the soils across England and Wales are provided. Further to this, properties of each association's component soil series are described in relation to each other. Lastly, schematic diagrams of each component series are provided for greater understanding and in-field verification purposes.

EAST KESWICK 1 (541x)

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

a. General Description

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging. Some coarse loamy soils affected by groundwater.
The major landuse on this association is defined as cereals and grassland in the northern region; stock rearing on permanent grassland in wales.

b. Distribution (England & Wales)

The EAST KESWICK 1 association covers 804km² of England and Wales which accounts for 0.53% of the landmass. The distribution of this association is shown in Figure 1. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the EAST KESWICK 1 association are outlined in Table 1 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 1.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

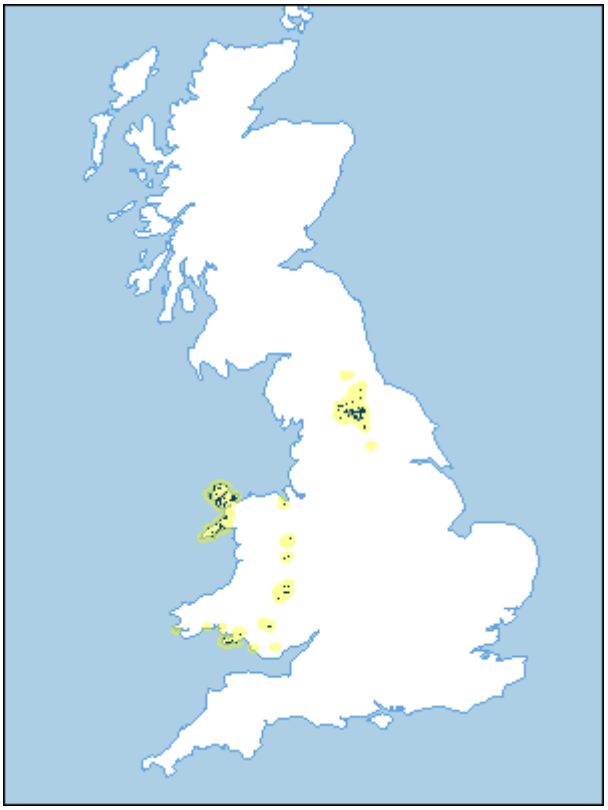


Figure 1. Association Distribution

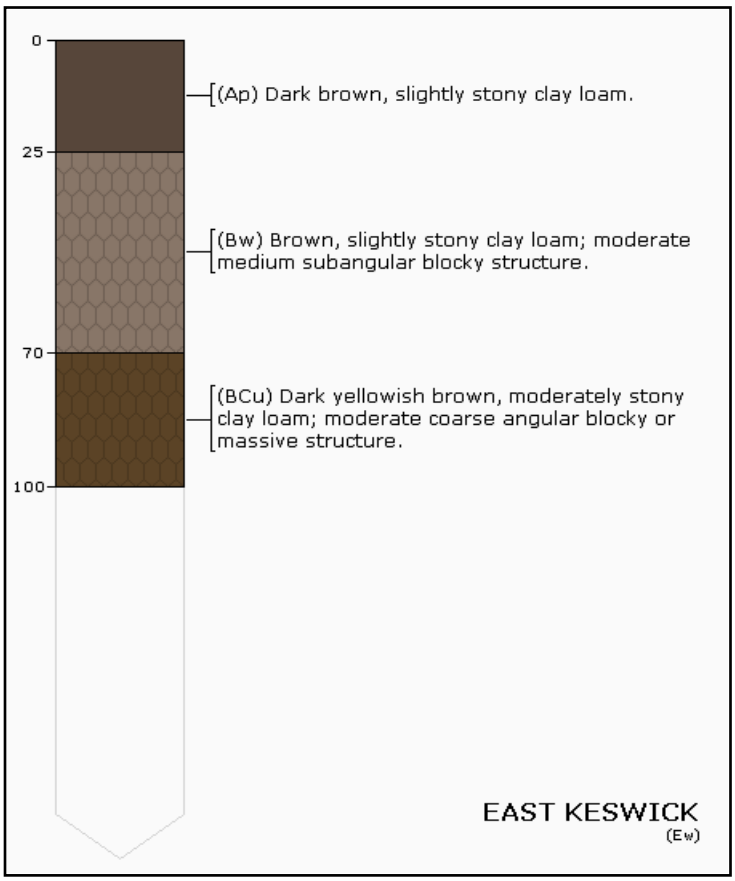
Soil Series	Description	Area %
EAST KESWICK (Ew)	medium loamy drift with siliceous stones	45%
NERCWYS (Nc)	medium loamy drift with siliceous stones	30%
ARROW (aO)	light loamy drift with siliceous stones	10%
OTHER	other minor soils	15%

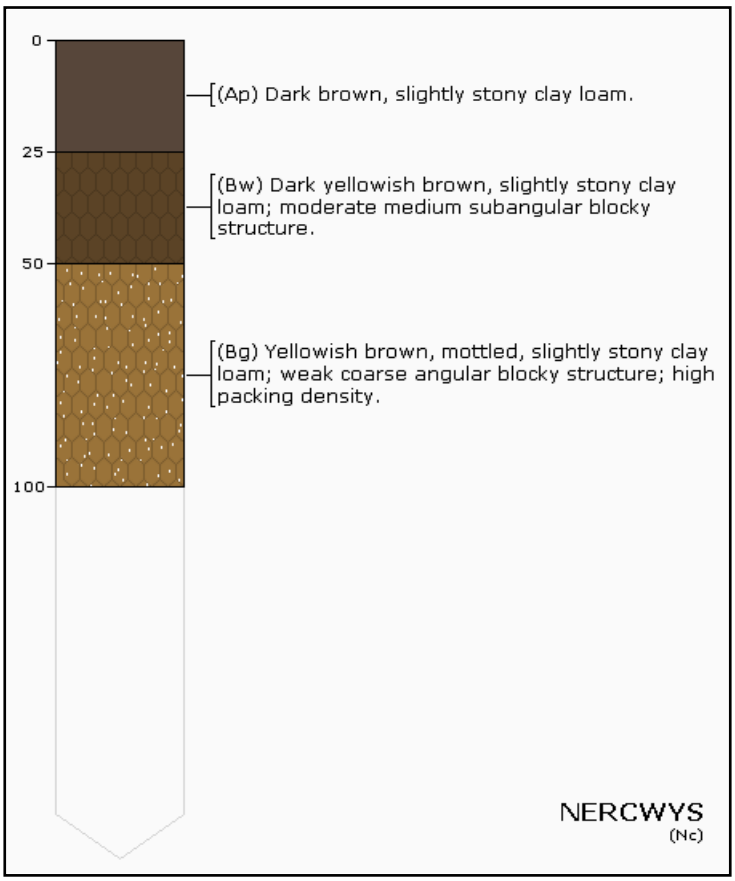
Table 1. The component soil series of the EAST KESWICK 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

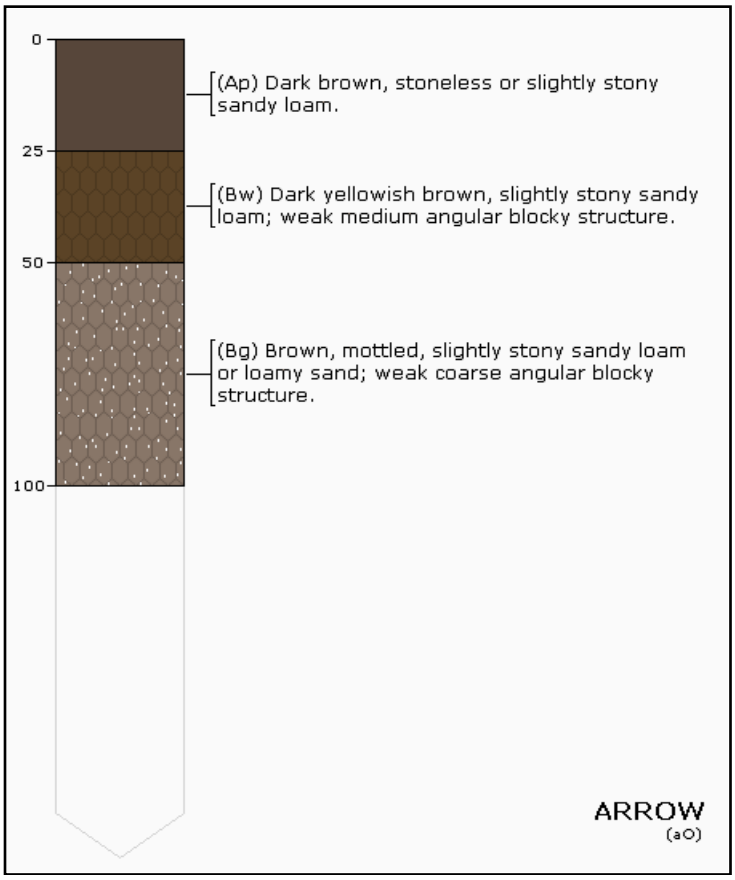
EAST KESWICK 1 (541x)

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

d. EAST KESWICK 1 Component Series Profiles







EAST KESWICK 1 (541x)

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
EAST KESWICK (Ew)	medium loamy drift with siliceous stones	45%
NERCWYS (Nc)	medium loamy drift with siliceous stones	30%
ARROW (aO)	light loamy drift with siliceous stones	10%
OTHER	other minor soils	15%

Table 1. The component soil series of the EAST KESWICK 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

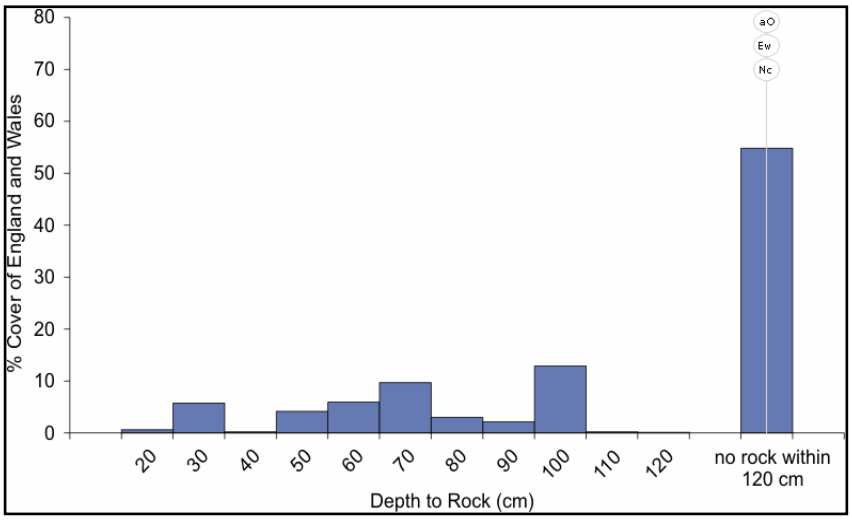


Figure 2. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

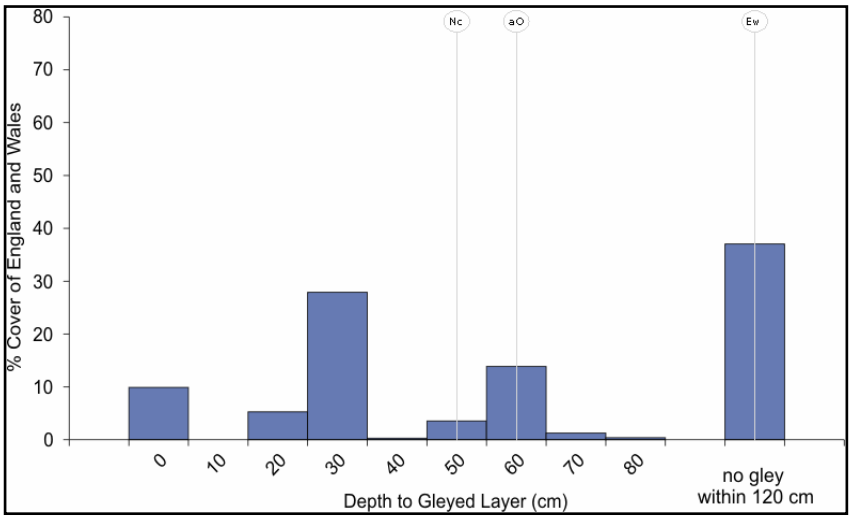


Figure 3. Depth of Soil to Gleying

EAST KESWICK 1 (541x)

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

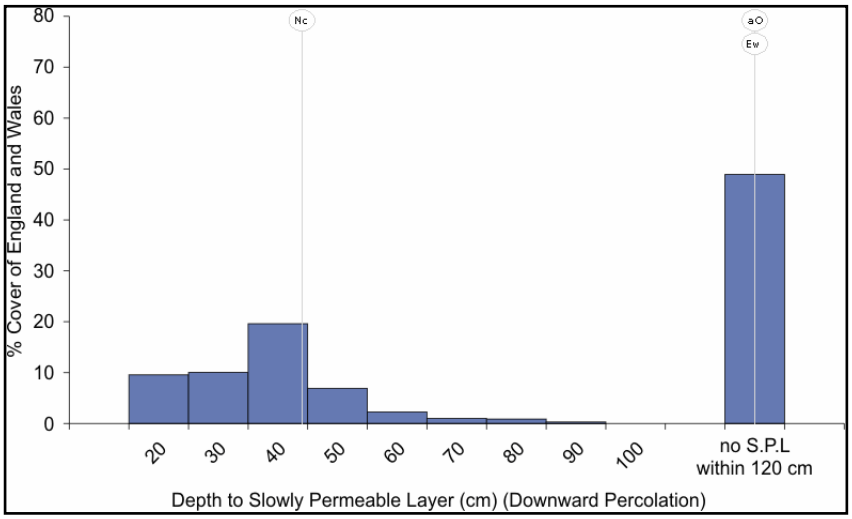


Figure 4. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

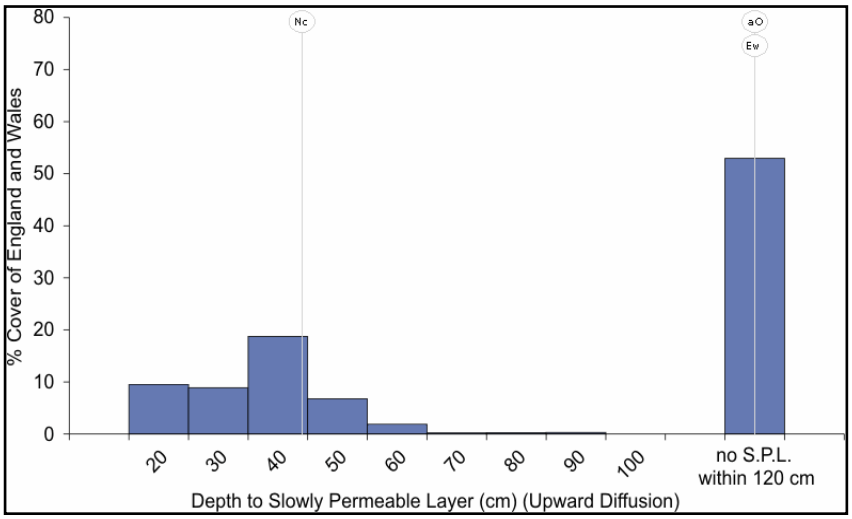


Figure 5. Depth to Slowly Permeable Layer (upward diffusion)

EAST KESWICK 1 (541x)

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

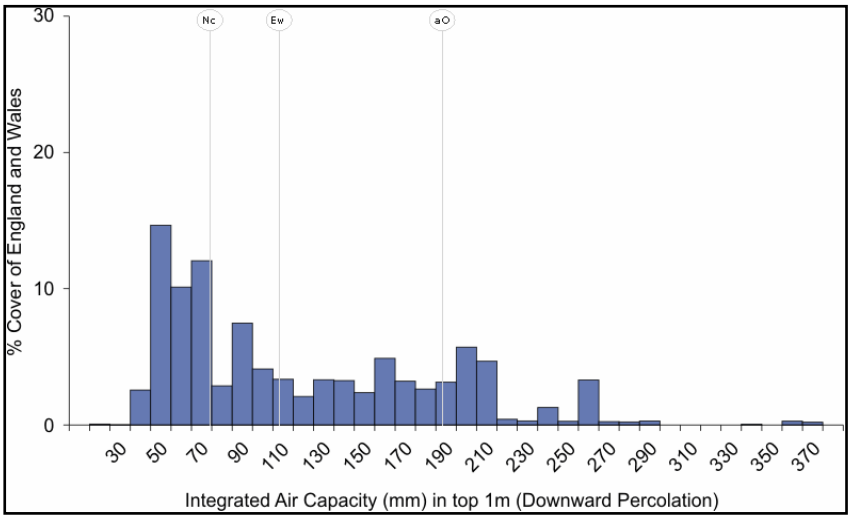


Figure 6. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

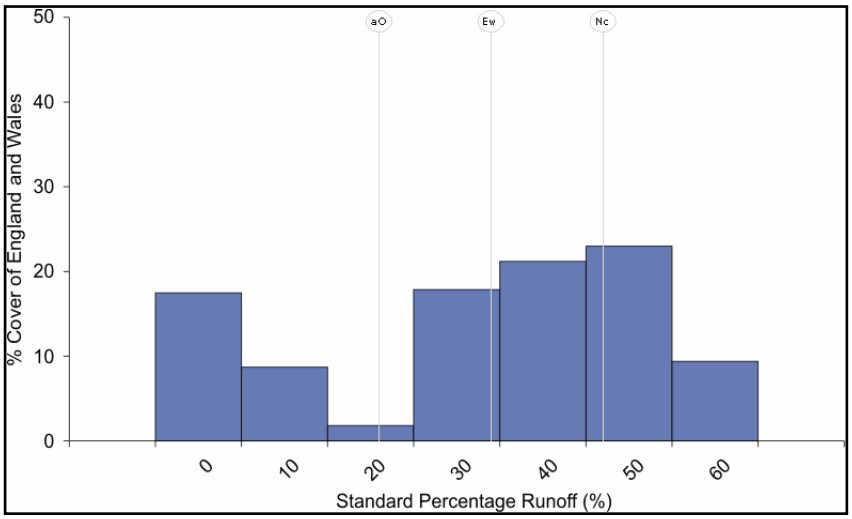


Figure 7. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

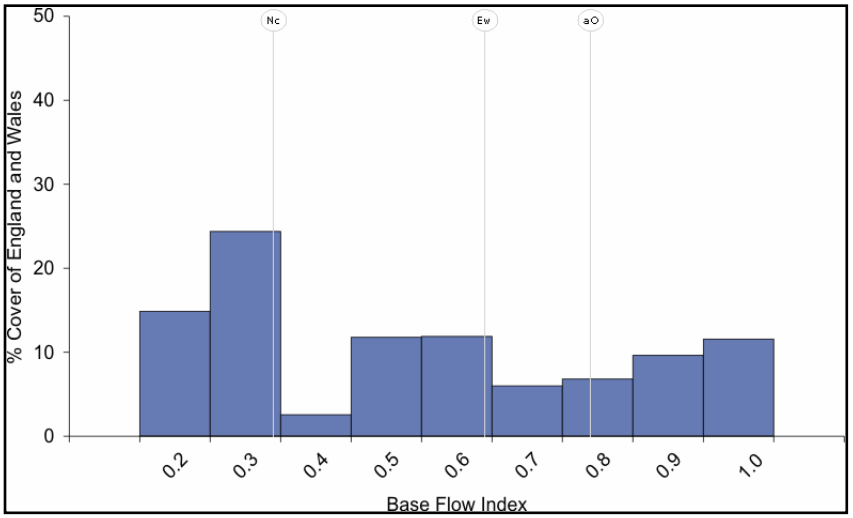


Figure 8. Base Flow Index

EAST KESWICK 1 (541x)

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

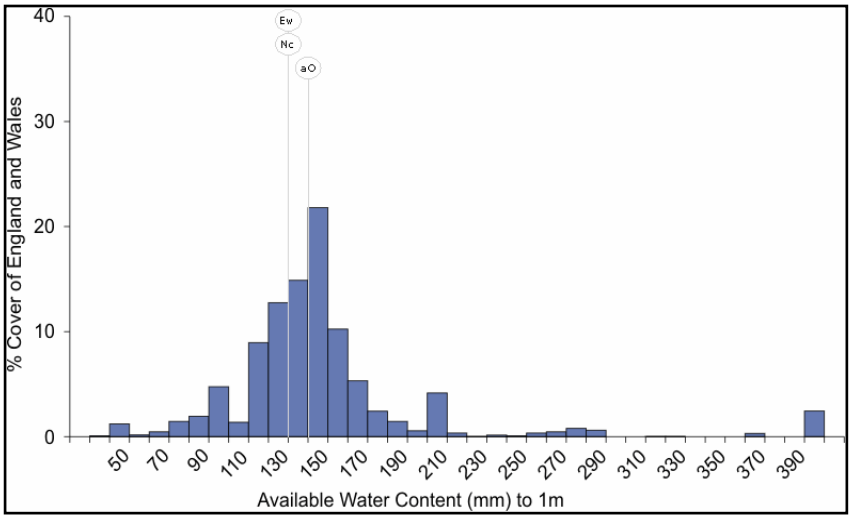


Figure 9. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

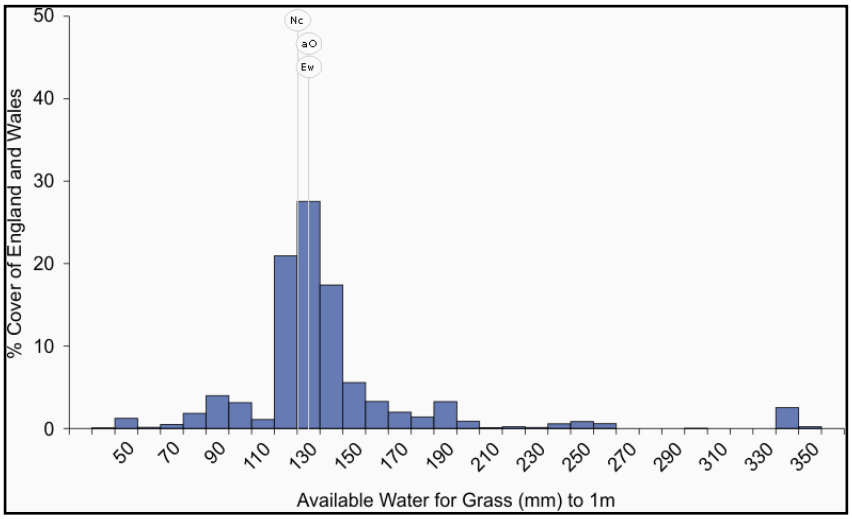


Figure 10. Available Water for Grass

EAST KESWICK 1 (541x)

Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

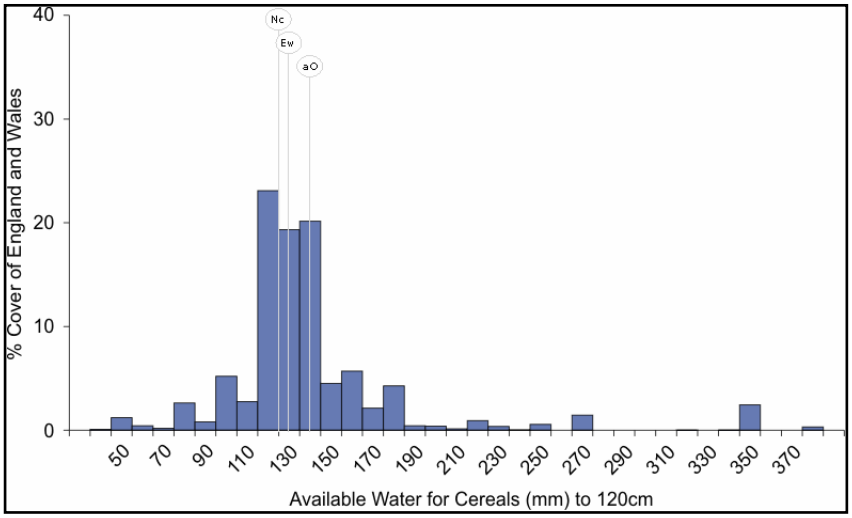


Figure 11. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

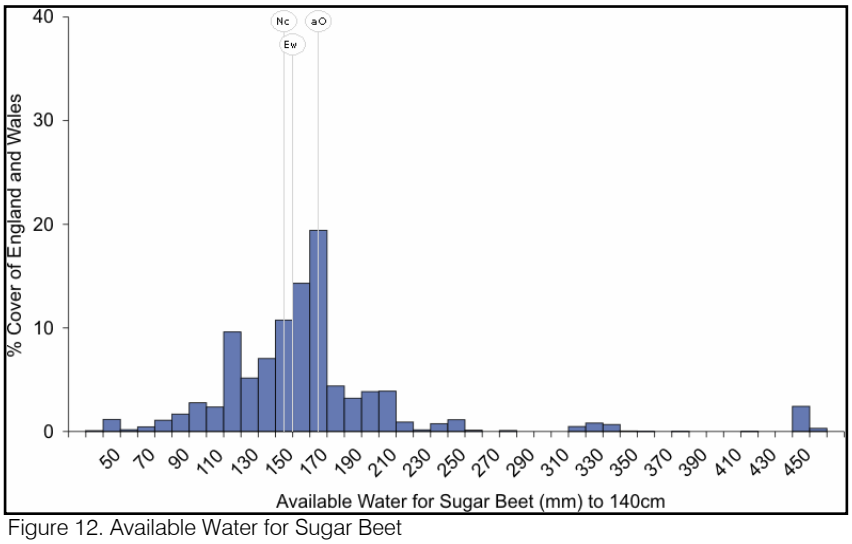


Figure 12. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

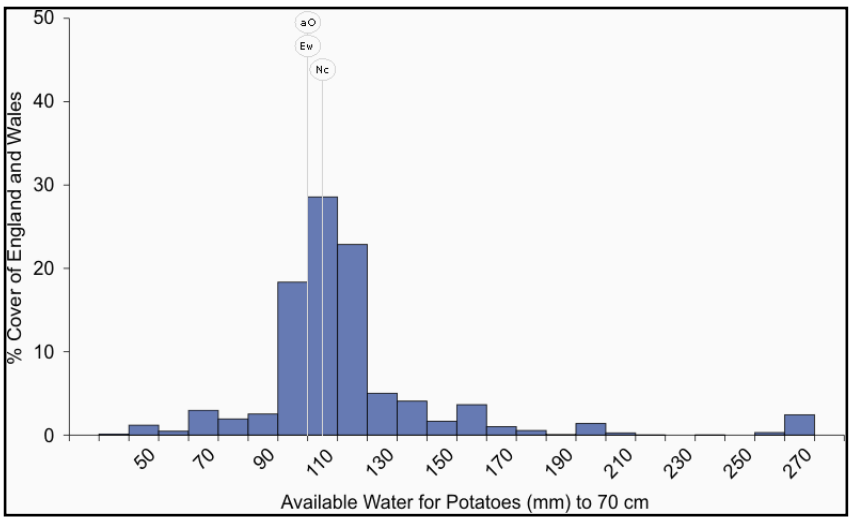


Figure 13. Available Water for Potatoes

BRICKFIELD 2 (713f)

Slowly permeable seasonally waterlogged fine loamy soils.

a. General Description

Slowly permeable seasonally waterlogged fine loamy soils. Associated with fine loamy soils with only slight waterlogging and some deep well drained fine loamy soils.

The major landuse on this association is defined as dairying and stock rearing on permanent or short term grassland; some cereals in drier areas.

b. Distribution (England & Wales)

The BRICKFIELD 2 association covers 1596km² of England and Wales which accounts for 1.06% of the landmass. The distribution of this association is shown in Figure 14. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the BRICKFIELD 2 association are outlined in Table 2 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 2.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

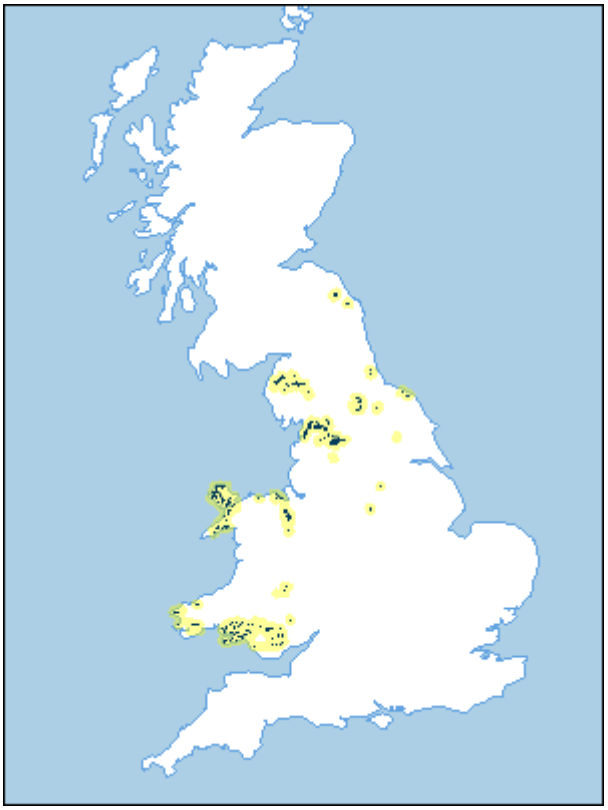


Figure 14. Association Distribution

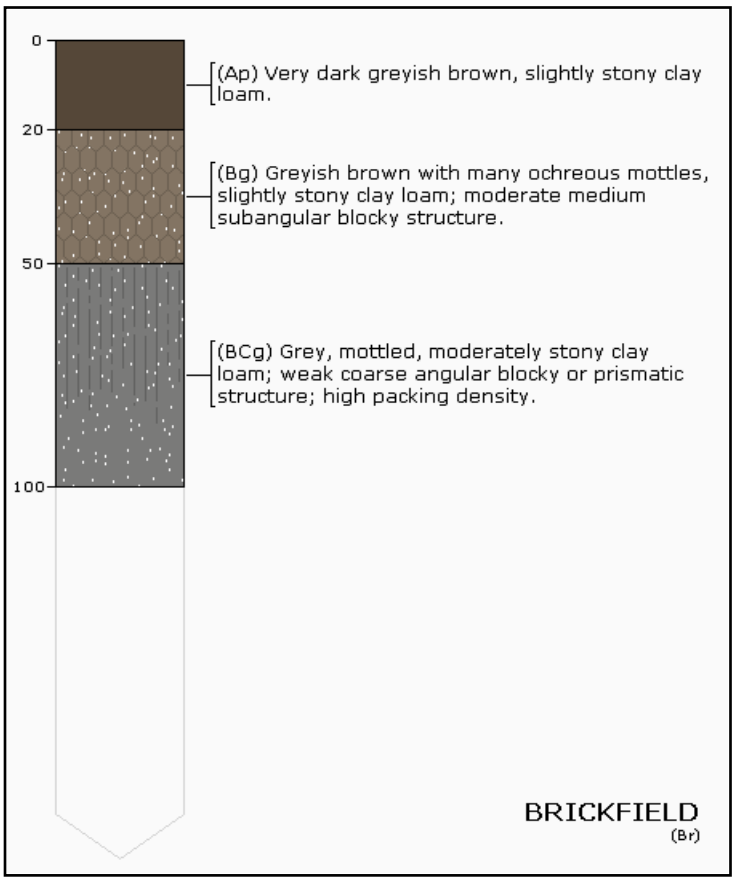
Soil Series	Description	Area %
BRICKFIELD (Br)	medium loamy drift with siliceous stones	40%
NERCWYS (Nc)	medium loamy drift with siliceous stones	20%
EAST KESWICK (Ew)	medium loamy drift with siliceous stones	15%
OTHER	other minor soils	25%

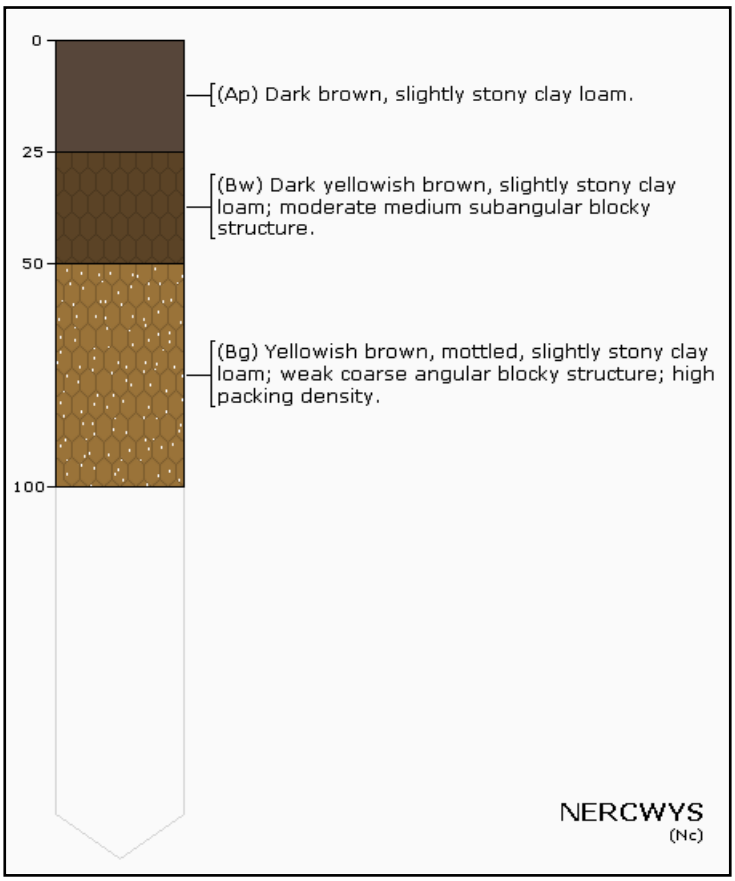
Table 2. The component soil series of the BRICKFIELD 2 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

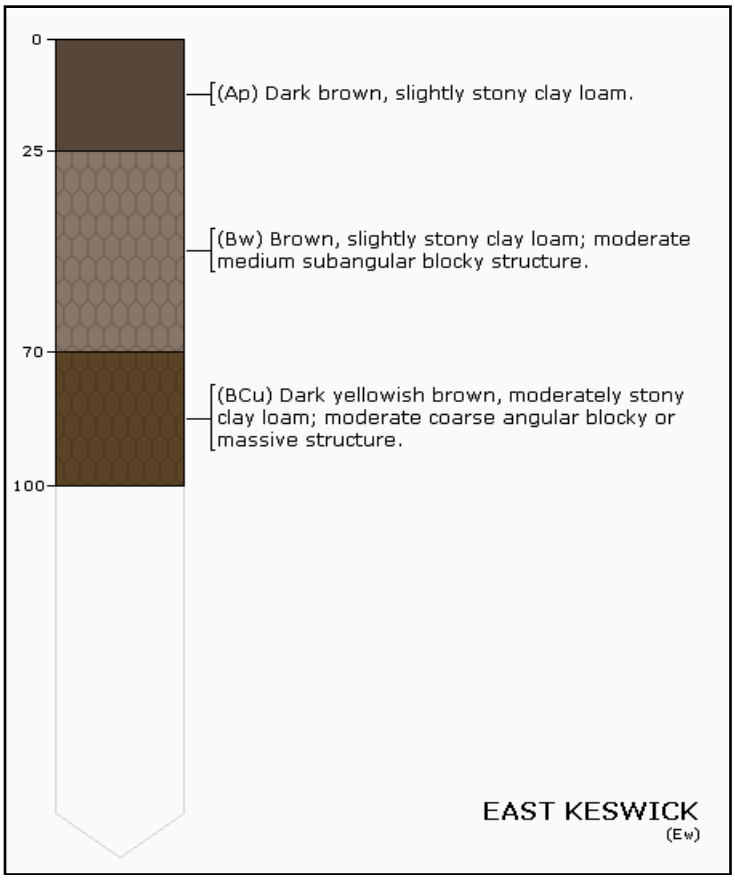
BRICKFIELD 2 (713f)

Slowly permeable seasonally waterlogged fine loamy soils.

d. BRICKFIELD 2 Component Series Profiles







BRICKFIELD 2 (713f)

Slowly permeable seasonally waterlogged fine loamy soils.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
BRICKFIELD (Br)	medium loamy drift with siliceous stones	40%
NERCWYS (Nc)	medium loamy drift with siliceous stones	20%
EAST KESWICK (Ew)	medium loamy drift with siliceous stones	15%
OTHER	other minor soils	25%

Table 2. The component soil series of the BRICKFIELD 2 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

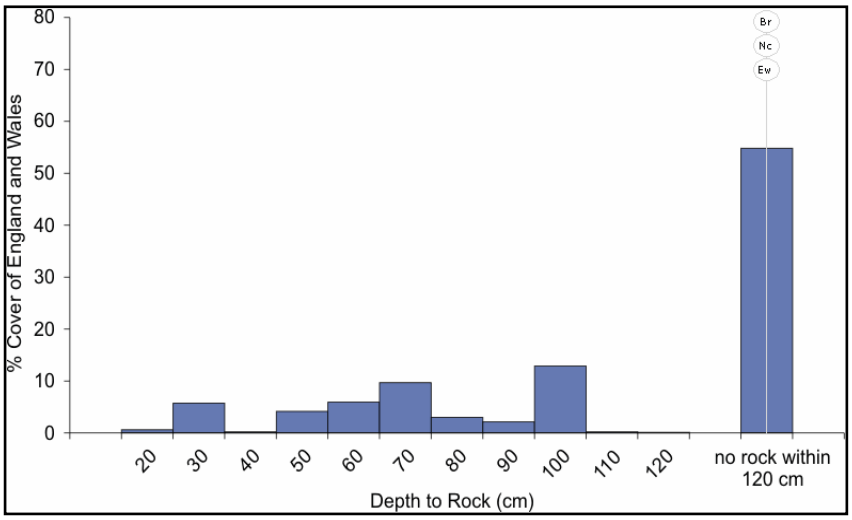


Figure 15. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

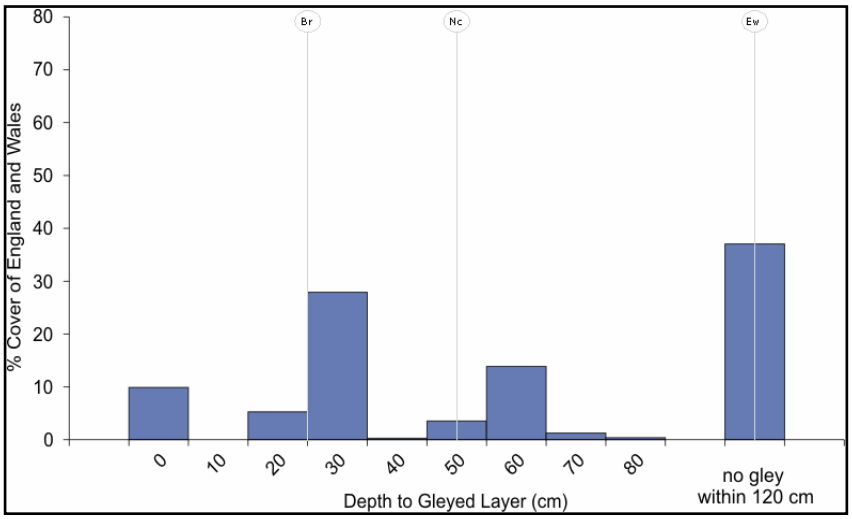


Figure 16. Depth of Soil to Gleying

BRICKFIELD 2 (713f)

Slowly permeable seasonally waterlogged fine loamy soils.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

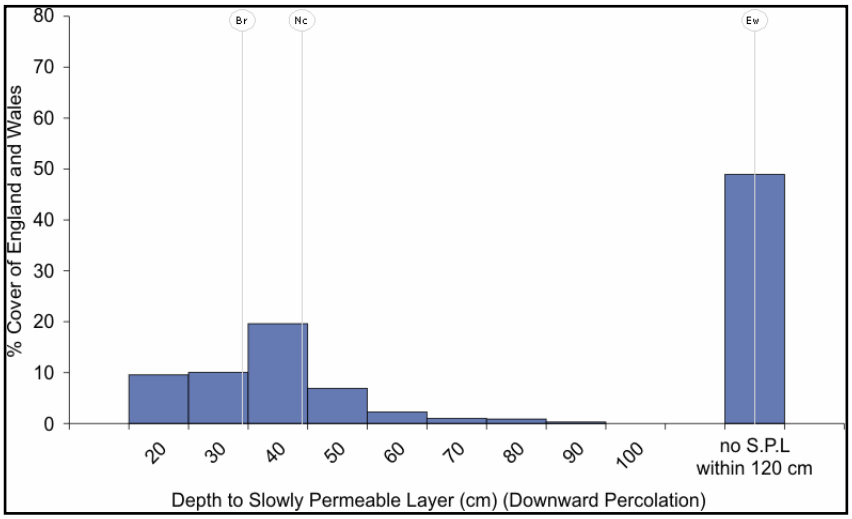


Figure 17. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

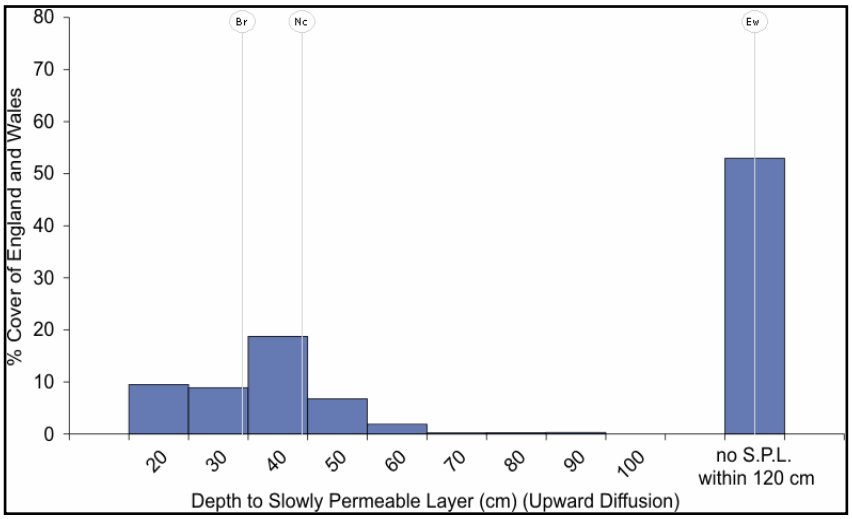


Figure 18. Depth to Slowly Permeable Layer (upward diffusion)

BRICKFIELD 2 (713f)

Slowly permeable seasonally waterlogged fine loamy soils.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

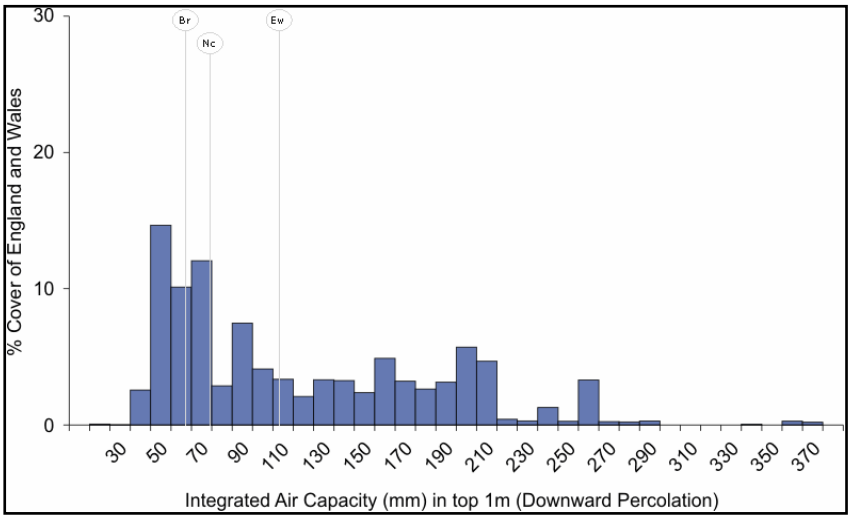


Figure 19. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

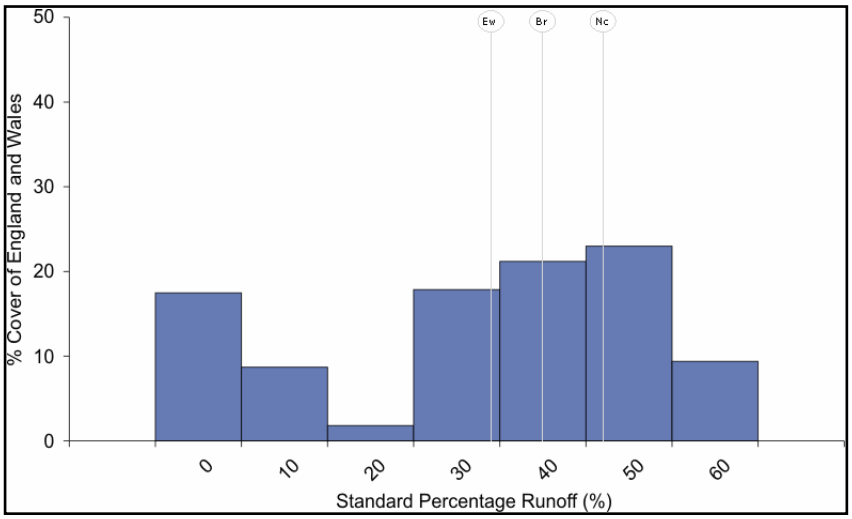


Figure 20. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

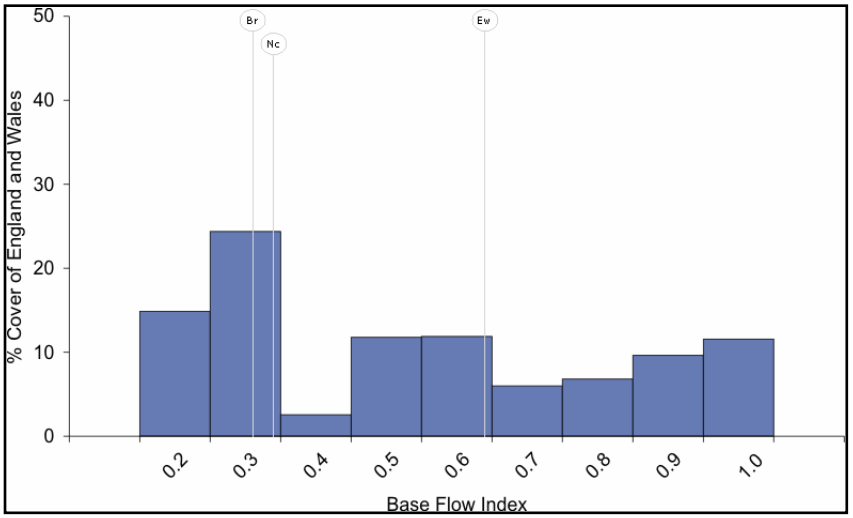


Figure 21. Base Flow Index

BRICKFIELD 2 (713f)

Slowly permeable seasonally waterlogged fine loamy soils.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

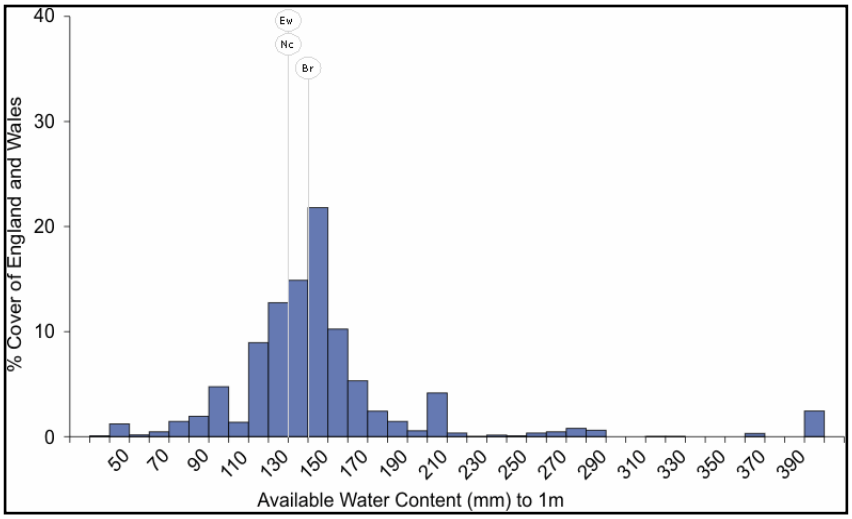


Figure 22. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

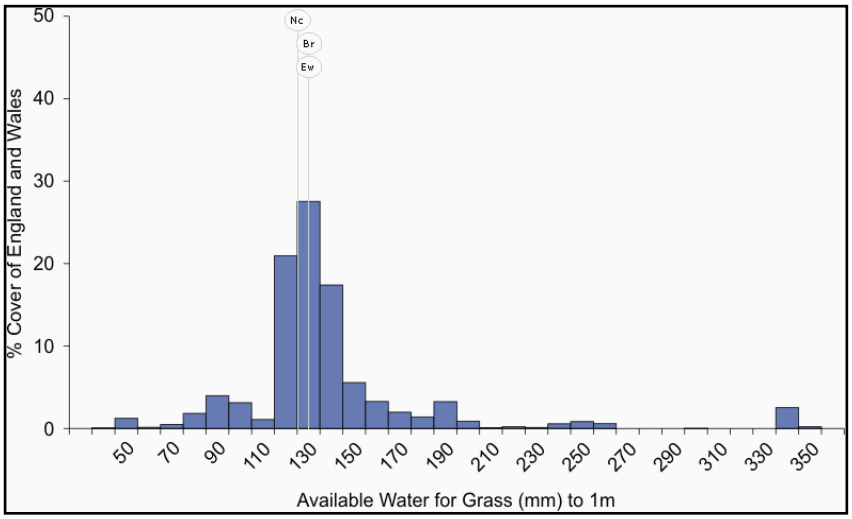


Figure 23. Available Water for Grass

BRICKFIELD 2 (713f)

Slowly permeable seasonally waterlogged fine loamy soils.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

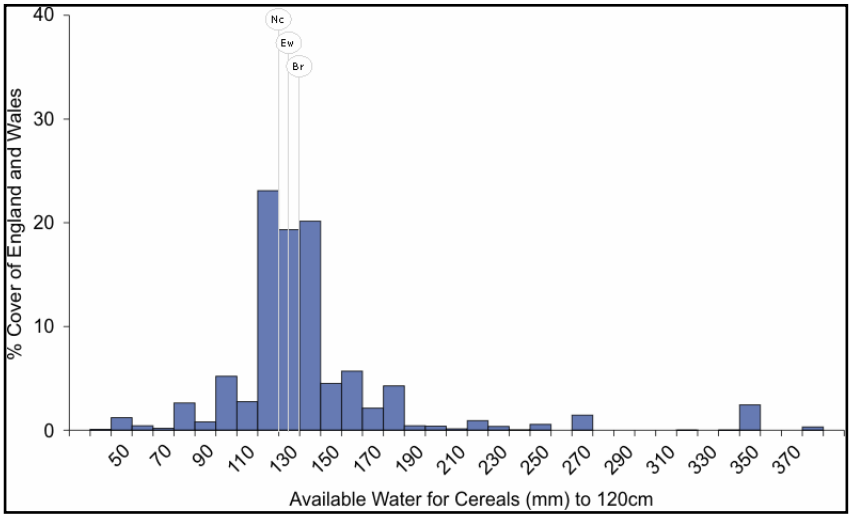


Figure 24. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

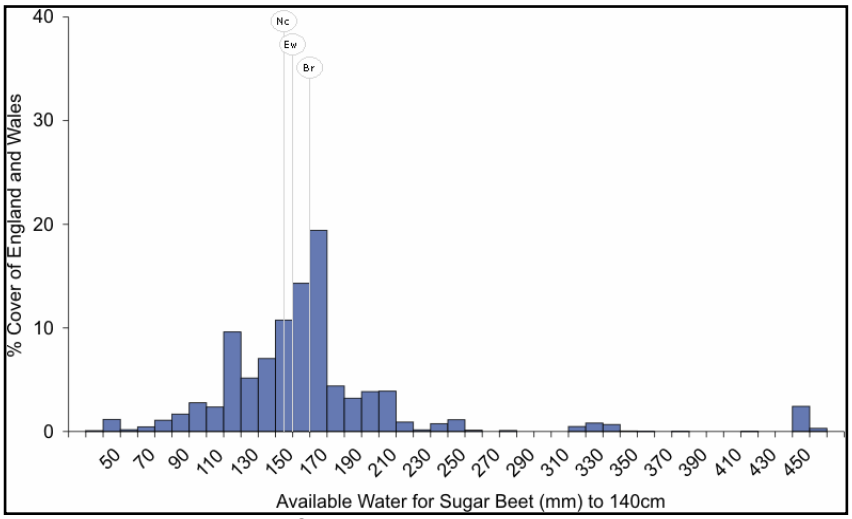


Figure 25. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

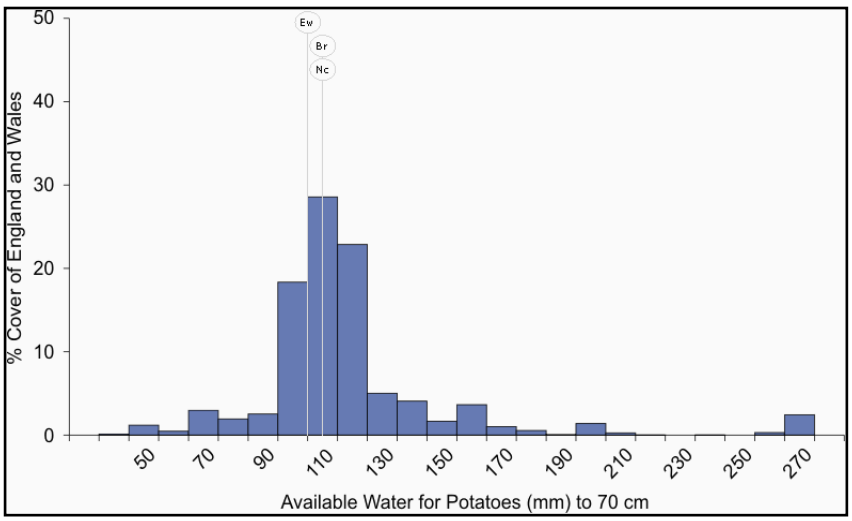
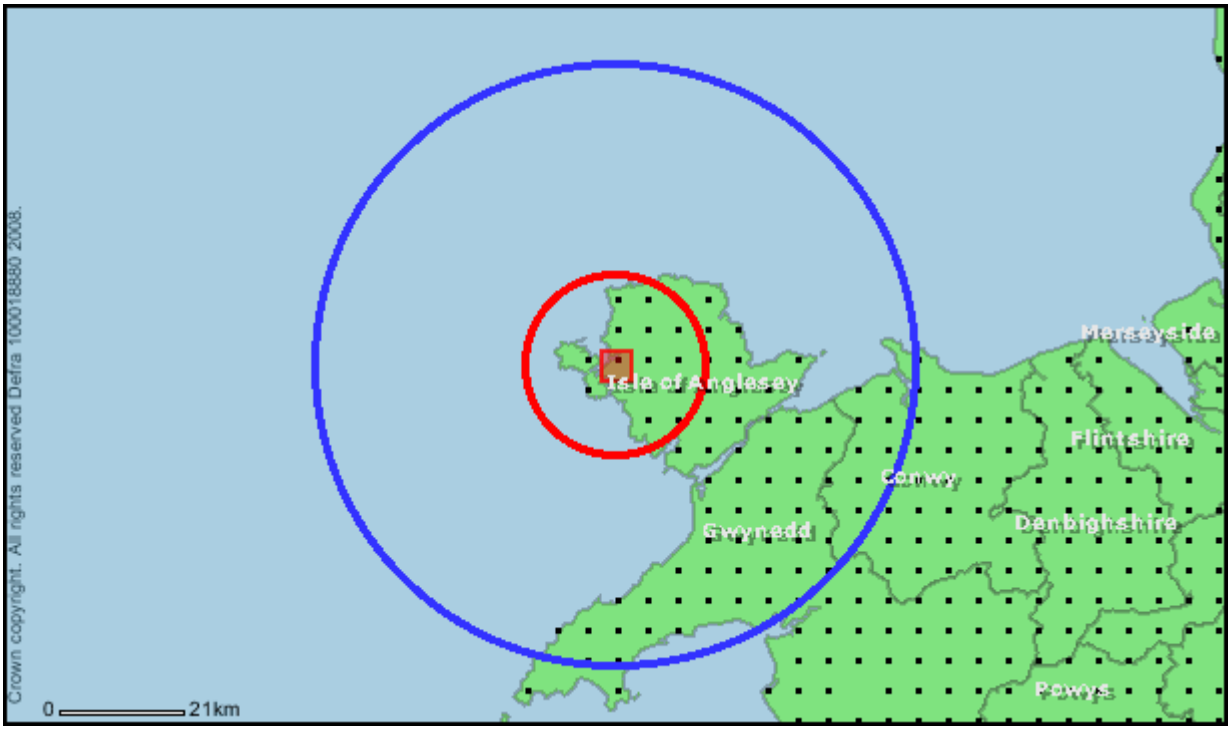


Figure 26. Available Water for Potatoes

3. TOPSOIL ELEMENT BACKGROUND LEVELS



TOPSOIL ELEMENT BACKGROUND LEVELS KEY

- NSI sample points
- Report area
- 15 km radius - local area
- 50 km radius - regional area

TOPSOIL ELEMENT BACKGROUND LEVELS DESCRIPTION

The National Soil Inventory (NSI) covers England and Wales on a 5 km grid and provides detailed information for each intersect of the grid. Collectively NSI data are statistically representative of England and Wales soils. The original sampling was undertaken around 1980 and there were partial resamplings in the mid-1990s. The most up-to-date data is presented here.

Analysis of the NSI samples provides detailed measurements of over 20 elements from the soils, in addition to pH. This data is summarised over three areas to provide you with an understanding of how your site, and your data for it, sits within the local, regional and national context.

Where available, the soil element levels are compared with the Soil Guideline Values and where a soil sample we have analysed has been found in excess of the SGV guidelines for "residential with plant uptake" land, this is displayed in red in the tables which follow.

SGV levels are provided for the following elements: lead, selenium, nickel, mercury, chromium, cadmium and arsenic.

In the following pages, a number of analyses of the topsoil are provided. The majority of analyses have been performed on the full compliment of sample points, however, in some areas, for some elements, only a few samples were analysed as part of subsequent programmes. In order to present the full suite of possible datasets, and accurately convey the validity of the data, the number of actual measured samples is stated for each analysis. Care should be taken where the number of samples is disproportionately low.

3a. Analyses Within a 15 km Radius (15 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST. DEV
pH (PH)	15	5.1	4.5	5.7	0.4
Carbon (CARBON)	15	4.6	2.2	13.5	2.8
Aluminium (AL_ACID)	15	30,575.5	13,802.0	53,950.0	9,952.5
Arsenic (AS_ACID)	13	3.6	2.0	9.6	1.9
Barium (BA_ACID)	15	200.7	76.0	372.0	96.0
Calcium (CA_ACID)	15	2,600.8	353.0	4,696.0	1,590.4
Cadmium (CD_ACID)	15	0.5	0.1	1.3	0.4
Cadmium (Extractable) (CD_EDTA)	15	0.2	0.1	0.4	0.1
Cobalt (CO_ACID)	15	10.8	3.6	25.5	5.5
Cobalt (Extractable) (CO_EDTA)	15	0.6	0.1	1.9	0.5
Chromium (CR_ACID)	15	50.0	34.3	88.4	16.1
Copper (CU_ACID)	15	21.7	5.8	49.1	10.5
Copper (Extractable) (CU_EDTA)	15	5.6	1.2	9.8	2.3
Flouride (F_ACID)	14	41.5	0.0	137.0	38.6
Iron (FE_ACID)	15	33,156.5	17,114.0	53,860.0	10,557.0
Mercury (HG_ACID)	13	0.0	0.0	0.1	0.0
Potassium (K_ACID)	15	4,637.1	1,717.0	8,269.0	2,005.7
Potassium (Extractable) (K_NITRATE)	15	104.3	25.0	247.0	58.7
Magnesium (MG_ACID)	15	3,778.7	2,133.0	5,459.0	1,093.7
Magnesium (Extractable) (MG_NITRATE)	15	135.0	66.0	307.0	59.8
Manganese (MN_ACID)	15	1,020.9	231.0	2,707.0	756.9
Manganese (Extractable) (MN_EDTA)	15	136.8	9.0	337.0	112.6
Molybdenum (MO_ACID)	14	1.1	0.0	2.9	0.8
Sodium (NA_ACID)	15	553.5	193.0	1,176.0	332.2
Nickel (NI_ACID)	15	21.7	13.5	32.7	6.7
Nickel (Extractable) (NI_EDTA)	15	0.7	0.3	2.9	0.6
Phosphorus (P_ACID)	15	920.0	358.0	2,016.0	443.3
Phosphorus (Extractable) (P_OLSEN)	15	22.5	6.0	58.0	13.4
Lead (PB_ACID)	15	36.8	15.0	69.0	15.2
Lead (Extractable) (PB_EDTA)	15	9.4	3.6	31.1	6.9
Selenium (SE_ACID)	13	0.5	0.2	0.7	0.1
Strontium (SR_ACID)	15	24.7	1.0	45.0	13.9
Vanadium (V_ACID)	14	44.8	6.7	84.3	19.4
Zinc (ZN_ACID)	15	71.4	25.0	158.0	31.0
Zinc (Extractable) (ZN_EDTA)	15	3.2	1.1	10.2	2.1

for units, see Analyses Definitions (p41)

3b. Analyses Within a 50 km Radius (80 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST. DEV
pH (PH)	80	4.8	3.5	6.2	0.6
Carbon (CARBON)	80	10.7	0.2	44.1	11.2
Aluminium (AL_ACID)	80	24,470.5	3,269.0	53,950.0	10,998.1
Arsenic (AS_ACID)	50	5.4	0.4	25.2	4.0
Barium (BA_ACID)	80	136.5	11.0	372.0	78.8
Calcium (CA_ACID)	80	1,897.8	100.0	5,800.0	1,480.9
Cadmium (CD_ACID)	80	0.6	0.0	4.5	0.6
Cadmium (Extractable) (CD_EDTA)	79	1.1	0.0	75.0	8.4
Cobalt (CO_ACID)	80	15.4	0.7	321.8	39.3
Cobalt (Extractable) (CO_EDTA)	79	0.9	0.0	10.8	1.6
Chromium (CR_ACID)	80	38.2	3.8	200.4	27.6
Copper (CU_ACID)	80	21.7	2.4	103.7	16.3
Copper (Extractable) (CU_EDTA)	79	5.3	1.2	39.2	4.7
Flouride (F_ACID)	69	52.9	0.0	554.8	87.5
Iron (FE_ACID)	80	27,840.4	3,538.0	83,515.0	14,684.2
Mercury (HG_ACID)	50	0.1	0.0	1.2	0.2
Potassium (K_ACID)	80	3,743.0	581.0	8,269.0	1,751.0
Potassium (Extractable) (K_NITRATE)	80	109.6	13.0	256.0	47.9
Magnesium (MG_ACID)	80	3,051.6	322.0	9,598.0	1,949.0
Magnesium (Extractable) (MG_NITRATE)	80	104.6	24.0	307.0	50.6
Manganese (MN_ACID)	80	1,297.4	26.0	13,613.0	1,723.0
Manganese (Extractable) (MN_EDTA)	79	165.4	1.0	2,347.0	277.3
Molybdenum (MO_ACID)	68	1.3	0.0	5.9	1.2
Sodium (NA_ACID)	80	460.7	137.0	2,209.0	341.4
Nickel (NI_ACID)	80	16.8	2.9	46.8	9.9
Nickel (Extractable) (NI_EDTA)	79	0.7	0.1	2.9	0.5
Phosphorus (P_ACID)	80	949.1	175.0	2,214.0	404.6
Phosphorus (Extractable) (P_OLSEN)	80	20.8	3.0	88.0	14.7
Lead (PB_ACID)	80	75.9	6.0	795.0	92.2
Lead (Extractable) (PB_EDTA)	79	18.7	3.6	108.0	17.6
Selenium (SE_ACID)	50	1.3	0.0	6.4	1.3
Strontium (SR_ACID)	80	18.9	0.0	54.0	11.2
Vanadium (V_ACID)	69	36.8	0.0	165.4	30.6
Zinc (ZN_ACID)	80	72.7	21.0	318.0	48.6
Zinc (Extractable) (ZN_EDTA)	79	5.8	1.1	35.9	5.8

for units, see Analyses Definitions (p41)

3c. National Analyses (5686 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST. DEV
pH (PH)	5,630	6.0	3.1	9.2	1.3
Carbon (CARBON)	5,672	6.1	0.1	61.5	8.9
Aluminium (AL_ACID)	5,677	26,775.3	491.0	79,355.0	12,772.2
Arsenic (AS_ACID)	2,729	4.6	0.0	110.0	5.7
Barium (BA_ACID)	5,677	150.0	7.0	3,840.0	159.5
Calcium (CA_ACID)	5,677	13,768.7	0.0	339,630.0	37,785.0
Cadmium (CD_ACID)	5,677	0.7	0.0	40.9	1.0
Cadmium (Extractable) (CD_EDTA)	5,655	0.5	0.0	85.0	3.0
Cobalt (CO_ACID)	5,677	10.6	0.0	567.0	13.7
Cobalt (Extractable) (CO_EDTA)	5,655	1.1	0.0	26.5	1.2
Chromium (CR_ACID)	5,677	38.9	0.0	2,339.8	43.7
Copper (CU_ACID)	5,677	22.6	0.0	1,507.7	36.8
Copper (Extractable) (CU_EDTA)	5,655	6.4	0.3	431.4	11.1
Flouride (F_ACID)	3,320	58.5	0.0	6,307.9	186.2
Iron (FE_ACID)	5,677	28,147.8	395.0	264,405.0	16,510.5
Mercury (HG_ACID)	2,159	0.1	0.0	2.4	0.2
Potassium (K_ACID)	5,677	4,727.7	60.0	23,905.0	2,700.2
Potassium (Extractable) (K_NITRATE)	5,609	182.0	6.0	2,776.0	151.6
Magnesium (MG_ACID)	5,677	3,648.1	0.0	62,690.0	3,284.1
Magnesium (Extractable) (MG_NITRATE)	5,609	146.0	1.0	1,601.0	147.5
Manganese (MN_ACID)	5,677	777.0	3.0	42,603.0	1,068.8
Manganese (Extractable) (MN_EDTA)	5,654	159.4	0.0	3,108.0	188.6
Molybdenum (MO_ACID)	4,417	0.9	0.0	56.3	2.0
Sodium (NA_ACID)	5,677	323.3	17.0	25,152.0	572.3
Nickel (NI_ACID)	5,677	25.4	0.0	1,350.2	29.2
Nickel (Extractable) (NI_EDTA)	5,655	1.6	0.1	73.2	2.0
Phosphorus (P_ACID)	5,677	792.1	41.0	6,273.0	433.9
Phosphorus (Extractable) (P_OLSEN)	5,604	27.4	0.0	534.0	25.5
Lead (PB_ACID)	5,677	73.3	0.0	17,365.0	280.6
Lead (Extractable) (PB_EDTA)	5,655	27.8	1.2	6,056.5	119.7
Selenium (SE_ACID)	2,729	0.6	0.0	22.8	0.8
Strontium (SR_ACID)	5,677	42.3	0.0	1,445.0	67.8
Vanadium (V_ACID)	4,428	41.0	0.0	854.4	33.9
Zinc (ZN_ACID)	5,677	90.2	0.0	3,648.0	104.4
Zinc (Extractable) (ZN_EDTA)	5,655	9.6	0.5	712.0	24.6

for units, see Analyses Definitions (p41)

SOIL GUIDELINE VALUES (SGV)

Defra and the Environment Agency have produced soil guideline values (SGVs) as an aid to preliminary assessment of potential risk to human health from land that may be contaminated. SGVs represent 'intervention values', which, if exceeded, act as indicators of potential unacceptable risk to humans, so that more detailed risk assessment is needed.

The SGVs were derived using the Contaminated Land Exposure Assessment (CLEA) model for four land uses:

1. residential (with plant uptake / vegetable growing)
2. residential (without vegetable growing)
3. allotments
4. commercial / industrial

SGVs are only designed to indicate whether further site-specific investigation is needed. Where a soil guideline value is exceeded, it does not mean that there is necessarily a chronic or acute risk to human health.

The values presented in this report represent those from a number of sample points (given in the "Samples" column in each table) providing local, regional and national background levels. Figures which appear in red indicate that a bulked sample from 20m surrounding a sample point, has at a past date, exceeded the SGV for the 'residential with plant uptake' land use.

It is always advisable to perform site specific investigations.

More details on all the SGVs can be found on the Environment Agency Website.

All units are mg/kg which is equivalent to parts per million (ppm)

SUBSTANCE	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	ALLOTMENTS	COMMERCIAL / INDUSTRIAL
LEAD	450	450	450	750
SELENIUM	35	260	35	8000
NICKEL	50	75	50	5000
MERCURY	8	15	8	480
CHROMIUM	130	200	130	5000
CADMIUM (pH 6)	1	30	1	1400
CADMIUM (pH 7)	2	30	2	1400
CADMIUM (pH 8)	8	30	8	1400
ARSENIC	20	20	20	500

ANALYSES DEFINITIONS

PH (pH)
pH of soil measure after shaking 10ml of soil for 15 minutes with 25ml of water

CARBON (Carbon)
Organic Carbon (% by wt) measured either by loss-on-ignition for soils estimated to contain more than about 20% organic carbon or by dichromate digestion.

AL_ACID (Aluminium)
Total Aluminium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

AS_ACID (Arsenic)
Total Arsenic concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), extracted into hydrochloric acid after digestion with nitric acid and ashing with magnesium nitrate

BA_ACID (Barium)
Total Barium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CA_ACID (Calcium)
Total Calcium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CD_ACID (Cadmium)
Total Cadmium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CD_EDTA (Cadmium Extractable)
Extractable Cadmium concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

CO_ACID (Cobalt)
Total Cobalt concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CO_EDTA (Cobalt Extractable)
Extractable Cobalt concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

CR_ACID (Chromium)
Total Chromium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CU_ACID (Copper)
Total Copper concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CU_EDTA (Copper Extractable)
Extractable Copper concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

F_ACID (Flouride)
Flouride extracted with 1mol / l sulphuric acid and determined by Ion Selective Electrode (ISE)

FE_ACID (Iron)
Total Iron concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

HG_ACID (Mercury)
Total Mercury concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), digested in a nitric/sulphuric acid mixture

K_ACID (Potassium)
Total Potassium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

K_NITRATE (Potassium Extractable)
Extractable Potassium concentration (mg/l) determined by shaking 10ml of air dry soil with 50ml of 1.0M ammonium nitrate for 30mins, filtering and then measuring the concentration by flame photometry

ANALYSES DEFINITIONS continued

MG_ACID (Magnesium)
Total Magnesium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

MG_NITRATE (Magnesium Extractable)
Extractable Magnesium concentration (mg/l) determined by shaking 10ml of air dry soil with 50ml of 1.0M ammonium nitrate for 30mins, filtering and then measuring the concentration by flame photometry

MN_ACID (Manganese)
Total Manganese concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

MN_EDTA (Manganese Extractable)
Extractable Manganese concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

MO_ACID (Molybdenum)
Total Molybdenum concentration (mg/kg) determined by Atomic Adsorption Spectrometyr (AAS) in an aqua regia digest

MO_EDTA (Molybdenum Extractable)
Extractable Molybdenum concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

NA_ACID (Sodium)
Total Sodium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

NI_ACID (Nickel)
Total Nickel concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

NI_EDTA (Nickel Extractable)
Extractable Nickel concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

P_ACID (Phosphorus)
Total Phosphorus concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

P_OLSON (Phosphorous Extractable)
Extractable Phosphorus concentration (mg/l) determined by shaking 5ml of air dry soil with 100ml of 0.5M sodium bicarbonate for 30mins at 20 deg.C, filtering and then measuring the absorbance at 880 nm colorimetrically with acid ammonium molybdate solution

PB_ACID (Lead)
Total Lead concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

PB_EDTA (Lead Extractable)
Extractable Lead concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

SE_ACID (Selenium)
Total Selenium concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), extracted into hydrochloric acid after digestion with nitric acid and ashing with magnesium nitrate

SR_ACID (Strontium)
Total Strontium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

V_ACID (Vanadium)
Total Vanadium concentration (mg/kg) determined by Atomic Adsorption Spectrometyr (AAS) in an aqua regia digest

ZN_ACID (Zinc)
Total Zinc concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

ZN_EDTA (Zinc Extractable)
Extractable Zinc concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

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To view the glossary visit: www.landis.org.uk/sitereporter/GLOSSARY.pdf

For a list of further reading visit: www.landis.org.uk/sitereporter/FURTHER_READING.pdf

For more information visit: www.landis.org.uk/reports

GIS DATASETS:

The GIS data used in the creation of this report is available to lease for use in projects.

To learn more about, or acquire the GIS datasets used in the creation of this report, please contact the National Soil Resources Institute:

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Appendix C. Agricultural Land Classification report

Jacobs UK Limited

Wylfa Associated Development, Anglesey

Agricultural Land Classification and Soil Resources

May 2016

Reading Agricultural Consultants Ltd

www.readingagricultural.co.uk

1. Introduction

1.1.1. Reading Agricultural Consultants Ltd (RAC) is instructed by Jacobs UK Limited to investigate the Agricultural Land Classification (ALC) and soil resources of land at Amlwch A and B, and Dalar Hir on the Isle of Angelsey. The sites were surveyed in March 2016.

1.1.2. Guidance for assessing the quality of agricultural land in England and Wales is set out in the Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for grading the quality of agricultural land (1988[1]).

1.1.3. Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. The principal physical factors influencing grading are climate, site and soil which, together with interactions between them, form the basis for classifying land into one of the five grades.

1.1.4. Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use, and Grade 5 is very poor quality land, with severe limitations due to adverse soil, relief, climate or a combination of these. Grade 3 land is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Land which is classified as Grades 1, 2 and 3a in the ALC system is defined as best and most versatile agricultural land.

2. Site and Climatic Conditions

2.1. General Features, Land Form and Drainage

Amlwch A and B

2.1.1. Amlwch A and B are located to the west and east of the B5111 respectively, just beyond the southern limits of Amlwch. The site collectively extends to 13.4ha of grassland and is bounded to the north by commercial buildings and the A5025, to the east also by the A5025, to the south by a link road between the A5025 and B5111, and other agricultural land, and to the west by Amlwch Leisure Centre and non-agricultural land characterised by gorse.

2.1.2. The north of the site is relatively low lying, with a north-facing slope between around 35m and 45m above Ordnance Datum (AOD). In the south-east, topography is very uneven with some short and abrupt changes in slope whilst slopes in the south are more regular and convex. Altitude rises to around 60m AOD.

[1] **MAFF (1988).** *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land.* MAFF Publications.

Dalar Hir

2.1.3. The site at Dalar Hir extends to around 15.4ha, of which 15ha is agricultural land under grass. The non-agricultural land comprises agricultural buildings at Dalar Hir.

2.1.4. The site is bounded to the south by the A5, to the west by a minor highway and to the north and east by other agricultural land.

2.1.5. Topography across most of the area is low lying and largely level, occupying a shallow valley at between around 15m and 20m AOD.

2.2. Agro-climatic Conditions

2.2.1. Agro-climatic data for one point at each of the sites have been interpolated from the Meteorological Office's standard 5km grid point data set at representative altitudes, and are given in Table 1. Climate at the survey areas is wet and warm to moderately warm. Crop moisture deficits are moderate and the number of Field Capacity Days is relatively high.

Table 1: Local agro-climatic conditions

	Amlwch A and B	**Dalar Hir**
Grid Reference	SH 2443 3922	SH 2330 3784
Altitude (AOD)	45m	20m
Average Annual Rainfall	968mm	900mm
Accumulated Temperatures >0°C	1,428 day°	1,465 day°
Field Capacity Days	205 days	189 days
Average Moisture Deficit, wheat	81mm	89mm
Average Moisture Deficit, potatoes	66mm	76mm

2.3. Soil Parent Material and Soil Type

2.3.1. The principal underlying geology as mapped by the British Geological Survey[2] comprises mica schist of the Harbour Group which is present across Amlwch and Dalar Hir.

2.3.2. The bedrock across both the survey areas is overlain by superficial deposits of glacial till, the content of which may include clay, sand, gravel and boulders.

2.3.3. The Soil Survey of England and Wales soil association mapping[3] (1:250,000 scale) shows the Brickfield 2 association to be present across both sites, characterised by fine loamy soils derived from shale and sandstone. The associated Brickfield series has slowly permeable subsurface horizons and is commonly of Wetness Class (WC) IV, although responds well to drainage. The East Keswick series of the Brickfield 2 association is contrastingly well drained, of WC I[4].

3. Agricultural Land Quality

3.1. Soil Survey Methods

3.1.1. Soil profiles were examined across each of the sites using an Edelman (Dutch) auger at an observation density of approximately one per hectare. In addition, one observation pit was excavated at each of the Amlwch and Dalar Hir sites to examine subsoil structures. The locations of observations are indicated on Figures RAC6753-1b and 1c. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120cm or any impenetrable layer:

- soil texture;
- significant stoniness;
- colour (including local gley and mottle colours);
- consistency;
- structural condition;
- free carbonate; and
- depth.

[2] **British Geological Survey (2016).** *Geology of Britain viewer, http://mapapps.bgs.ac.uk/geologyofbritain/home.html*

[3] **Soil Survey of England and Wales (1984).** *1:250,000 scale soil association mapping, Sheet 2 – Soils of Wales.*

[4] **Rudeforth *et al.* (1984).** *Soils and Their Use in Wales.* Soil Survey of England and Wales Bulletin 11, Harpenden.

3.1.2. Topsoil samples from Amlwch and Dalar Hir were submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are given in Appendix 1.

3.1.3. Soil Wetness Class (WC) was inferred from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling and/or poorly permeable subsoil layers at least 15cm thick, in relation to the number of Field Capacity Days at the location.

3.1.4. Soil droughtiness was investigated by the calculation of moisture balance equations (given in Appendix 2). Crop-adjusted Available Profile Water (AP) is estimated from texture, stoniness and depth, and then compared to a calculated moisture deficit (MD) for the standard crops wheat and potatoes. The MD is a function of potential evapotranspiration and rainfall. Grading of the land can be affected if the AP is insufficient to balance the MD and droughtiness occurs. When a profile is found with significant stoniness, sufficient to prevent penetration of a hand auger, then it is assumed, for the purposes of calculating droughtiness, that similar levels of stoniness continue to the full 1.2m depth considered.

3.2. Agricultural Land Classification and Site Limitations

3.2.1. Assessment of agricultural land quality has been carried out according to the MAFF revised guidelines (19881). Soil profiles have been described according to the Soil Survey Field Handbook[5] which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.

Amlwch A and B

3.2.2. The soil profiles predominantly comprise medium clay loam topsoil, although sandy clay loam and clay are occasionally present. The average depth is 33cm and the colour is typically dark brown or brown (7.5YR3/2, 3/3 or 4/2 in the Munsell soil colour charts[6]). Stone content is slightly variable, ranging from stoneless up to 10%, found at the higher altitudes. The topsoil structure is moderately well developed with medium to fine subangular blocky peds and is therefore permeable. Many worms and common fine roots were observed in the excavated topsoil.

3.2.3. There are two subsoil variants at Amlwch. The dominant variant comprises light olive brown (2.5Y5/3) clay which is mottled with common, faint to distinct ochreous mottles and therefore is gleyed. The consistency of the clay is very plastic and sticky with poor structure and drainage. These profiles are of WC IV, resulting in a wetness and workability limitation to Subgrade 3b.

3.2.4. The subordinate subsoil variant is present in the north of Amlwch A and across the higher altitudes in the south-east of Amlwch B. The subsoil is medium clay loam or

[5] **Hodgson, J. M. (Ed.) (1997).** *Soil Survey Field Handbook*. Soil Survey Technical Monograph No. 5, Silsoe.

[6] **Munsell Color (2009).** *Munsell Soil Color Book,* Grand Rapids, MI, USA

sandy clay loam with variable colour, including brown (7.5YR4/3), dark yellowish brown (10YR4/4) and light olive brown (2.5Y5/3). The occurrence of light olive brown sandy clay loam also contains common distinct ochreous mottles, although as with the remainder of this soil variant, remains to be permeable.

3.2.5. The subsoil structure is weakly developed although forms fine subangular or angular blocky peds, although the latter break to a crumb structure. The profiles are therefore of WC I or where mottled, WC II.

3.2.6. However the main limitations to agricultural land quality in these profiles are physical site characteristics. The south-east and north of Amlwch A are characterised by hummocks, with rock outcrops and gorse. In the northernmost field, the land is otherwise rough grassland which could not practically be farmed independently of the hummocky area. The whole northern field is of Grade 5. In the south-east, the hummocks and outcrops are within a restricted area resulting in a limited extent of Grade 5.

3.2.7. The landform in the south-east of Amlwch B is in parts hummocky or otherwise interspersed with short, steep slopes and bowl-shaped features. The general downward slope commonly measures around 8° which restricts the types of agricultural machinery that can be safely operated. The area is most suitable for grass rather than arable crops and is assessed as Grade 4.

Dalar Hir

3.2.8. Soil profiles at Dalar Hir mostly include medium clay loam and sandy clay loam topsoils, of 33cm average depth. To the east the topsoil is of heavy clay loam. The topsoil is consistently dark greyish brown in colour (10YR4/2) and is stoneless or slightly stony. The structure is weakly developed but forms fine subangular blocky peds and is permeable. Many medium roots are distributed through the topsoil.

3.2.9. There are two subsoil variants at Dalar Hir. The first type comprises clay which is mostly brown in colour (10YR4/2 or 5/3). The subsoil structure is weakly developed and forms fine angular blocky peds. Consistency is moist and commonly firm and the subsoil is poorly permeable. Stone content is up to 20% gravel.

3.2.10. The second subsoil type is of sandy clay loam which is predominantly brown although in the centre of the site a light greenish grey (10Y7/1) lower subsoil layer can be distinguished. Stone content is typically around 5-10% by volume although is occasionally up to 20%, also around the centre of the site.

3.2.11. All of the subsoil is marked with common ochreous mottles and is gleyed and poorly permeable, of WC IV. Profiles of WC IV with medium loamy topsoil textures are limited by wetness and workability to Subgrade 3b.

3.2.12. The areas of each ALC grade are given in Table 2 and shown in Figures RAC6753-2b and 2c. Photographs taken at each of the sites are given in Appendix 3.

Table 2: Agricultural Land Classification

Grade	Description	Amlwch A and B		Dalar Hir	
		Area (ha)	% of agri. land	Area (ha)	% of agri. land
3b	Moderate quality	7.4	55	15.0	100
4	Poor quality	2.4	18	0	-
5	Very poor quality	3.6	27	0	-
	Total Agricultural	13.4	100	15.0	100

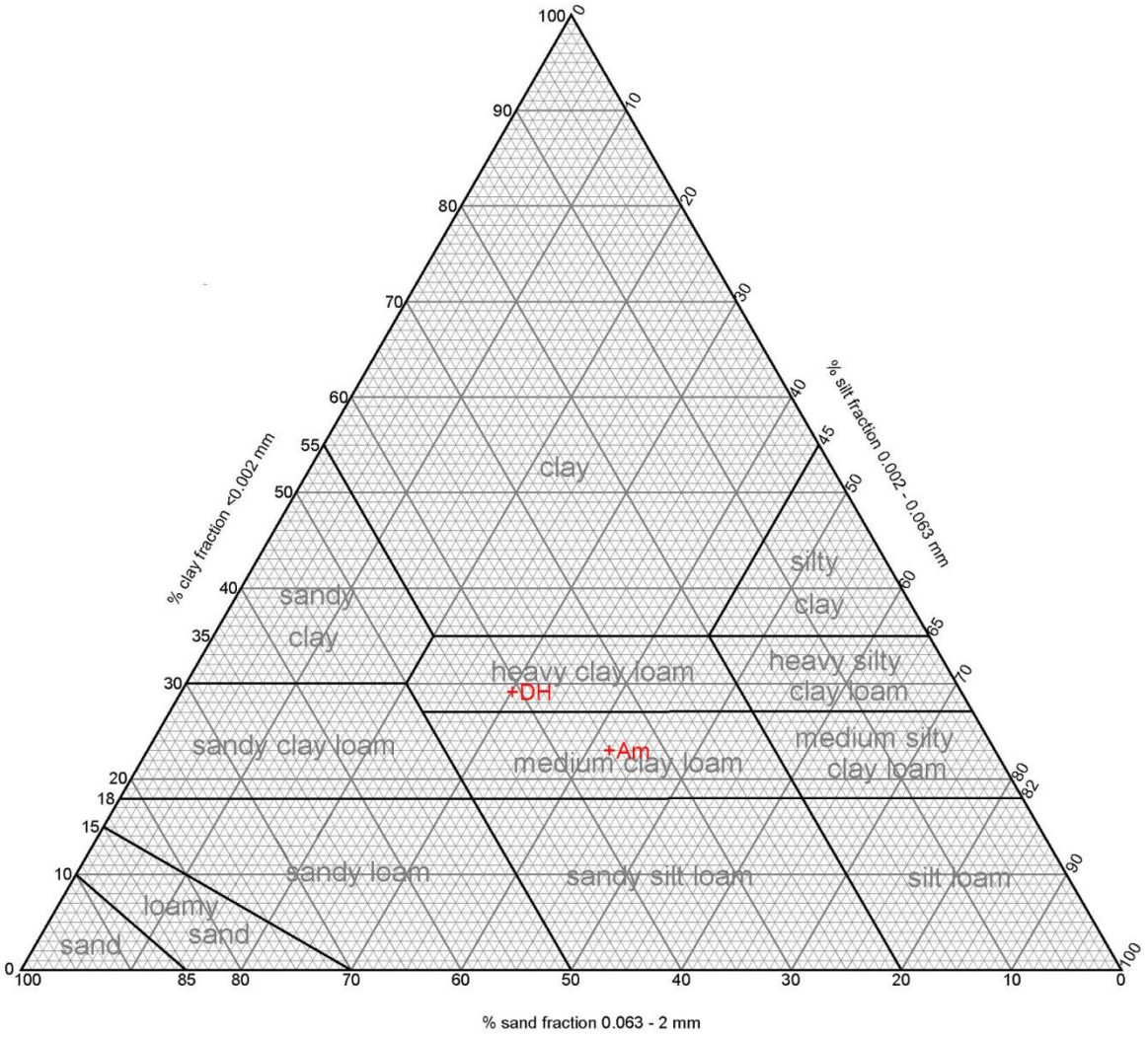
Appendix 1: Laboratory Data

Determinand	DH	Am	Units
Sand 2.00-0.063 mm	41	35	% w/w
Silt 0.063-0.002 mm	30	42	%w/w
Clay <0.002 mm	29	23	% w/w
Organic Matter WB	8.8	5.6	% w/w
Texture	Heavy Clay Loam	Medium Clay Loam	% w/w

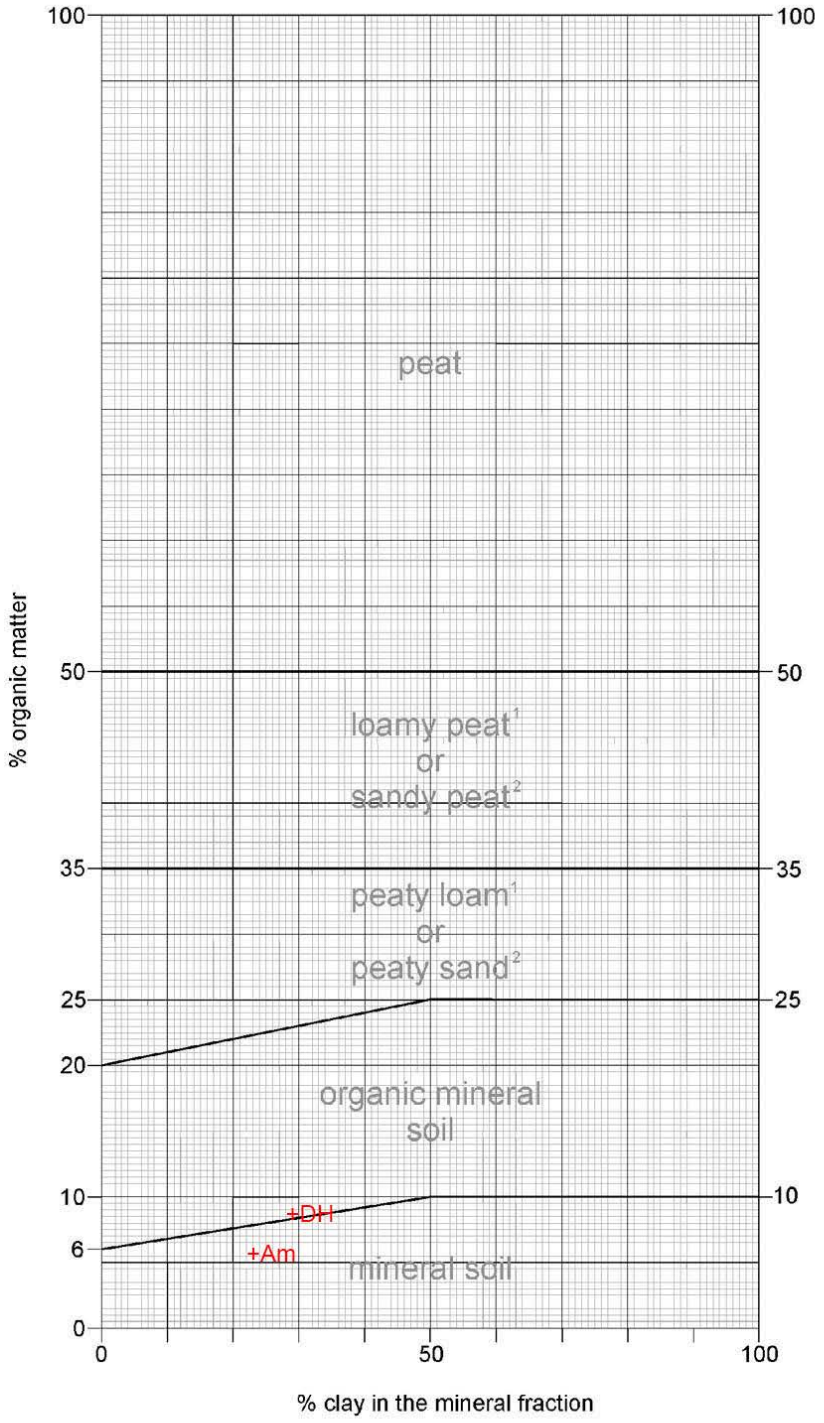
Determinand	DH	Am	Units
Soil pH	6.6	6.4	
Phosphorus (P)	30.8	4.2	mg/l (av)
Potassium (K)	316	33.5	mg/l (av)
Magnesium (Mg)	119	64.9	mg/l (av)

Determinand	DH	Am	Units
Phosphorus (P)	3	0	ADAS Index
Potassium (K)	3	0	ADAS Index
Magnesium (Mg)	3	2	ADAS Index

Soil Texture by Particle Size Analysis



Organic Matter Content



[1] Less than 50% sand in the mineral fraction

[2] 50% sand or more in the mineral fraction

Amlwch A and B

Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines, MAFF 1988.

MDw= 81 MDp= 66

							Wheat Calculation			Potato Calculation						
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
1	0	30	MCL	7.5YR4/2		0	1	18	54.0	1	18	54.0	n	n	IV	3b
	30	50	C	2.5Y5/3	cff och	5	1	13	24.8	1	13	24.8	y	y		
	50	70	C	2.5Y5/3	cff och	5	0.5	7	13.4	1	13	24.8	y	y		
	70	120	C	2.5Y5/3	cff och	5	0.5	7	33.4				y	y		
								Total (mm) =	125.5		Total (mm) =	103.6				
								MBw=	44.5		MBp=	37.6				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
2	0	30	MCL	7.5YR4/2		0	1	18	54.0	1	18	54.0	n	n	IV	3b
	30	50	C	2.5Y5/3	cff och	5	1	13	24.8	1	13	24.8	y	y		
	50	70	C	2.5Y5/3	cff och	5	0.5	7	13.4	1	13	24.8	y	y		
	70	120	C	2.5Y5/3	cff och	5	0.5	7	33.4				y	y		
								Total (mm) =	125.5		Total (mm) =	103.6				
								MBw=	44.5		MBp=	37.6				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
3	0	32	MCL	7.5YR4/2		0	1	18	57.6	1	18	57.6	n	n	IV	3b
	32	50	C	2.5Y5/3	cff och	5	1	13	22.3	1	13	22.3	y	y		
	50	70	C	2.5Y5/3	cff och	5	0.5	7	13.4	1	13	24.8	y	y		
	70	120	C	2.5Y5/3	cff och	5	0.5	7	33.4				y	y		
								Total (mm) =	126.6		Total (mm) =	104.7				
								MBw=	45.6		MBp=	38.7				
								Grade =	1		Grade =	1				

							Wheat Calculation			Potato Calculation						
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
4	0	30	MCL	10YR4/2		0	1	18	54.0	1	18	54.0	n	n	IV	5
	30	50	C	2.5Y5/3	cff och	5	1	13	24.8	1	13	24.8	y	y		
	50	70	C	2.5Y5/3	cff och	5	0.5	7	13.4	1	13	24.8	y	y		
	70	120	C	2.5Y5/3	cff och	5	0.5	7	33.4				y	y		
								Total (mm) =	125.5		Total (mm) =	103.6				
								MBw=	44.5		MBp=	37.6				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
5	0	30	C	10YR4/2		0	1	17	51.0	1	17	51.0	n	n	IV	3b
	30	50	C	10YR6/1	cmd och	0	1	13	26.0	1	13	26.0	y	y		
	50	70	C	10YR6/1	cmd och	0	0.5	7	14.0	1	13	26.0	y	y		
	70	120	C	10YR6/1	cmd och	0	0.5	7	35.0				y	y		
								Total (mm) =	126.0		Total (mm) =	103.0				
								MBw=	45.0		MBp=	37.0				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
6	0	32	MCL	10YR3/2		0	1	18	57.6	1	18	57.6	n	n	IV	3b
	32	50	C	10YR5/3	cff och	5	1	13	22.3	1	13	22.3	y	y		
	50	70	C	10YR5/3	cff och	5	0.5	7	13.4	1	13	24.8	y	y		
	70	120	C	10YR5/3	cff och	5	0.5	7	33.4				y	y		
								Total (mm) =	126.6		Total (mm) =	104.7				
								MBw=	45.6		MBp=	38.7				
								Grade =	1		Grade =	1				

							Wheat Calculation			Potato Calculation						
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
7	0	28	MCL	10YR3/2		0	1	18	50.4	1	18	50.4	n	n	IV	3b
	32	50	C	10YR5/3	cmf och	5	1	13	22.3	1	13	22.3	y	y		
	50	70	C	10YR5/3	cmf och	5	0.5	7	13.4	1	13	24.8	y	y		
	70	120	C	10YR5/3	cmf och	5	0.5	7	33.4				y	y		
								Total (mm) =	119.4		Total (mm) =	97.5				
								MBw=	38.4		MBp=	31.5				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
8	0	50	MCL	7.5YR3/3		2	1	18	88.3	1	18	88.3	n	n	I	4
	50	65	MCL	7.5YR3/3		10	0.5	16	21.7	1	16	21.8	n	n		
	65	70	MCL	7.5YR4/3		10	0.5	10	4.5	1	16	7.3	n	n		
	70	80	MCL	7.5YR4/3		10	0.5	10	9.1				n	n		
	80	120	MCL	7.5YR4/3		10	0.5	10	36.2				n	n		
								Total (mm) =	159.8		Total (mm) =	117.3				
								MBw=	78.8		MBp=	51.3				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
9	0	27	MCL	7.5YR3/2		2	1	18	47.7	1	18	47.7	n	n	II	4
	27	50	SCL	2.5Y5/3	cfd och	10	1	15	31.3	1	15	31.3	y	n		
	50	60	SCL	2.5Y5/3	cfd och	10	0.5	10	9.1	1	15	13.6	y	n		
	60	70	SCL	2.5Y5/3	cfd och	10	0.5	10	9.1				y	n		
	70	120	SCL	2.5Y5/3	cfd och	10	0.5	10	45.3				y	n		
								Total (mm) =	142.3		Total (mm) =	92.6				
								MBw=	61.3		MBp=	26.6				
								Grade =	1		Grade =	1				

							Wheat Calculation			Potato Calculation						
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
10	0	30	SCL	7.5YR4/2		10	1	17	46.2	1	17	46.2	n	n	I	4
	30	50	SCL	2.5Y5/3		20	1	15	24.4	1	15	24.4	n	n		
	50	70	SCL	2.5Y5/3		20	0.5	10	16.2	1	15	24.4	n	n		
	70	120	SCL	2.5Y5/3		20	0.5	10	40.5				n	n		
								Total (mm) =	127.3		Total (mm) =	95.0				
								MBw=	46.3		MBp=	29.0				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
11	0	20	MCL	10YR3/2		5	1	18	34.3	1	18	34.3	n	n	I	5
Pit	20	40	MCL	7.5YR3/2		30	1	16	23.0	1	16	23.0	n	n		
	40	50	SCL	10YR4/4		20	1	16	13.0	1	16	13.0	n	n		
	50	70	SCL	10YR4/4		20	0.5	10	16.2	1	16	26.0	n	n		
	70	120	SCL	10YR4/4		20	0.5	10	40.5				n	n		
								Total (mm) =	127.0		Total (mm) =	96.3				
								MBw=	46.0		MBp=	30.3				
								Grade =	1		Grade =	1				

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Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines, MAFF 1988.

MDw= 89 MDp= 76

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	Wheat Calculation: TAv or EAv (stones) %	Wheat Calculation: TAv or EAv (soil) %	Wheat Calculation: AP (wheat) mm	Potato Calculation: TAv (stones) %	Potato Calculation: TAv (soil) %	Potato Calculation: AP (potatoes) mm	Gley	SP	WC	Grade
1	0	35	MCL	10YR4/2		0	1	18	63.0	1	18	63.0	n	n	IV	3b
	35	50	SCL	10YR5/3	cff-d och	10	1	13	17.7	1	13	17.7	y	y		
	50	70	SCL	10YR5/3	cff-d och	10	0.5	8	14.5	1	13	23.6	y	y		
	70	120	SCL	10YR5/3	cff-d och	10	0.5	8	36.3				y	y		
								Total (mm) =	131.5		Total (mm) =	104.3				
								MBw=	42.5		MBp=	28.3				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
2	0	35	MCL	10YR4/2		0	1	18	63.0	1	18	63.0	n	n	IV	3b
	35	50	SCL	10YR5/3	cfd och	10	1	13	17.7	1	13	17.7	y	y		
	50	70	SCL	10YR5/3	cfd och	10	0.5	8	14.5	1	13	23.6	y	y		
	70	120	SCL	10YR5/3	cfd och	10	0.5	8	36.3				y	y		
								Total (mm) =	131.5		Total (mm) =	104.3				
								MBw=	42.5		MBp=	28.3				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
3	0	32	SCL	10YR4/2		0	1	17	54.4	1	17	54.4	n	n	IV	3b
	32	50	C	10YR4/2	c-mmd och	5	1	13	22.3	1	13	22.3	y	y		
	50	64	C	10YR4/2	c-mmd och	5	0.5	7	9.3	1	13	17.4	y	y		
	64	70	C	10YR5/3	cmd och	15	0.5	7	3.6	1	13	6.7	y	n		
	70	120	C	10YR5/3	cmd och	15	0.5	7	30.1				y	n		
								Total (mm) =	119.8		Total (mm) =	100.8				
								MBw=	30.8		MBp=	24.8				
								Grade =	1		Grade =	1				

							Wheat Calculation			Potato Calculation						
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
4	0	30	MCL	10YR4/2		0	1	18	54.0	1	18	54.0	n	n	IV	3b
	30	50	C	10YR4/2	c-mmd och	5	1	13	24.8	1	13	24.8	y	y		
	50	70	C	10YR4/2	c-mmd och	5	0.5	7	13.4	1	13	24.8	y	y		
	70	120	C	10YR4/2	c-mmd och	5	0.5	7	33.4				y	y		
								Total (mm) =	125.5		Total (mm) =	103.6				
								MBw=	36.5		MBp=	27.6				
								Grade =	1		Grade =	1				
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
5	0	35	MCL	10YR4/2		0	1	18	63.0	1	18	63.0	n	n	IV	3b
Pit	35	50	C	10YR5/3	cmd och	20	1	13	15.9	1	13	15.9	y	y		
	50	65	C	10YR5/3	cmd och	20	0.5	7	8.6	1	13	15.9	y	y		
	65	70	C	10YR5/3	cmd och	20	0.5	7	2.9	1	13	5.3	y	y		
	70	120	C	10YR5/3	cmd och	20	0.5	7	28.5				y	y		
								Total (mm) =	118.8		Total (mm) =	100.1				
								MBw=	29.8		MBp=	24.1				
								Grade =	2		Grade =	1				
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
6	0	28	MCL	10YR4/2		0	1	18	50.4	1	18	50.4	n	n	IV	3b
	28	50	SCL	10YR5/2+5/3	cmp och	10	1	13	26.0	1	13	26.0	y	y		
	50	60	SCL	10YR5/2+5/3	cmp och	10	0.5	8	7.3	1	13	11.8	y	y		
	60	70	SCL	10Y7/1	cf-mf och	15	0.5	8	6.9	1	13	11.2	y	y		
	70	75	SCL	10Y7/1	cf-mf och	15	0.5	8	3.4				y	y		
	75	120	SCL	10Y7/1	cf-mf och	15	0.5	8	30.9				y	y		
								Total (mm) =	124.9		Total (mm) =	99.4				
								MBw=	35.9		MBp=	23.4				
								Grade =	1		Grade =	1				

							Wheat Calculation			Potato Calculation						
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
7	0	30	MCL	10YR4/2		2	1	18	53.0	1	18	53.0	n	n	IV	3b
	30	50	C	10YR5/3	cmd och	10	1	13	23.6	1	13	23.6	y	y		
	50	70	C	10YR5/3	cmd och	10	0.5	7	12.7	1	13	23.6	y	y		
	70	80	C	10YR5/3	cmd och	10	0.5	7	6.4				y	y		
	80	120	C	10YR5/3	cmd och	10	0.5	7	25.4				y	y		
								Total (mm) =	121.0		Total (mm) =	100.2				
								MBw=	32.0		MBp=	24.2				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
8	0	40	MCL	7.5YR4/2		5	1	18	68.6	1	18	68.6	n	n	IV	3b
	40	50	SCL	10YR5/3	cff och	20	1	13	10.6	1	13	10.6	y	y		
	50	60	SCL	10YR5/3	cff och	20	0.5	8	6.5	1	13	10.6	y	y		
	60	70	SCL	10YR5/3	cff och	20	0.5	8	6.5	1	13	10.6	y	y		
	70	120	SCL	10YR5/3	cff och	20	0.5	8	32.5				y	y		
								Total (mm) =	124.7		Total (mm) =	100.4				
								MBw=	35.7		MBp=	24.4				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
9	0	35	MCL	10YR4/2		0	1	18	63.0	1	18	63.0	n	n	IV	3b
	35	50	C	10YR5/3	cmd och	15	1	13	16.8	1	13	16.8	y	y		
	50	70	C	10YR5/3	cmd och	15	0.5	7	12.1	1	13	22.4	y	y		
	70	120	C	10YR5/3	cmd och	15	0.5	7	30.1				y	y		
								Total (mm) =	122.0		Total (mm) =	102.2				
								MBw=	33.0		MBp=	26.2				
								Grade =	1		Grade =	1				

							Wheat Calculation			Potato Calculation						
Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
10	0	35	MCL	10YR4/2		0	1	18	63.0	1	18	63.0	n	n	IV	3b
	35	50	SCL	10YR5/3	cff och	5	1	13	18.6	1	13	18.6	y	y		
	50	70	SCL	10YR5/3	cff och	5	0.5	8	15.3	1	13	24.8	y	y		
	70	120	SCL	10YR5/3	cff och	5	0.5	8	38.1				y	y		
								Total (mm) =	135.0		Total (mm) =	106.4				
								MBw=	46.0		MBp=	30.4				
								Grade =	1		Grade =	1				

Site No.	Depth (cm)		Texture	Colour	Mottle	stones %	TAv or EAv (stones) %	TAv or EAv (soil) %	AP (wheat) mm	TAv (stones) %	TAv (soil) %	AP (potatoes) mm	Gley	SP	WC	Grade
11	0	36	MCL	10YR4/2		0	1	18	64.8	1	18	64.8	n	n	IV	3b
	36	50	SCL	10YR5/3	cff och	0	1	13	18.2	1	13	18.2	y	y		
	50	60	SCL	10YR5/3	cff och	0	0.5	8	8.0	1	13	13.0	y	y		
	60	70	SCL	10YR5/3+5/4	cff och	5	0.5	8	7.6	1	13	12.4	y	y		
	70	85	SCL	10YR5/3+5/4	cff och	5	0.5	8	11.4				y	y		
	85	120	SCL	10YR5/3+5/4	cff och	5	0.5	8	26.7				y	y		
								Total (mm) =	136.8		Total (mm) =	108.4				
								MBw=	47.8		MBp=	32.4				
								Grade =	1		Grade =	1				

Appendix 3: Site Photographs

Dalar Hir Pit

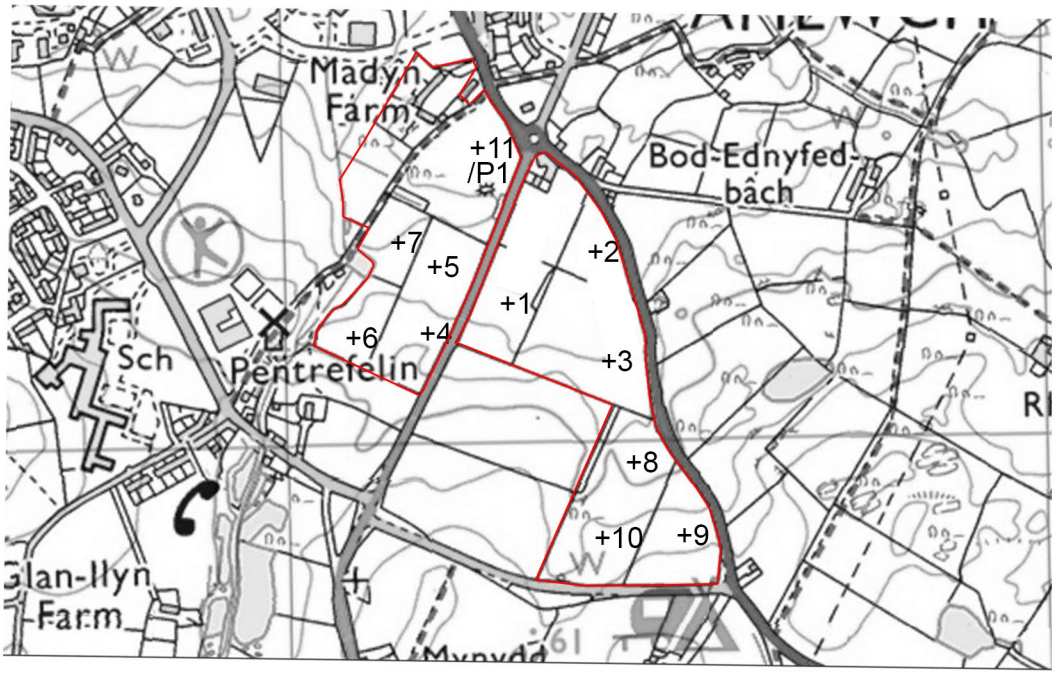
Dalar Hir Topsoil

Dalar Hir Subsoil

Amlwch Pit

Amlwch Topsoil

Amlwch Subsoil



Survey Area

.1 Auger Observation

.P1 Pit Observation

N

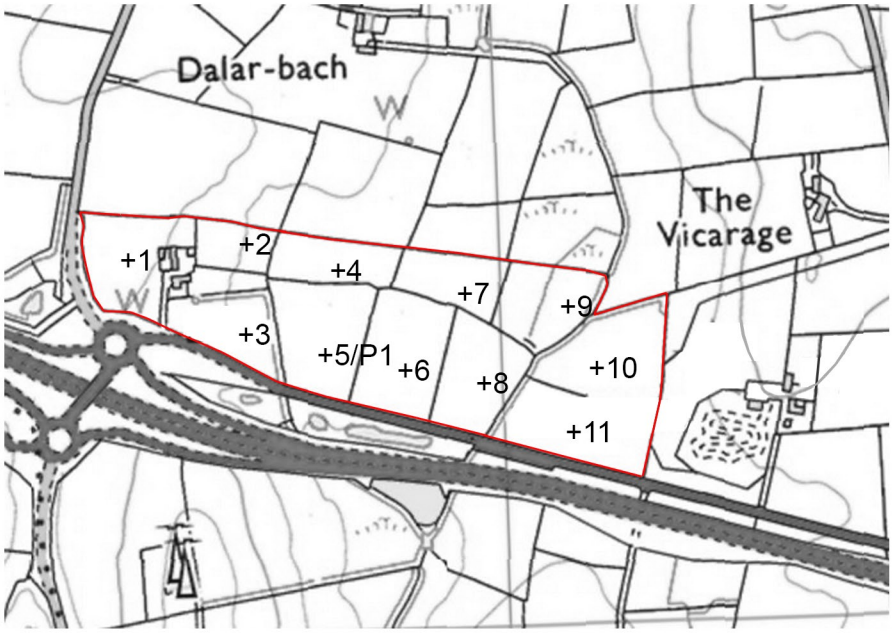
Scale 1:10,000@A4 Apr/2016

Figure RAC6753-1b: Observations

Site: Amlwch A and B

Client: Jacobs UK Ltd

Reading Agricultural Consultants



Survey Area

.1 Auger Observation

.P1 Pit Observation

N

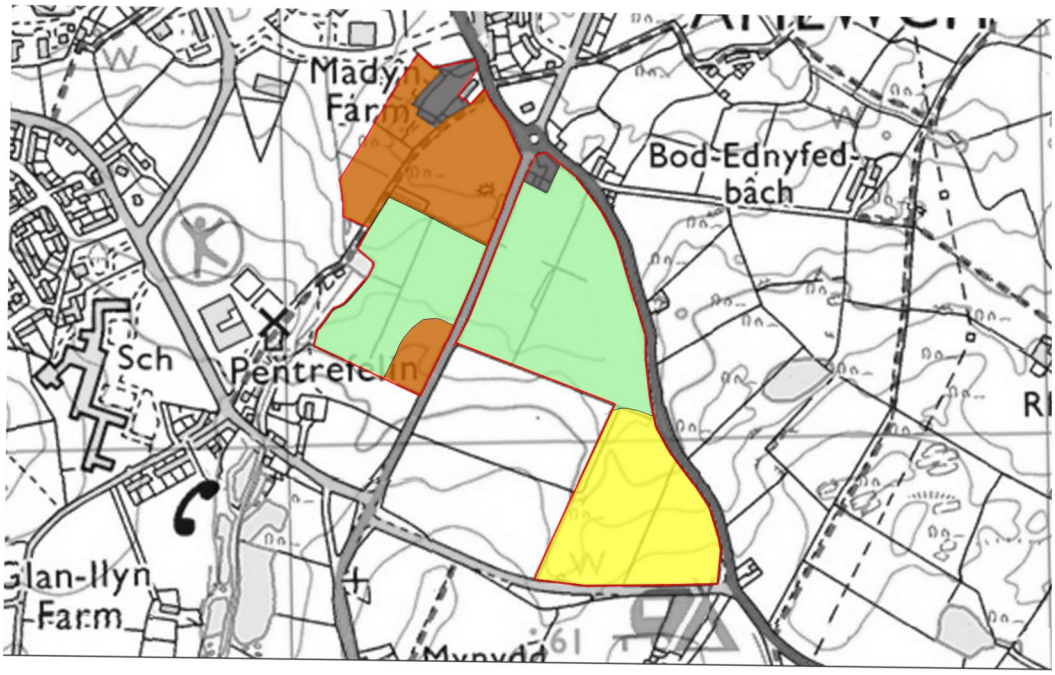
Scale 1:10,000@A4 Apr/2016

Figure RAC6753-1c: Observations

Site: Dalar Hir

Client: Jacobs UK Ltd

Reading Agricultural Consultants



- Grade 1 - excellent quality
- Grade 2 - very good quality
- Subgrade 3a - good quality

} Best and most versatile land

- Subgrade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality

* Not Present

N

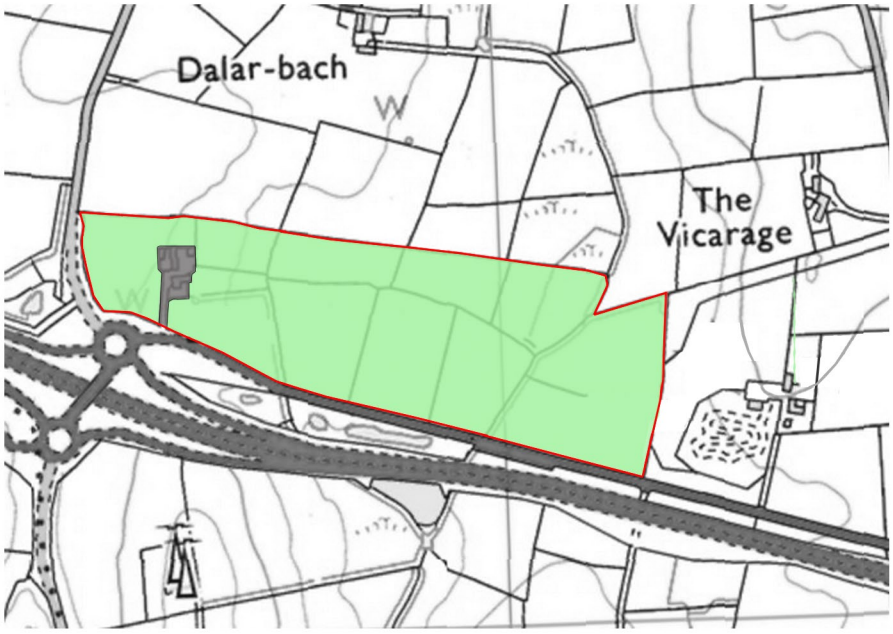
Scale 1:10,000@A4 Apr/2016

Figure RAC6753-2b: Agricultural Land Classification

Site: Amlwch A and B

Client: Jacobs UK Ltd

Reading Agricultural Consultants



Grade 1 - excellent quality
Grade 2 - very good quality
Subgrade 3a - good quality
Best and most versatile land
Not Present
Subgrade 3b - moderate quality
Grade 4 - poor quality
Grade 5 - very poor quality
Non-Agricultural

N

Scale 1:10,000@A4 Apr/2016

Figure RAC6753-2c: Agricultural Land Classification

Site: Dalar Hir

Client: Jacobs UK Ltd

Reading Agricultural Consultants

Appendix D. Groundsure report pack

Groundsure
LOCATION INTELLIGENCE

Jacobs Engineering

NEWMINSTER HOUSE 27-29, BALDWIN STREET,
BRISTOL, BS1 1LT

Groundsure Reference:	GS-2319783
Your Reference:	Jacobs_Engineering_60PO8042000000 01
Report Date	3 Aug 2015
Report Delivery Method:	Email - pdf

Groundsure Enviroinsight

Address: Dalar Hir,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviroinsight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,

[redacted]

Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Groundsure Enviroinsight

Address:	**Dalar Hir,**
Date:	**3 Aug 2015**
Reference:	**GS-2319783**
Client:	**Jacobs Engineering**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	04-Jun-2013
Grid Reference:	232873,378377
Site Size:	15.71ha

Groundsure
LOCATION INTELLIGENCE

Contents Page

Groundsure
LOCATION INTELLIGENCE

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	2	1	1
1.2 Additional Information – Historical Tank Database	0	0	0	2
1.3 Additional Information – Historical Energy Features Database	0	0	0	0
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Potentially Infilled Land	0	5	6	0

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	0
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	0	1
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Groundsure
LOCATION INTELLIGENCE

Section 3: Landfill and Other Waste Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-5000
3.1 Landfill Sites						
3.1.1 Environment Agency Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency Historic Landfill Sites	0	0	0	0	0	0
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	1	1	Not searched	Not searched
3.2.2 Environment Agency Licensed Waste Sites	0	0	0	0	2	0

Section 4: Current Land Use

	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	2	0	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology

5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology

	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	1
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	0	0	0	0	Not searched	Not searched

	On-site	0-50m	51-250	251-500	501-1000	1000-1500

Section 6: Hydrogeology and Hydrology	0-500m					
6.9 Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	No	Yes
6.10 Detailed River Network entries within 500m of the site	10	3	17	15	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding	
7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	No
7.2 Are there any Environment Agency Zone 3 floodplains within 250m of the study site	No
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Moderate

Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	1	1
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	1
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Very Low
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Very Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Negligible
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	Yes
10.3 Are there any brine affected areas within 75m of the study site?	No

Groundsure
LOCATION INTELLIGENCE

Using this report

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

1. Historical Industrial Sites

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

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

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

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

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

8. Designated Environmentally Sensitive Sites

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

9. Natural Hazards

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

10. Mining

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

11. Contacts

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

Note: Maps

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

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

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

1. Historical Land Use

Mapping sourced from Ordnance Survey

Site Outline

250
500
Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

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

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

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 4

ID	Distance [m]	Direction	Use	Date
1A	21	SW	Unspecified Pit	1887
2A	24	SW	Unspecified Old Quarry	1899
3	239	SW	Transmitting Station	1977
4	497	S	Unspecified Tank	1977

1.2 Additional Information – Historical Tank Database

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

Records of historical tanks within 500m of the search boundary: 2

ID	Distance (m)	Direction	Use	Date
5B	455	W	Unspecified Tank	1973
6B	455	W	Unspecified Tank	1995

1.3 Additional Information – Historical Energy Features Database

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

Records of historical energy features within 500m of the search boundary: 0

Database searched and no data found.

1.4 Additional Information – Historical Petrol and Fuel Site Database

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

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 0

Database searched and no data found.

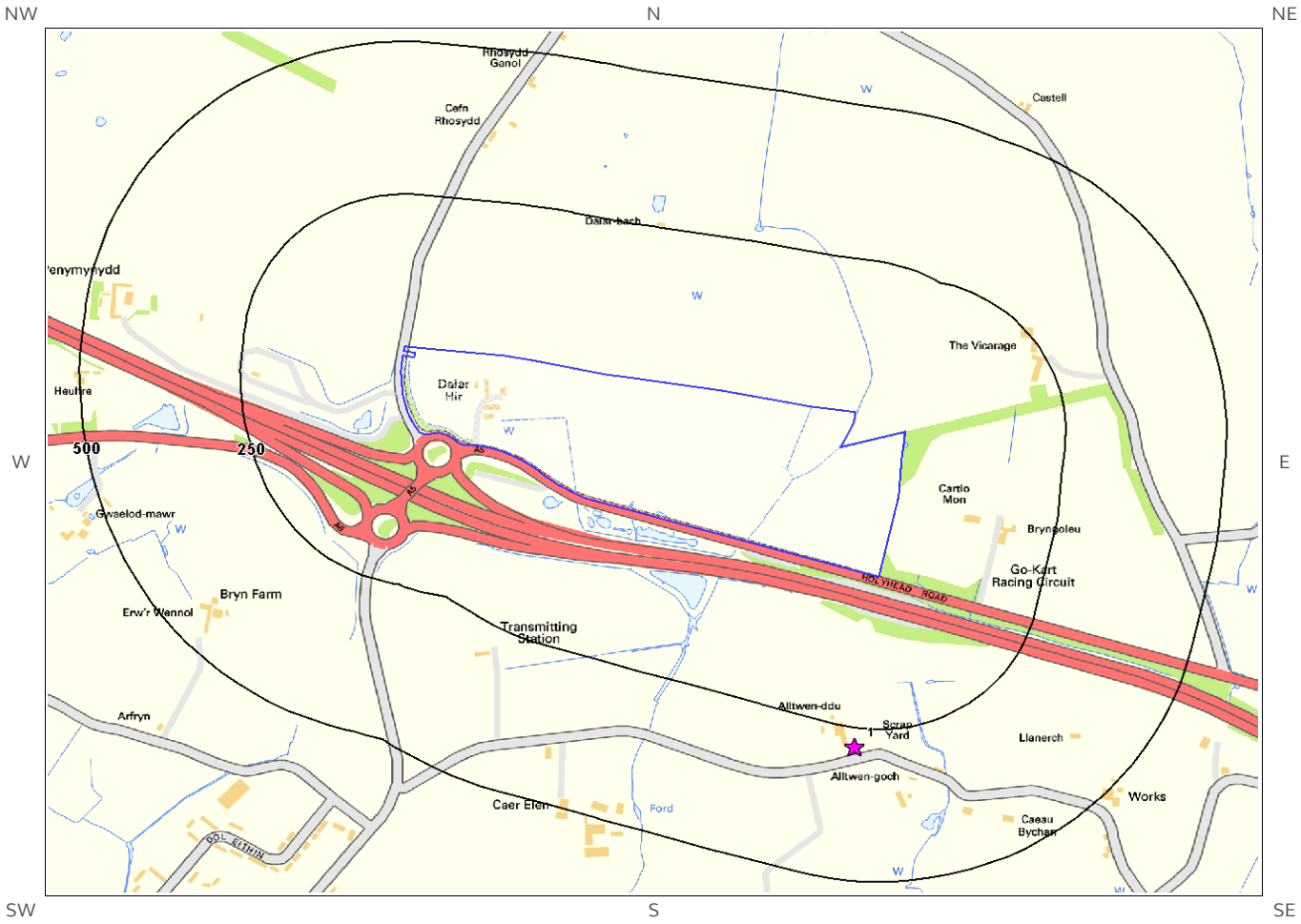
1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 11

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

ID	Distance(m)	Direction	Use	Date
7A	19	SW	Pond	1959
8A	21	SW	Unspecified Pit	1887
9A	22	SW	Pond	1926
10A	24	SW	Pond	1949
11A	24	SW	Unspecified Old Quarry	1899
12C	139	N	Ponds	1977
13C	141	N	Ponds	1959
14C	143	N	Ponds	1899
15C	143	N	Ponds	1949
16C	143	N	Ponds	1887
17C	143	N	Ponds	1926

2. Environmental Permits, Incidents and Registers Map



Mapping sourced from Ordnance Survey

- Site Outline
- Search Buffers (m) — 250, 500
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: 0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations: 0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site: 0

Database searched and no data found.

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: 0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: 0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

2.3 Environment Agency Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

1

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	282	S	233146 377911	Incident Date: 30-May-2003 Incident Identification: 161923 Pollutant: Specific Waste Materials Pollutant Description: Vehicles and Vehicle Parts	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

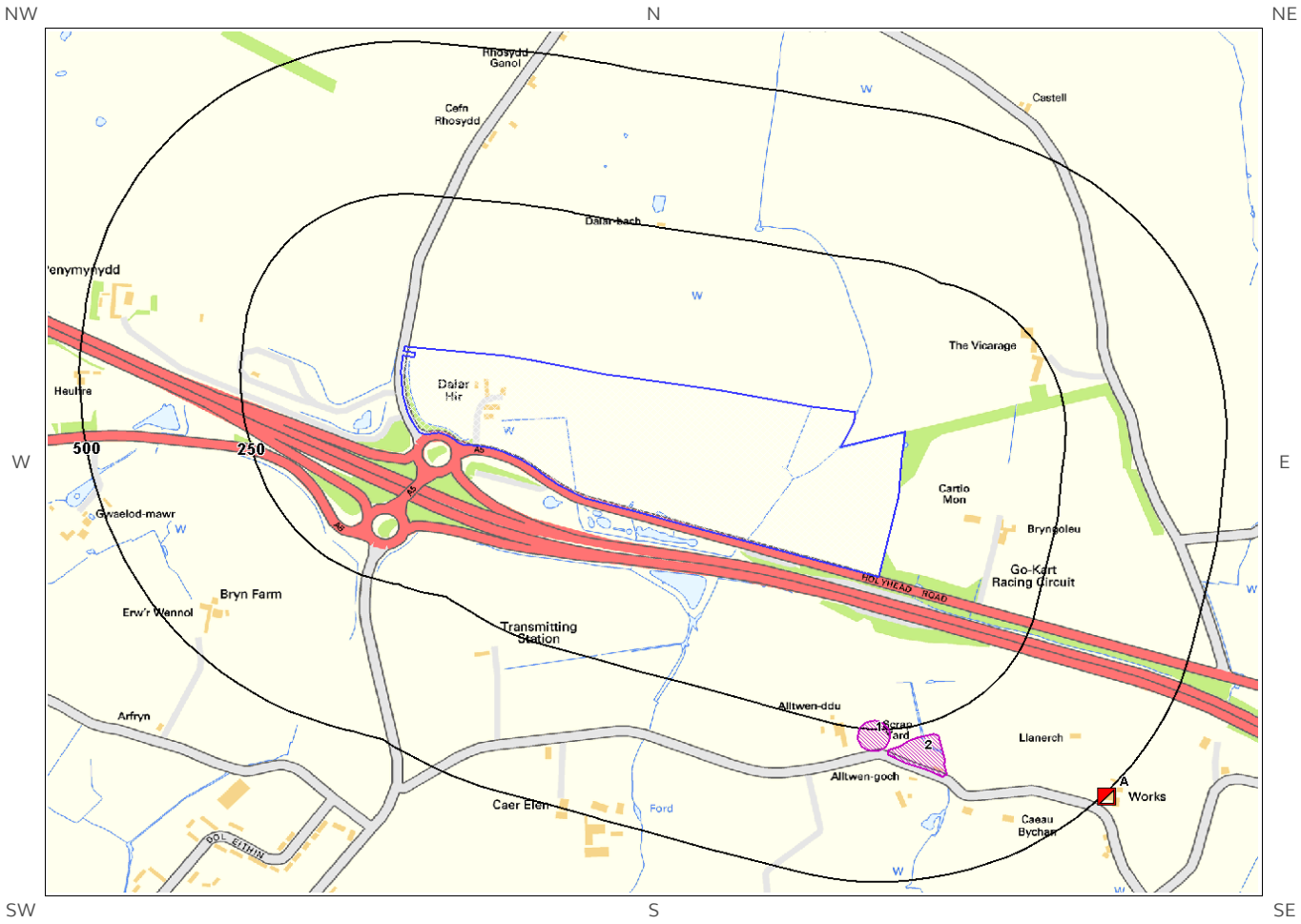
Database searched and no data found.

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

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



Mapping sourced from Ordnance Survey

Site Outline

250
500
Search Buffers (m)

E.A. Active Landfill

E.A. Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

E.A. Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency historic landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

2

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details		
1	236	S	233176 377929	Type of Site: Waste Transfer Station Site Address: Efail Newydd, Caergeiliog, HOLYHEAD, Gwynedd, LL65	Planning Application Reference: 13C42B Date: 20/11/2011	Further Details: Scheme comprises change of use of land from that of an engineering fabrication yard to that of a waste transfer and recycling station. An application (ref: 13C42B) for detailed planning permission was granted by Anglesey C.C. A detailed planning application has been granted. Data Source: Historic Planning Application Data Type: Point
2	270	S	233244 377897	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1995	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

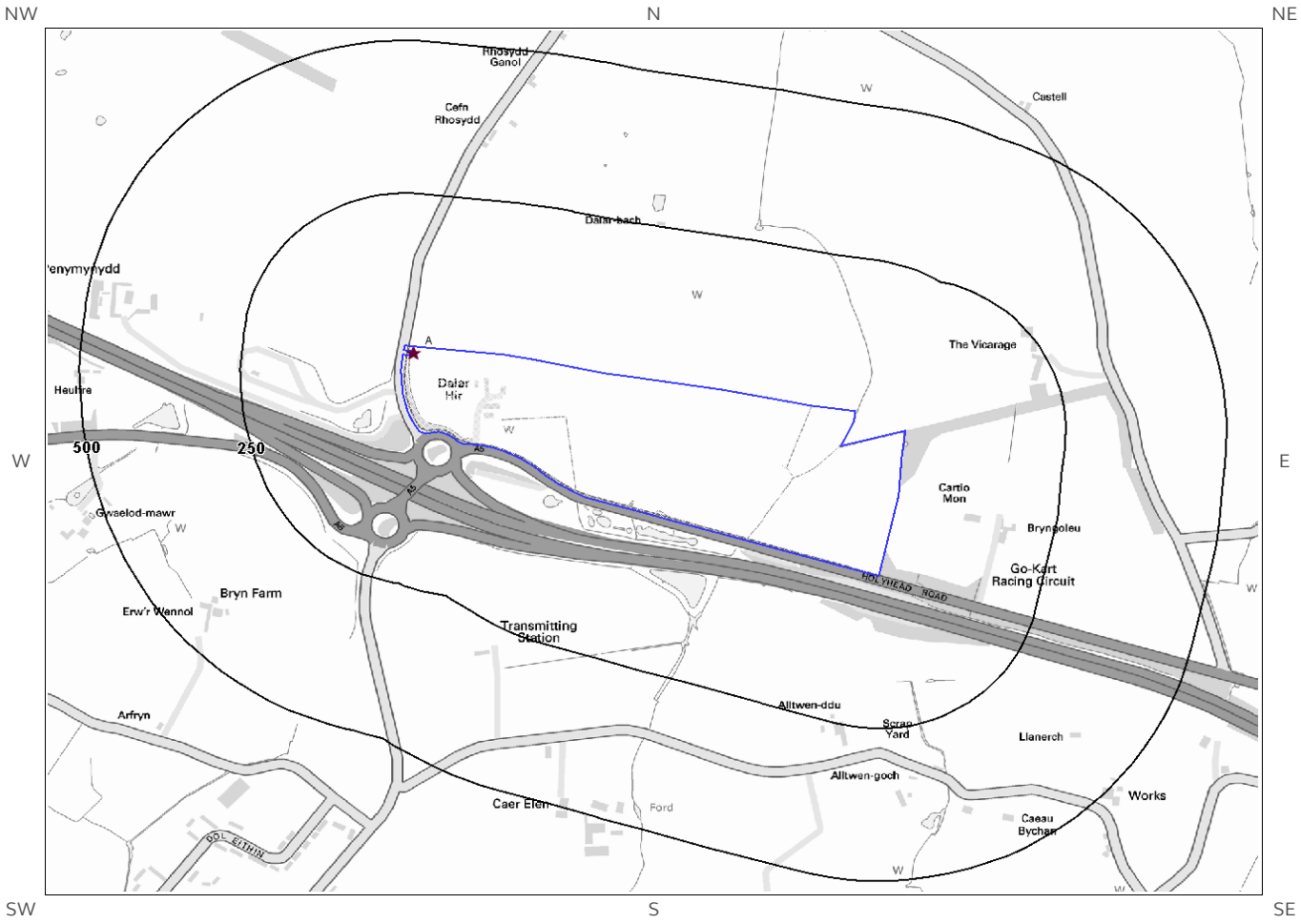
3.2.2 Records of Environment Agency licensed waste sites within 1500m of the study site:

2

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
3A	504	SE	233538 377831	Site Address: Refail Newydd, Caergeiliog, Holyhead, Gwynedd, LL65 3DX Type: HCI Waste TS + treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: KEV006 EPR reference: EA/EPR/ZP3695VH/A001 Operator: Humphreys Kevin Waste Management licence No: 102916 Annual Tonnage: 74999.0	Issue Date: 07/12/2011 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Refail Newydd Correspondence Address: -, -
4A	504	SE	233538 377831	Site Address: Refail Newydd, Caergeiliog, Holyhead, Gwynedd, LL65 3DX Type: HCI Waste TS + treatment Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: KEV006 EPR reference: ZP3695VH/A001 Operator: Humphreys Kevin Waste Management licence No: 102916 Annual Tonnage: 0.0	Issue Date: 07/12/2011 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Refail Newydd Correspondence Address: -, -

4. Current Land Use Map



Mapping sourced from Ordnance Survey

Site Outline

Search Buffers (m)

250

500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 2

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1A	1	S	Gas Governor Station	232461 378556	LL65	Gas Features	Infrastructure and Facilities
2A	2	S	Gas Governor Station	232460 378556	LL65	Gas Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

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

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

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

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

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

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

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

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
TILLD	TILL, DEVENSIAN	DIAMICTON

5.3 Bedrock and Solid Geology

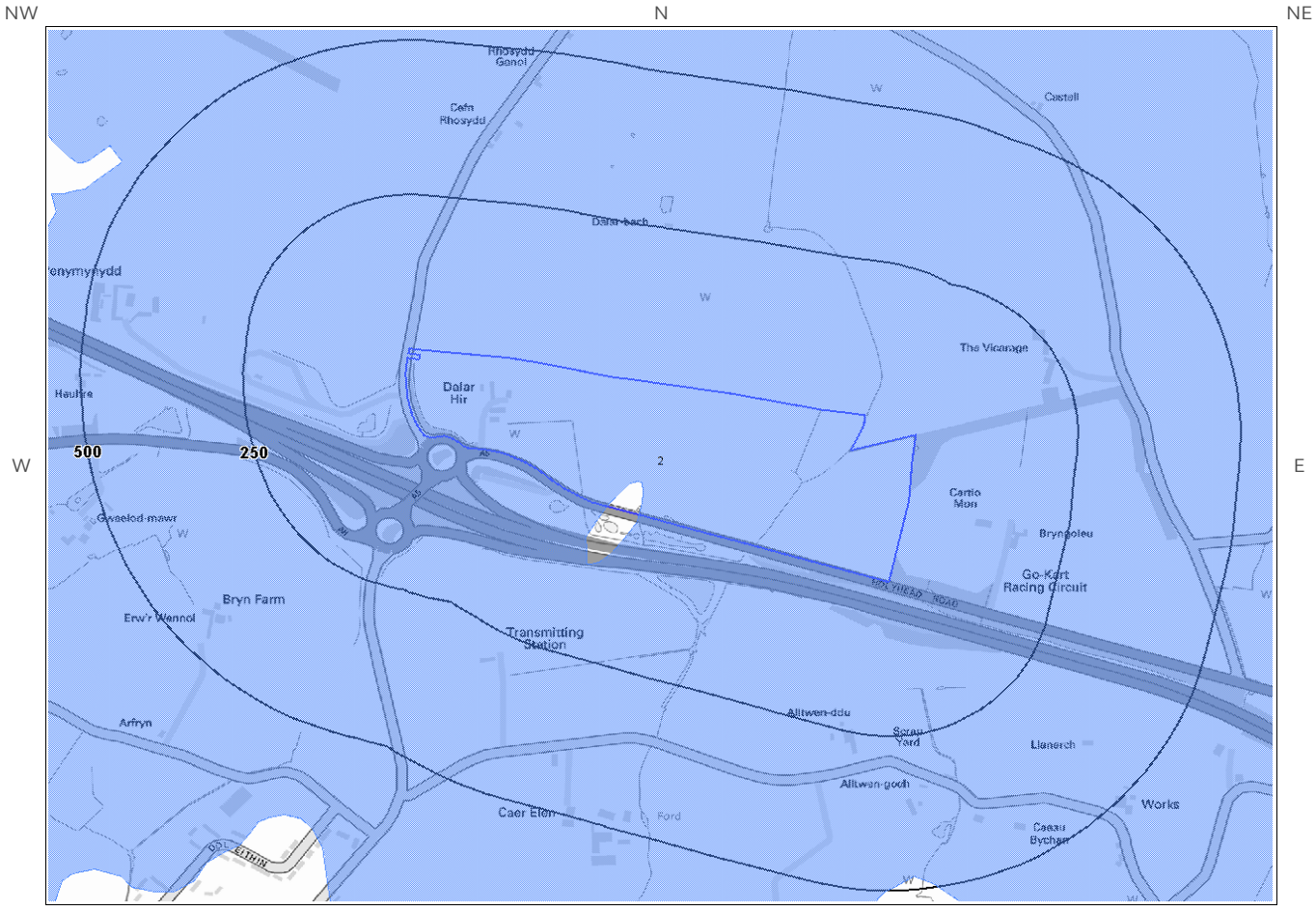
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
NNH-SMPS	NEW HARBOUR GROUP	MICA SCHIST AND PSAMMITE
NNH-LAVA	NEW HARBOUR GROUP	LAVA
NNH-LAVA	NEW HARBOUR GROUP	LAVA
ORD-SCON	ORDOVICIAN ROCKS (UNDIFFERENTIATED)	SANDSTONE AND CONGLOMERATE, INTERBEDDED

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



Mapping sourced from Ordnance Survey

Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

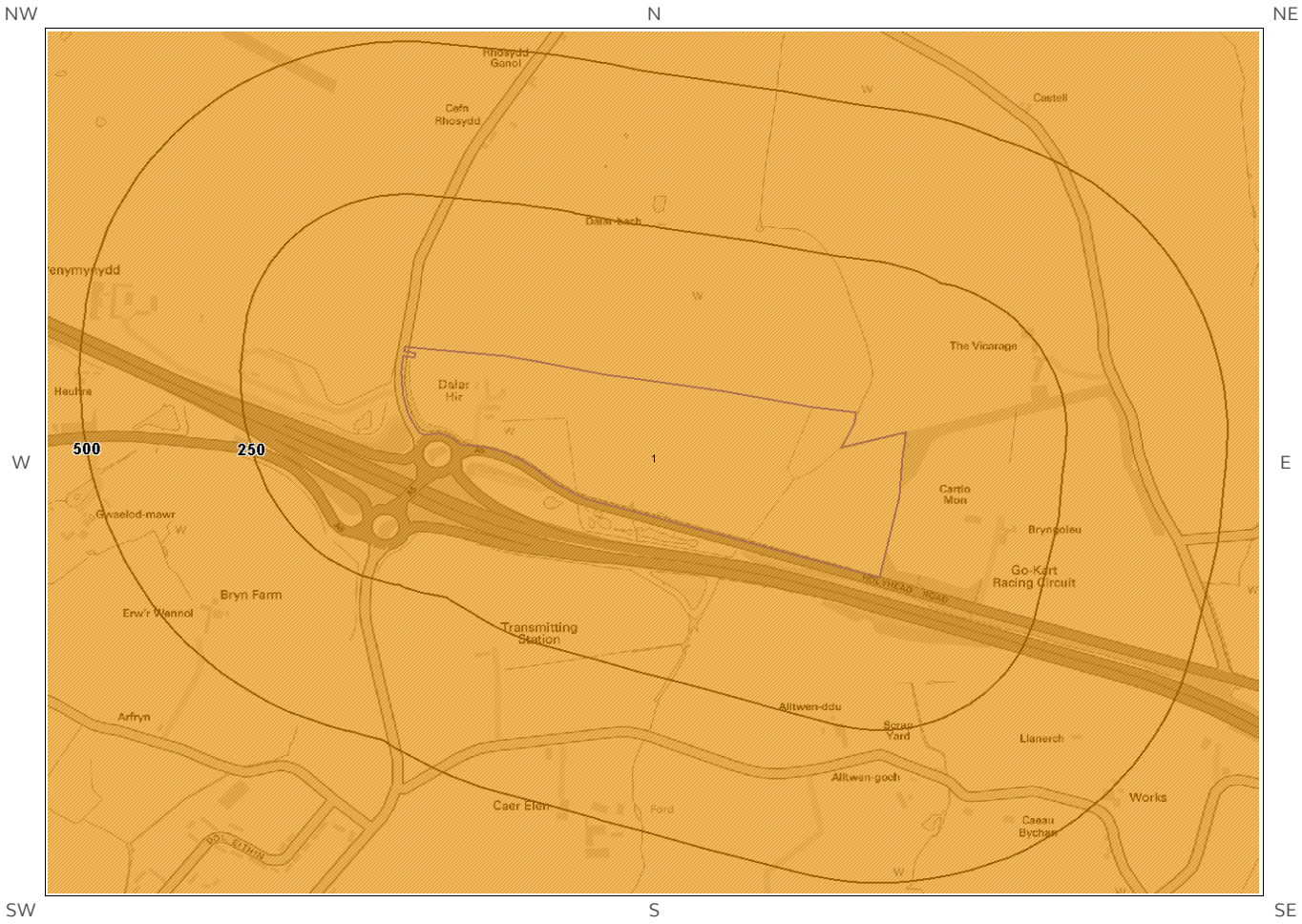
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licenses



Mapping sourced from Ordnance Survey

Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

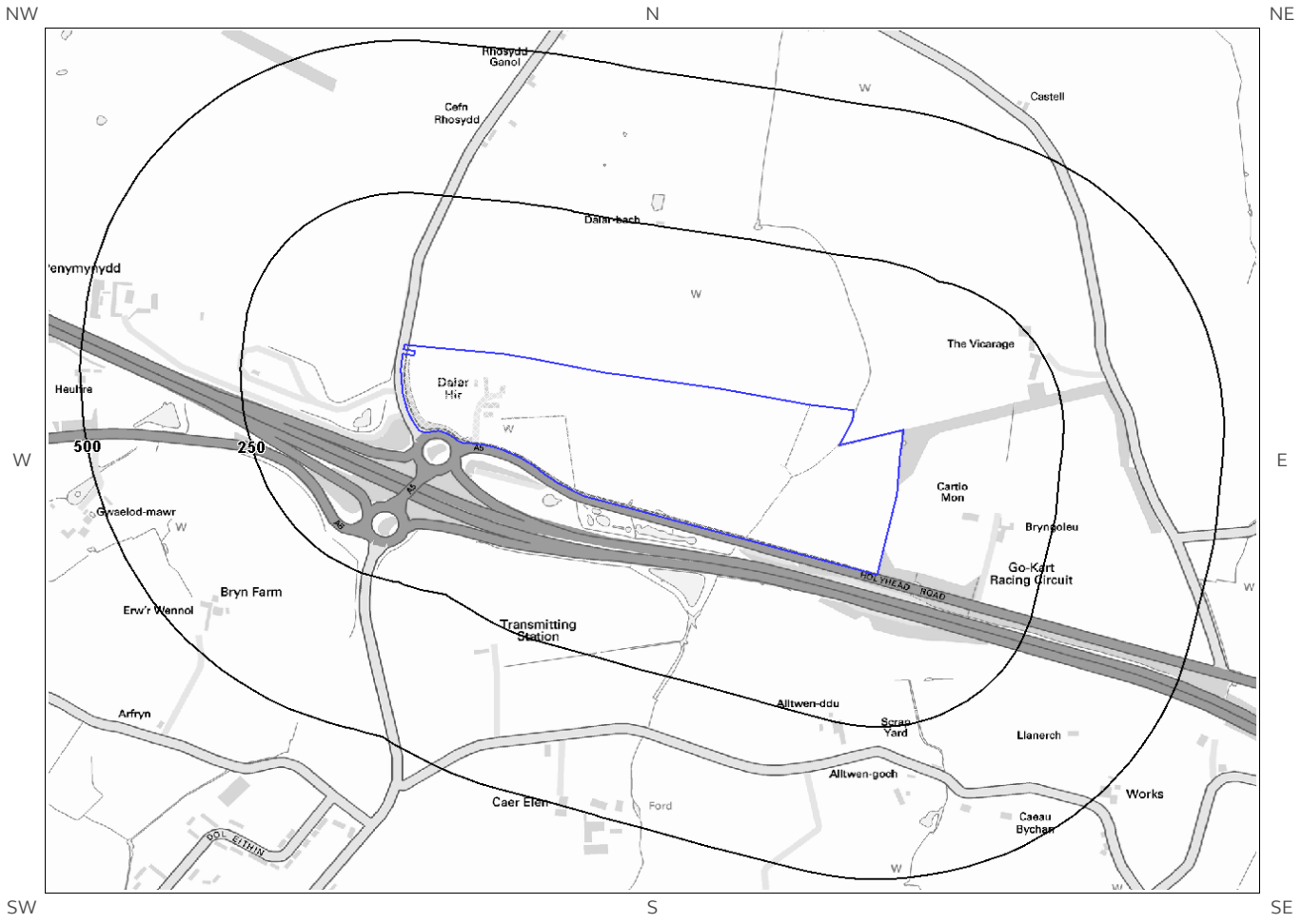
Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



Mapping sourced from Ordnance Survey

Site Outline

250
500
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

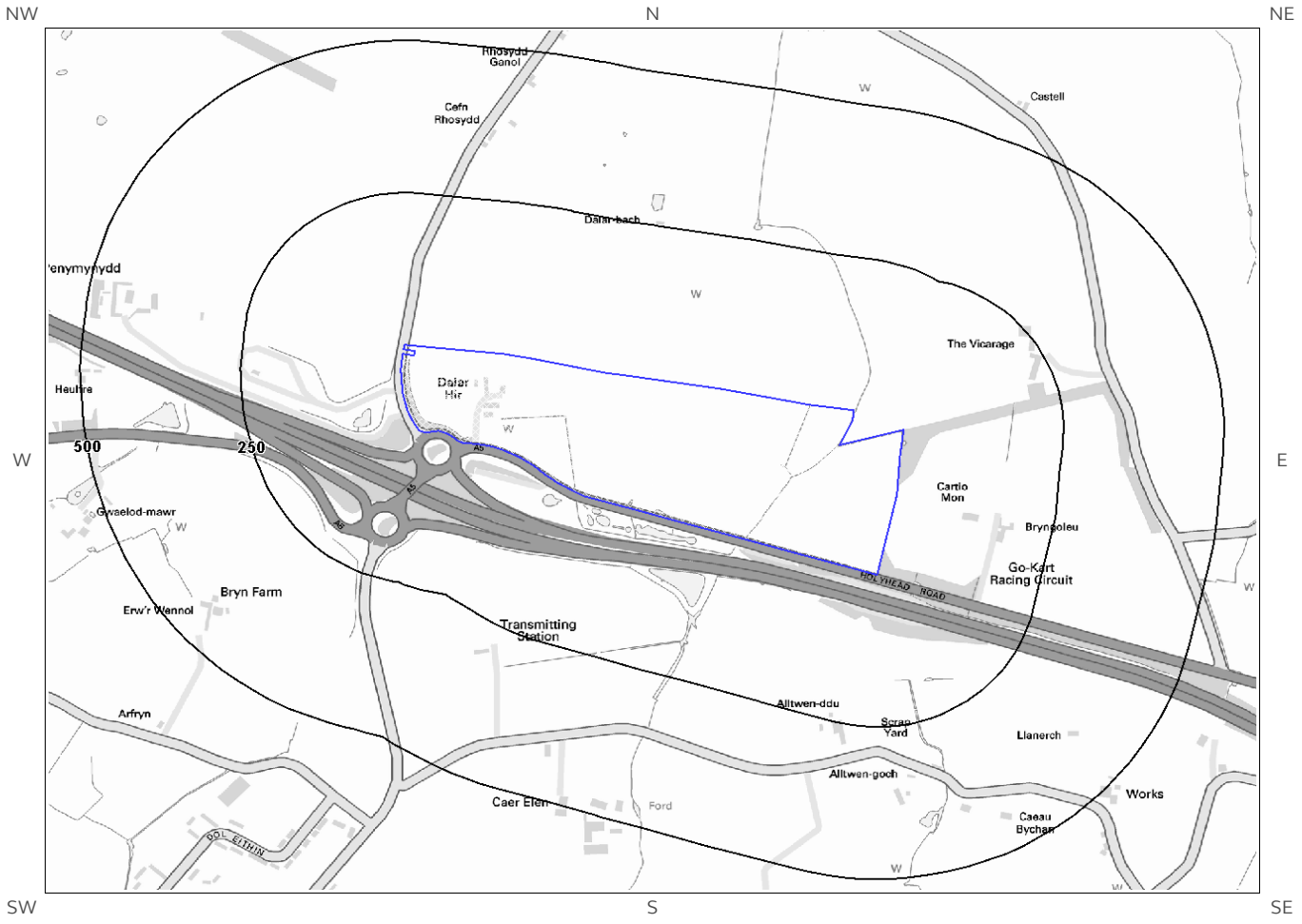
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



Mapping sourced from Ordnance Survey

Site Outline

250
500
Search Buffers (m)

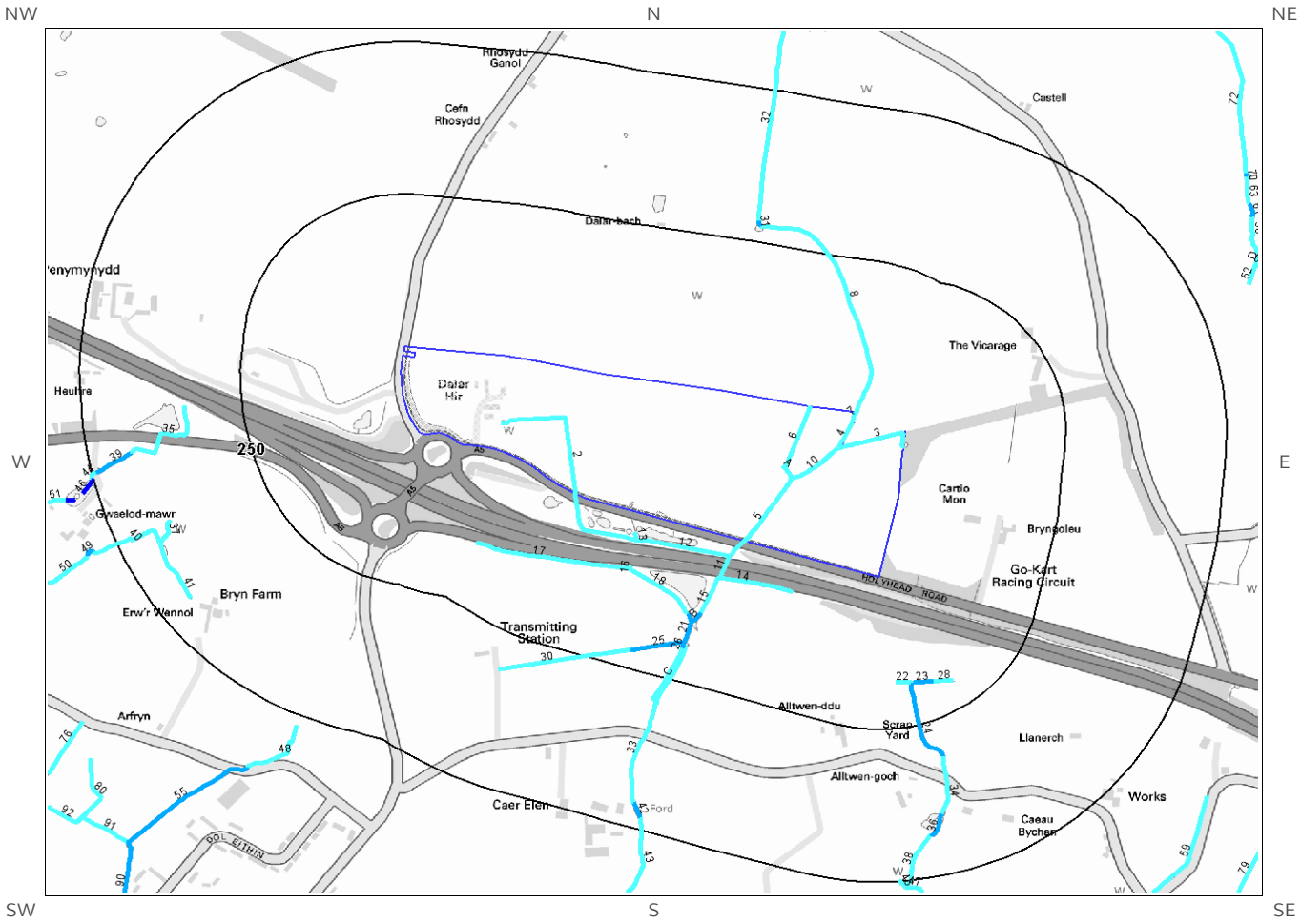
Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

6e. Hydrology – Detailed River Network and River Quality



Site Outline

250 — 500 — Search Buffers (m)

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
2	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeablehorizons and weathering. These are generally the water-bearing parts of the former non-aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? Yes

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1871	S	233140 376320	Status: Historical Licence No: 23/102/4/0008 Details: Lake & Pond Throughflow Direct Source: Eaw Surface Water Point: Un Named Stream From Llyn Traffwll Data Type: Point Name: Rspb	Annual Volume (m^3): 124416 Max Daily Volume (m^3): 1036.8 Application No: C219/1871 Original Start Date: 31/7/2001 Expiry Date: 31/3/2015 Issue No: 1 Version Start Date: 10/4/2007 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency information on groundwater vulnerability and soil leaching potential within 500m of the study site? No

Database searched and no data found.

6.9 River Quality

Is there any Environment Agency information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
Not shown	1207	SE	234000 377300	River Name: Crigyll Reach: Tidal Limit Glan Tywyn - Rd.br End/Start of Stretch: Start of Stretch NGR	B	B	B	B	B
Not shown	1207	SE	234000 377300	River Name: Crigyll Reach: Rd.br. - Bryngwran Rd.br. End/Start of Stretch: End of Stretch NGR	B	B	B	B	B

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
Not shown	1206	SE	234030 377330	River Name: Crigyll Reach: Tidal Limit Glan Tywyn - Rd.br End/Start of Stretch: Sample Point NGR	A	A	A	A	-
Not shown	1206	SE	234030 377330	River Name: Caradog Reach: Rd.br. - Bryngwran Rd.br. End/Start of Stretch: Sample Point NGR	A	A	A	A	-
Not shown	1207	SE	234000 377300	River Name: Caradog Reach: Rd.br. - Bryngwran Rd.br. End/Start of Stretch: End of Stretch NGR	A	A	A	A	-
Not shown	1207	SE	234000 377300	River Name: Crigyll Reach: Tidal Limit Glan Tywyn - Rd.br End/Start of Stretch: Start of Stretch NGR	A	A	A	A	-

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1A	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
3	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
4	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
5	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
6	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
7	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
8	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
9A	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
10	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
11	29	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
12	29	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
13	34	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
14	59	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
15	69	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
16	88	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
17	93	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
18	93	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
19B	133	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
20B	139	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
21	150	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
22	174	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
23	180	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
24	180	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
25	187	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
26	187	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
27C	189	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
28	190	SE	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
29C	195	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
30	220	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
31	276	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
32	285	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
33	290	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
34	311	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
35	339	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
36	400	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
37	408	SW	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
38	429	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
39	432	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
40	438	SW	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
41	439	SW	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
42	460	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
43	481	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
44	494	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
45	498	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined

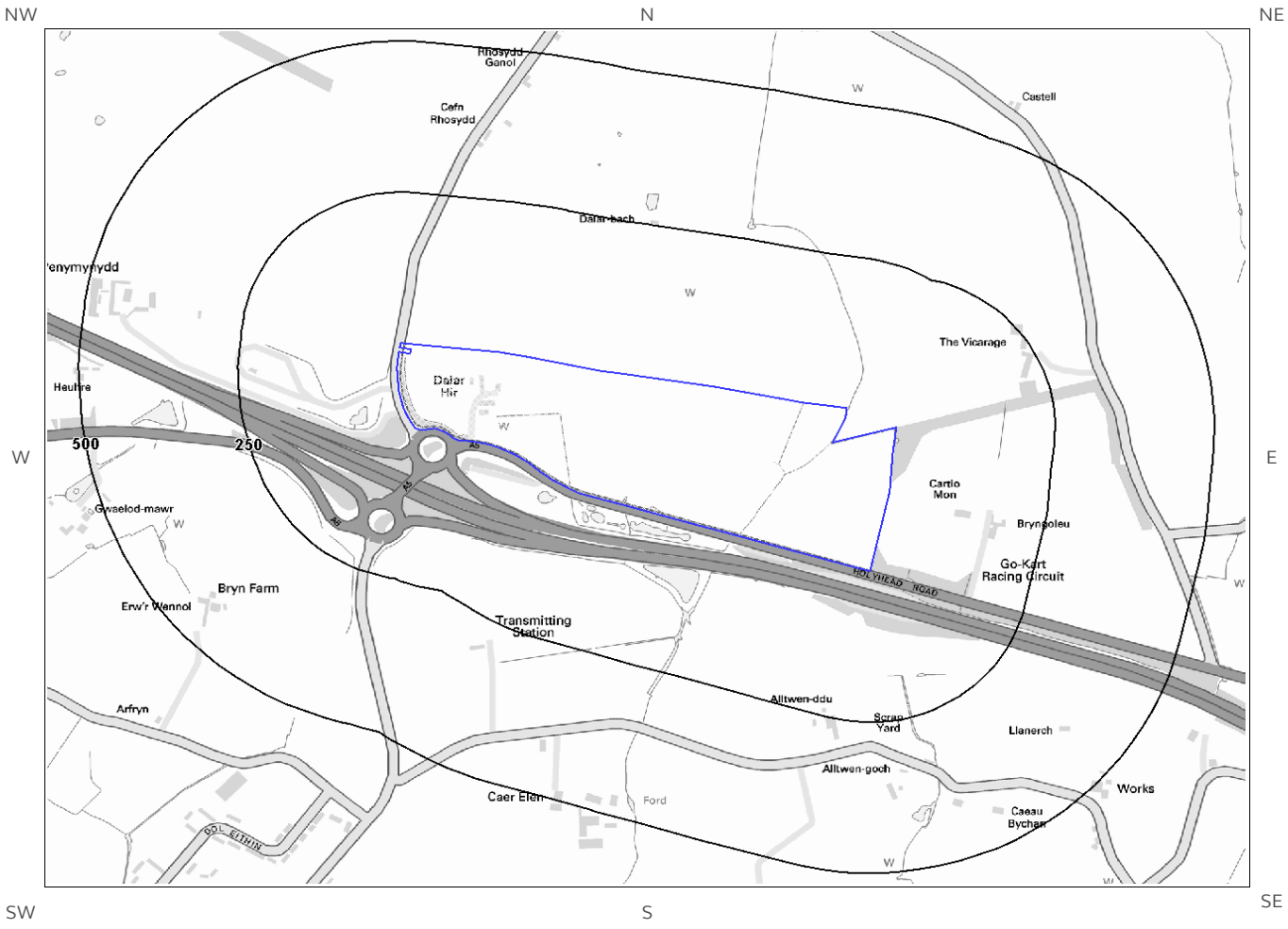
6.11 Surface Water Features

Are there any surface water features within 250m of the study site?	Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
10	W
11	SW
11	S
14	S
17	S
18	S
23	S
27	S
29	S
29	W
34	S
59	E
60	S
63	SE
69	S
73	S
86	W
93	S
93	S
130	S
153	E
153	E
154	SE
160	SW
164	E
174	S
180	S
189	S
190	SE
195	S
202	SW
220	S
223	SW
229	S
243	S

7a. Environment Agency Flood Map for Planning (from rivers and the sea)



Mapping sourced from Ordnance Survey

Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

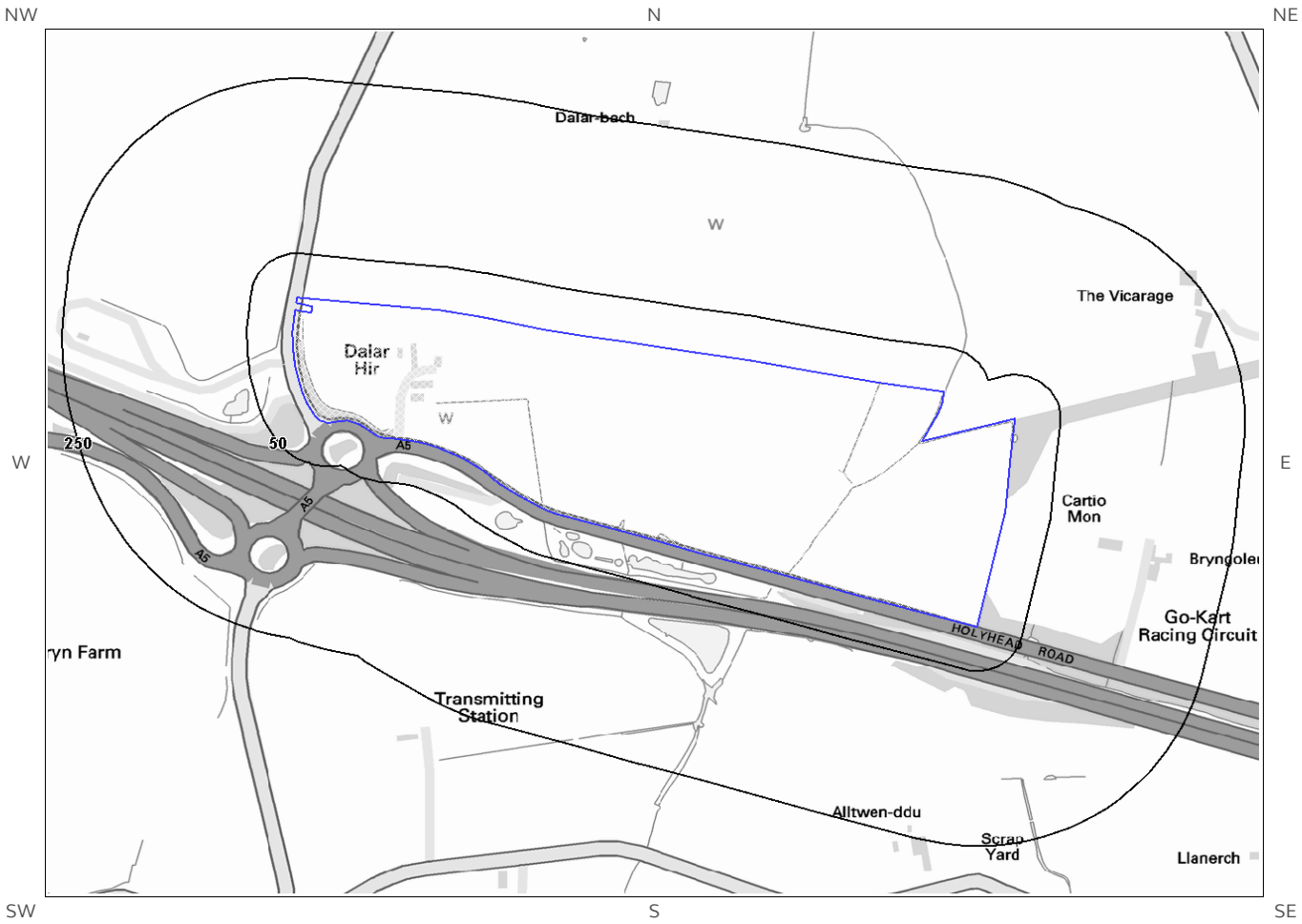
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) Map



Mapping sourced from Ordnance Survey

Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency Zone 2 floodplain? No

Environment Agency Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency Zone 3 floodplain? No

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

Database searched and no data found.

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? Very Low

The Environment Agency RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

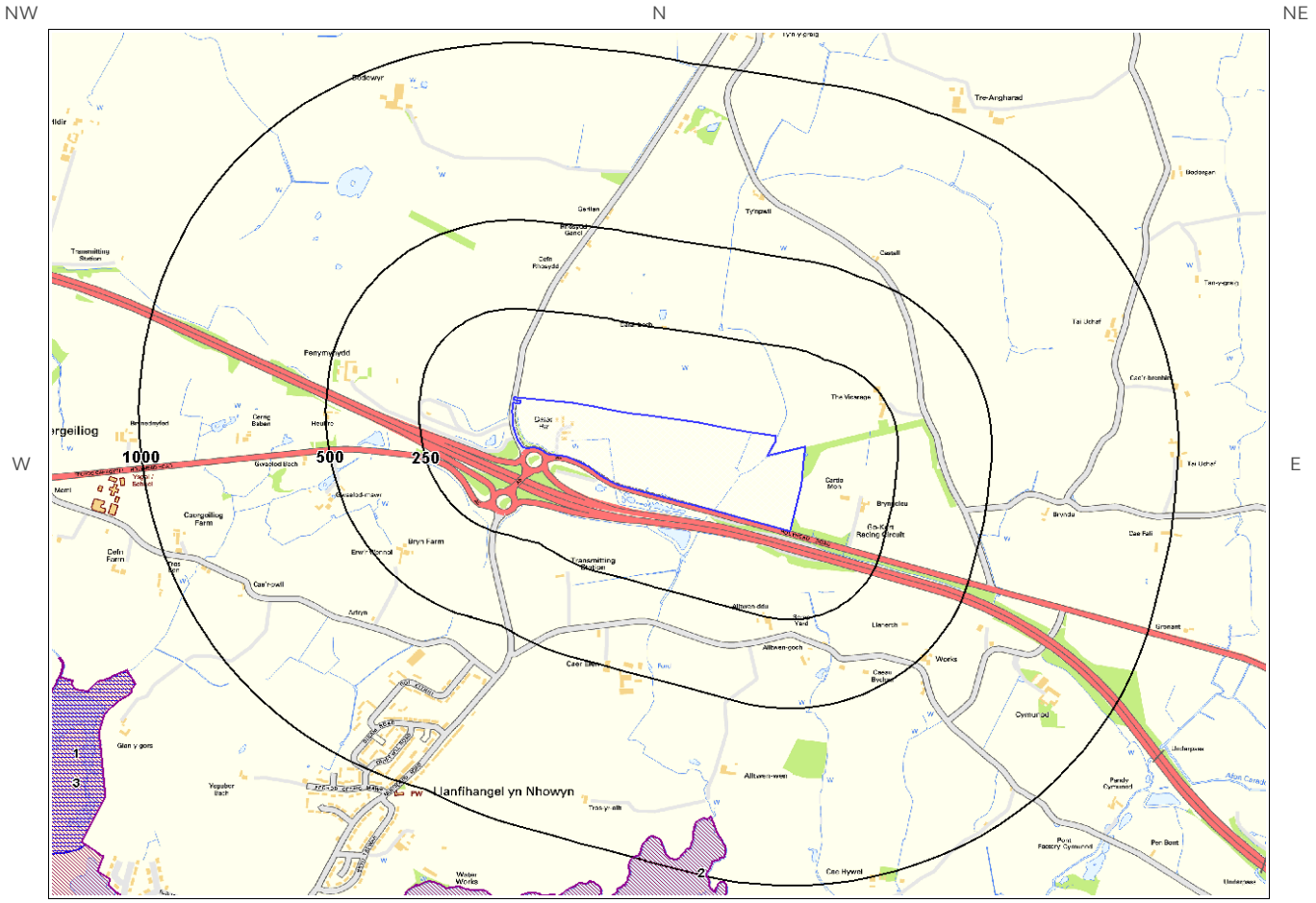
7.8 Groundwater Flooding Confidence Areas

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

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

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

8. Designated Environmentally Sensitive Sites Map



Mapping sourced from Ordnance Survey

- Site Outline
- 100 / 250 Search Buffers (m)
- AONB
- National Park
- SSSI
- Special Protection Areas
- Nitrate Vulnerable Zones
- Green Belt
- Environmentally Sensitive Areas
- Special Areas of Conservation
- World Heritage Sites
- Nitrate Sensitive Areas
- Ancient Woodland
- National Nature Reserve
- Local Nature Reserves
- Ramsar Sites

8. Designated Environmentally Sensitive Sites

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

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

2

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
2	832	S	LLYN TRAFFWLL	Natural Resources Wales
3	1231	SW	LLYNNAU Y FALI - VALLEY LAKES	Natural Resources Wales

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

0

Database searched and no data found.

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

1

The following Special Area of Conservation (SAC) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SAC Name	Data Source
1	1231	SW	Llyn Dinam	Natural Resources Wales

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

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

0

Database searched and no data found.

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

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure GeoInsight, available from our website. The following information has been found:

9.1.1 Shrink Swell

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

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

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

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

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

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

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

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

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

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

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

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

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

9.1.5 Collapsible Rocks

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

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

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

9.1.6 Running Sand

What is the maximum Running Sand*[*] hazard rating identified on the study site? Very Low

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

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? Yes

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

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Vein Mineral	Occasional minor mining may have occurred but of restricted extent.
0.0	On Site	Not available	Vein Mineral	Rare and localised small scale mining may have occurred.

Past underground mine workings may occur. The rock types present in these areas are such that small mineral veins may be present on which it is possible that small scale mining has been undertaken and/or it is possible that limited underground extraction of other materials may have occurred. All such occurrences are likely to be of minor localised extent and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency
National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 08708 506 506
Web:**www.environment-agency.gov.uk**
Email:**enquiries@environment-agency.gov.uk**

Public Health England
Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: Sir Ynys Mon - Isle of Anglesey County Council
Phone: 01248 750 057
Web: http://www.anglesey.gov.uk
Address: Council Offices, Llangefni, Anglesey, LL77 7TW

Gemapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444

Standard Terms and Conditions

1 Definitions

I**n these terms and conditions unless the context otherwise requires:**

"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.

"Client" means the party or parties entering into a Contract with Groundsure.

"Commercial" means any building or property which is not Residential.

"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than

(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and

(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).

"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.

"Third Party Data Provider" means any third party providing Third Party Content to Groundsure.

"Data Reports" means reports comprising factual data with no accompanying interpretation.

"Fees" has the meaning set out in clause 5.1.

"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.

"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.

"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.

"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.

"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.

"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.

"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.

"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.

"Residential" means any building or property used as or intended to be used as a single dwelling.

"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.

"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.

"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.

"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.

"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.

2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.

2.3 Subject to clause 7.3 the Client acknowledges that it has not relied on any statement or representation made by or on behalf of Groundsure which is not set out and expressly agreed in writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.

2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.

2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.

2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and

(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and

(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.

3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.

3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.

3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.

3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.

4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;

(i) the Beneficiary,

(ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate),

(iv) the first purchaser or first tenant of the Site, and

(v) the professional advisers and lenders of the first purchaser or tenant of the Site.

4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and

frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services (together "Fees").

5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.

5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to

(i) full payment of all relevant Fees and

(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.

6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.

6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, copyright or other proprietary marking belonging to Groundsure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

(iii) not create any product or report which is derived directly or indirectly from the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);

(iv) not combine the Services with or incorporate such Services into any other information data or service;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.

6.6 The Client shall procure that any person to whom the Services are made available shall notify Groundsure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.

7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.

7.4 Groundsure shall not be liable for

(i) loss of profits;

(ii) loss of business;

(iii) depletion of goodwill and/or similar losses;

(iv) loss of anticipated savings;

(v) loss of goods;

(vi) loss of contract;

(vii) loss of use;

(viii) loss or corruption of data or information;

(ix) business interruption;

(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;

(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;

(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;

(xiii) loss or damage to a computer, software, modem, telephone or other property; and

(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.

7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.

8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 days of the Payment Date; or

(ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an administration order made against it or if a receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or

(iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or

(iv) the Client or the Beneficiary breaches any term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.

9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event

(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) Groundsure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) the Client shall pay to Groundsure all and any Fees payable in respect of the performance of the Services up to the date of termination or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.

12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.

12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.

12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.

12.5 Save as expressly provided in this Contract, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.

12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.

12.7 Groundsure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:

(i) the Client or Beneficiary's failure to provide facilities, access or information;

(ii) fire, storm, flood, tempest or epidemic;

(iii) Acts of God or the public enemy;

(iv) riot, civil commotion or war;

(v) strikes, labour disputes or industrial action;

(vi) acts or regulations of any governmental or other agency;

(vii) suspension or delay of services at public registries by Third Party Data Providers;

(viii) changes in law; or

(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner.

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent required by law.

Groundsure
LOCATION INTELLIGENCE

Jacobs Engineering

NEWMINSTER HOUSE 27-29, BALDWIN STREET,
BRISTOL, BS1 1LT

Groundsure Reference:	GS-2319784
Your Reference:	Jacobs_Engineering_60PO804200000001
Report Date	3 Aug 2015
Report Delivery Method:	Email - pdf

Groundsure Geoinsight

Address: Dalar Hir,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geoinsight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,

[redacted]

Managing Director
Groundsure Limited

Enc.
Groundsure Geoinsight

Groundsure Geoinsight

Address:	**Dalar Hir,**
Date:	**3 Aug 2015**
Reference:	**GS-2319784**
Client:	**Jacobs Engineering**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	04-Jun-2013
Grid Reference:	232873,378377
Site Size:	15.71ha

Contents Page

Overview of Findings

The Groundsure Geoinsight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow Mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1:Geology		
1.1 Artificial Ground	1.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?	Yes
	1.2.2 Are there any records relating to permeability of superficial geology within the study site boundary?	Yes
	1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	1.2.4 Are there any records relating to permeability of landslips within the study site boundary?	No
1.3 Bedrock, Solid Geology & Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records relating to permeability of bedrock within the study site boundary?	Yes
	1.3.3 Are there any records of faults within 500m of the study site boundary?	No
1.4 Radon data	1.4.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level
	1.4.2 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary

Section 2:Ground Workings	On-site	0-50m	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	0	4	5	Not Searched	Not Searched
2.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
2.3 Current Ground Workings	0	1	0	0	4

Section 3: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
3.1 Historical Mining	0	0	0	0	0
3.2 Coal Mining	0	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining	2	0	0	0	1
3.5 Non-Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

Section 4: Natural Ground Subsidence	On-site
4.1 Shrink Swell Clay	Very Low
4.2 Landslides	Very Low
4.3 Ground Dissolution of Soluble Rocks	Negligible
4.4 Compressible Deposits	Negligible
4.5 Collapsible Deposits	Very Low
4.6 Running Sand	Very Low

Section 5: Borehole Records	On-site	0-50m	51-250
5 BGS Recorded Boreholes	0	2	7

Section 6: Estimated Background Soil Chemistry	On-site	0-50m	51-250
6 Records of Background Soil Chemistry	15	4	8

Section 7: Railways and Tunnels	On-site	0-50m	51-250	251-500
7.1 Tunnels	0	0	0	Not Searched
7.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
7.3 Historical Railways	0	0	0	Not Searched
7.4 Active Railways	0	0	0	Not Searched

Section 7:Railways and Tunnels	On-site	0-50m	51-250	251-500
7.5 Railway Projects	0	0	0	0

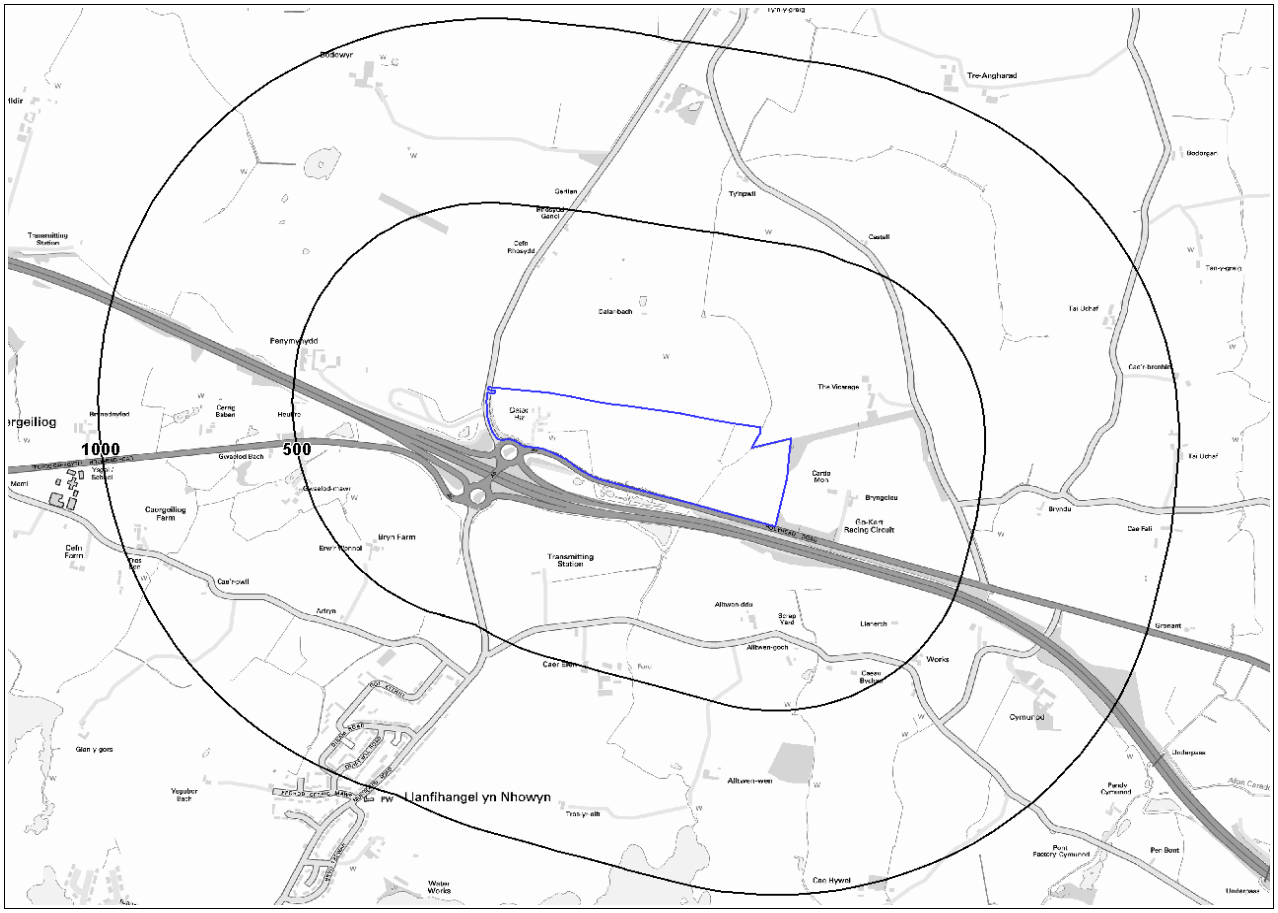
1 Geology

1.1 Artificial Ground Map

NW N NE

W E

SW S SE



Artificial Ground Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Disturbed Ground (undivided)

Worked Ground (undivided)

Landscaped Ground (undivided)

Infilled Ground

Reclaimed Ground

1 Geology

1.1 Artificial Ground

1.1.1Artificial/ Made Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:093

Are there any records of Artificial/Made Ground within 500m of the study site boundary? No

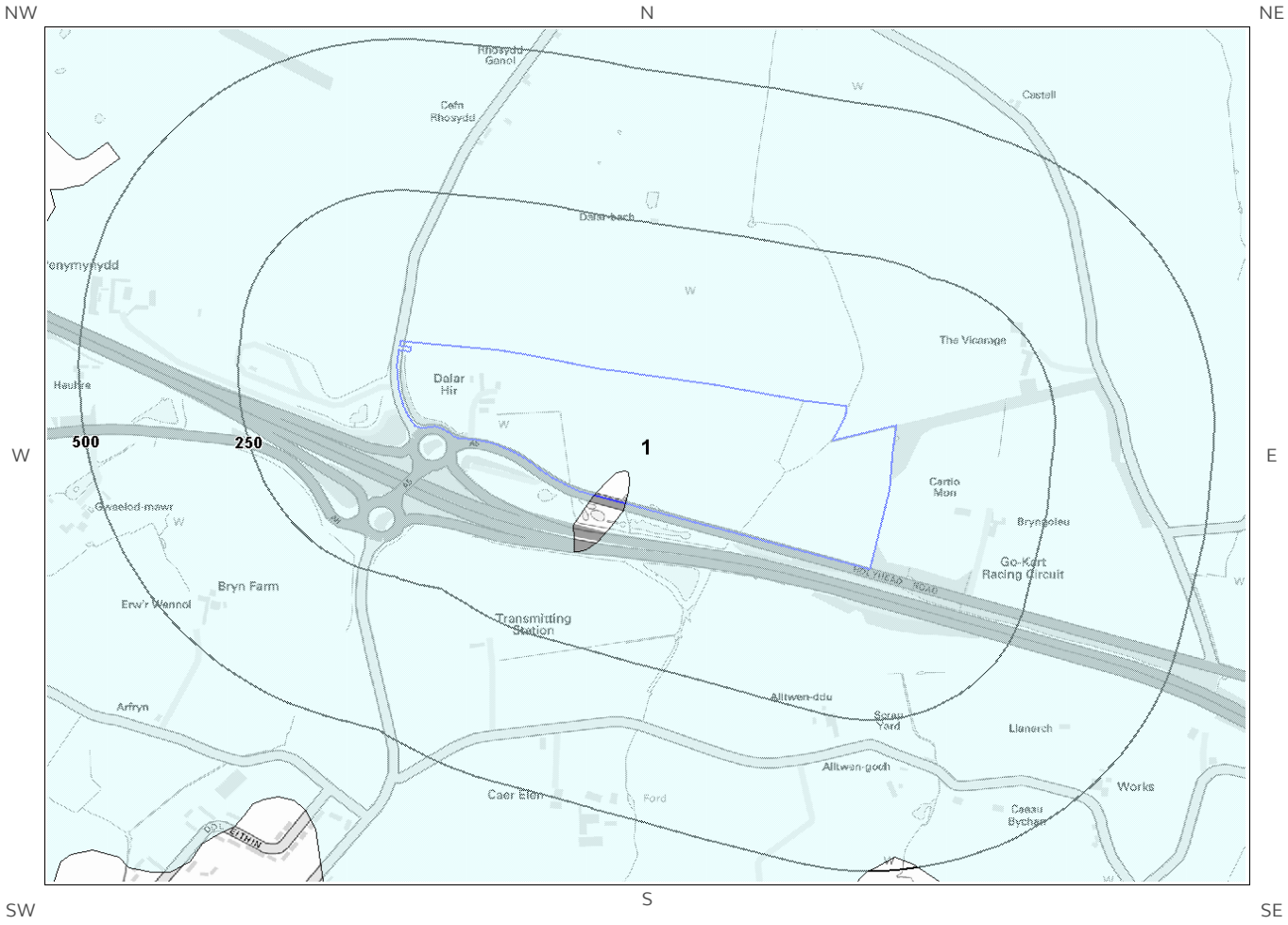
Database searched and no data found.

1.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

1.2 Superficial Deposits and Landslips Map



Superficial Deposits and Landslips Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD	TILL, DEVENSIAN	DIAMICTON

1.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Low

1.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

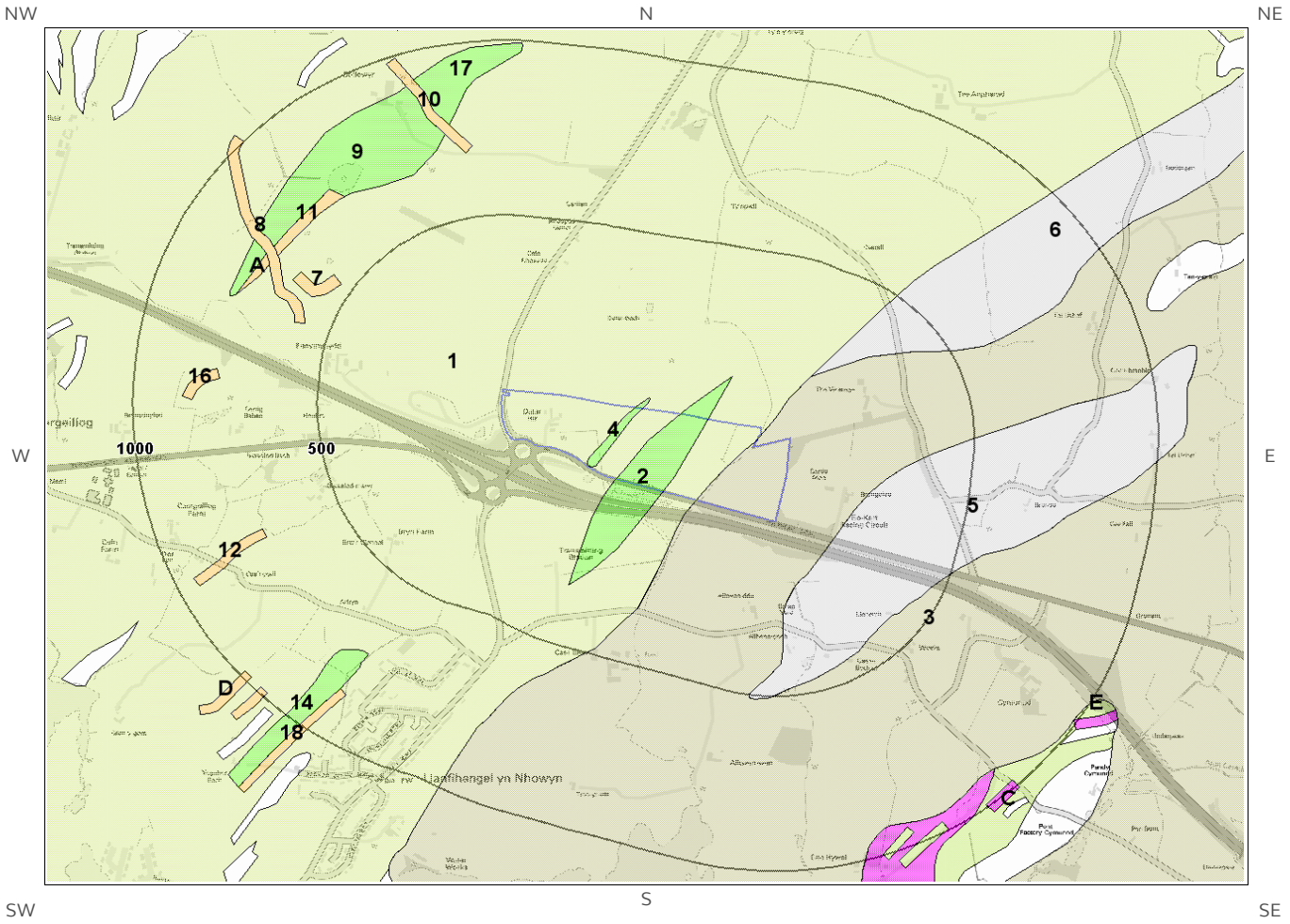
1.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

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

1.3 Bedrock and Faults Map



Bedrock and Faults Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:093

1.3.1 Bedrock/ Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	NNH-SMPS	New Harbour Group - Mica Schist And Psammite	No Details
2	0.0	On Site	NNH-LAVA	New Harbour Group - Lava	No Details
3	0.0	On Site	ORD-SCON	Ordovician Rocks (undifferentiated) - Sandstone And Conglomerate, Interbedded	No Details
4	0.0	On Site	NNH-LAVA	New Harbour Group - Lava	No Details
5	159.0	SE	ORD-MDSA	Ordovician Rocks (undifferentiated) - Mudstone And Sandstone, Interbedded	No Details
6	187.0	N	ORD-MDSA	Ordovician Rocks (undifferentiated) - Mudstone And Sandstone, Interbedded	No Details

1.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site* boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Low	Low
0.0	On Site	Fracture	Low	Low
0.0	On Site	Fracture	Low	Low
0.0	On Site	Fracture	Moderate	Low

1.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

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

1.4 Radon Data

1.4.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level

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1.4.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary

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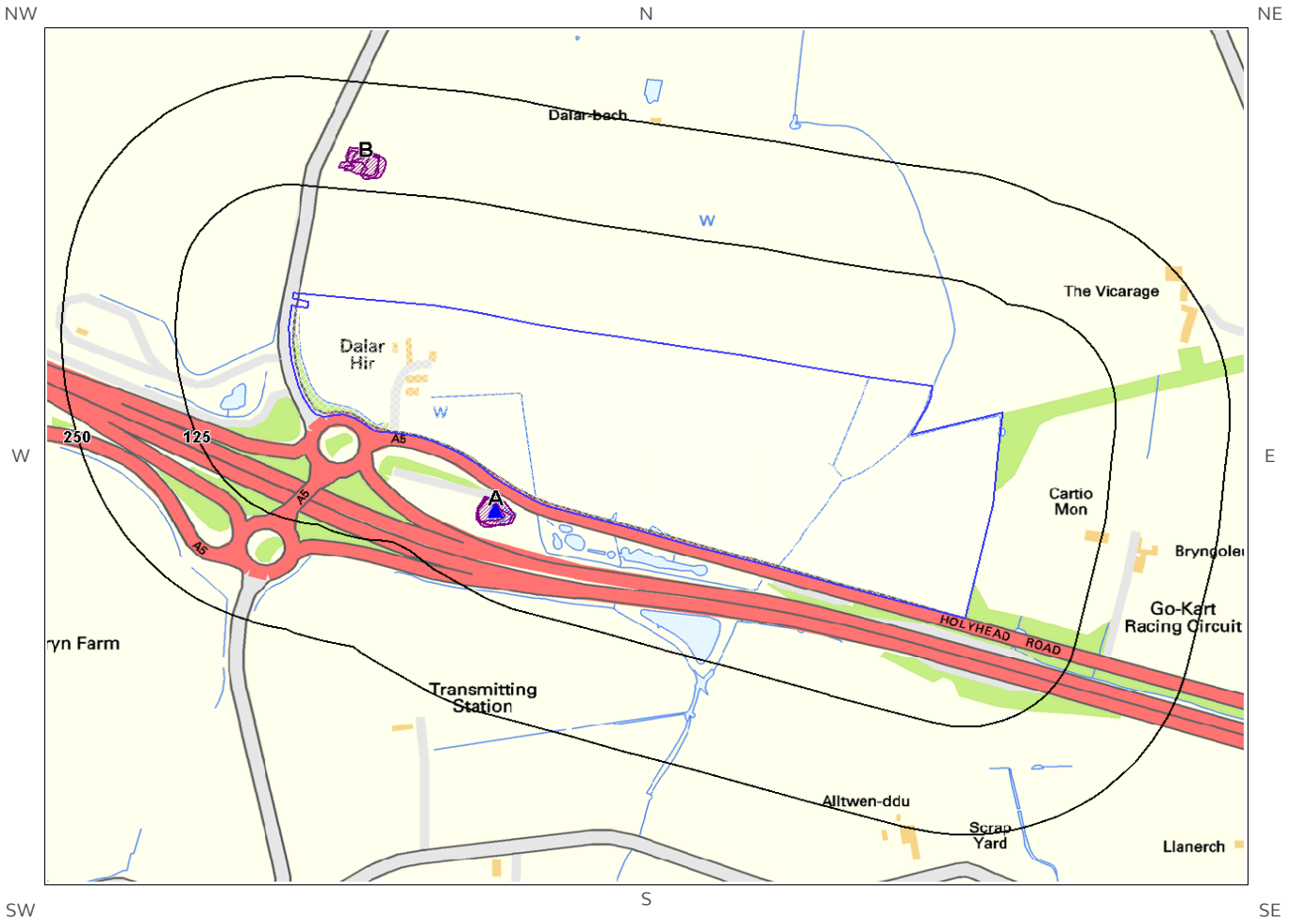
2 Ground Workings Map



Ground Workings Legend

Mapping sourced from Ordnance Survey

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

2 Ground Workings

2.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping.

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

The following Historical Surface Ground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
1A	19.0	SW	232670 378315	Pond	1959
2A	21.0	SW	232663 378317	Unspecified Pit	1887
3A	24.0	SW	232668 378313	Unspecified Old Quarry	1899
4A	24.0	SW	232668 378313	Pond	1949
5B	139.0	N	232532 378716	Ponds	1977
6B	141.0	N	232526 378716	Ponds	1959
7B	143.0	N	232507 378719	Ponds	1887
8B	143.0	N	232507 378719	Ponds	1899
9B	143.0	N	232507 378719	Ponds	1949

2.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

2.3 Current Ground Workings

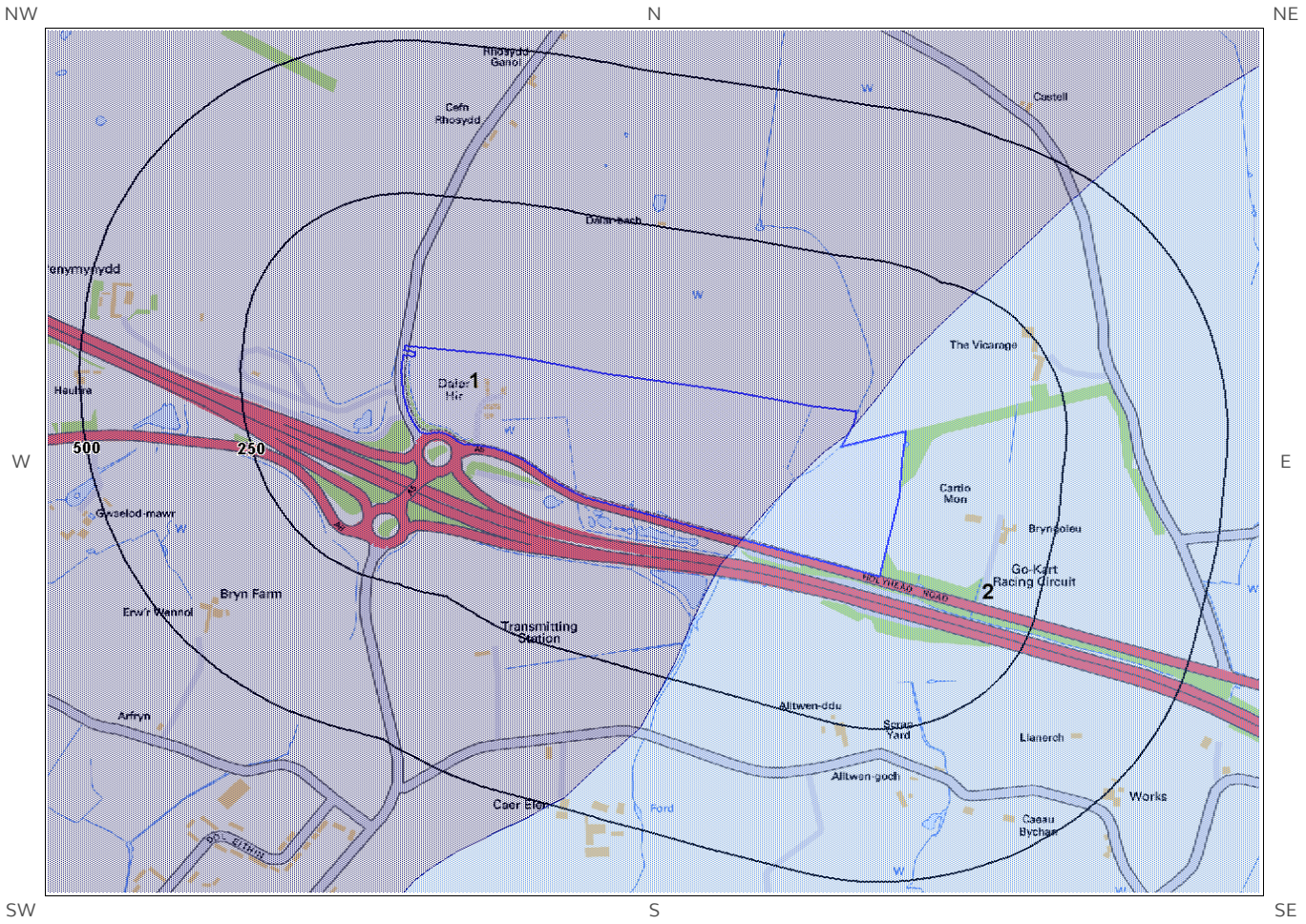
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
10A	32.0	SW	232668 378315	Igneous & Metamorphic Rock	Dalar-hir	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	632.0	S	232335 377808	Igneous & Metamorphic Rock	Tafarn-coch	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	711.0	S	232222 377761	Igneous & Metamorphic Rock	Ty'n-llan	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	840.0	N	232979 379339	Igneous & Metamorphic Rock	Rhosydd	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	996.0	SE	233774 377387	Igneous & Metamorphic Rock	Bryn-eithin	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

3 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

Mapping sourced from Ordnance Survey®

Site Outline

250 / 500 Search Buffers (m)

Historical Mining

Non-Coal Mining Cavities

Natural Cavities

Non-Coal Mining

Highly likely

Likely

Unlikely

Highly unlikely

Rare

3 Mining, Extraction & Natural Cavities

3.1 Historical Mining

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

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

Database searched and no data found.

3.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

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

Database searched and no data found.

3.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

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

The following information provided by JPB is not represented on mapping: Database searched and no data found.

3.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

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

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Vein Mineral	Occasional minor mining may have occurred but of restricted extent.
2	0.0	On Site	Not available	Vein Mineral	Rare and localised small scale mining may have occurred.
Not shown	920.0	SE	Not available	Vein Mineral	Occasional minor mining may have occurred but of restricted extent.

3.5 Non-Coal Mining Cavities

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

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

Database searched and no data found.

3.6 Natural Cavities

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

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

Database searched and no data found.

3.7 Brine Extraction

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

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

Database searched and no data found.

3.8 Gypsum Extraction

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

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

Database searched and no data found.

3.9 Tin Mining

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

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

Database searched and no data found.

3.10 Clay Mining

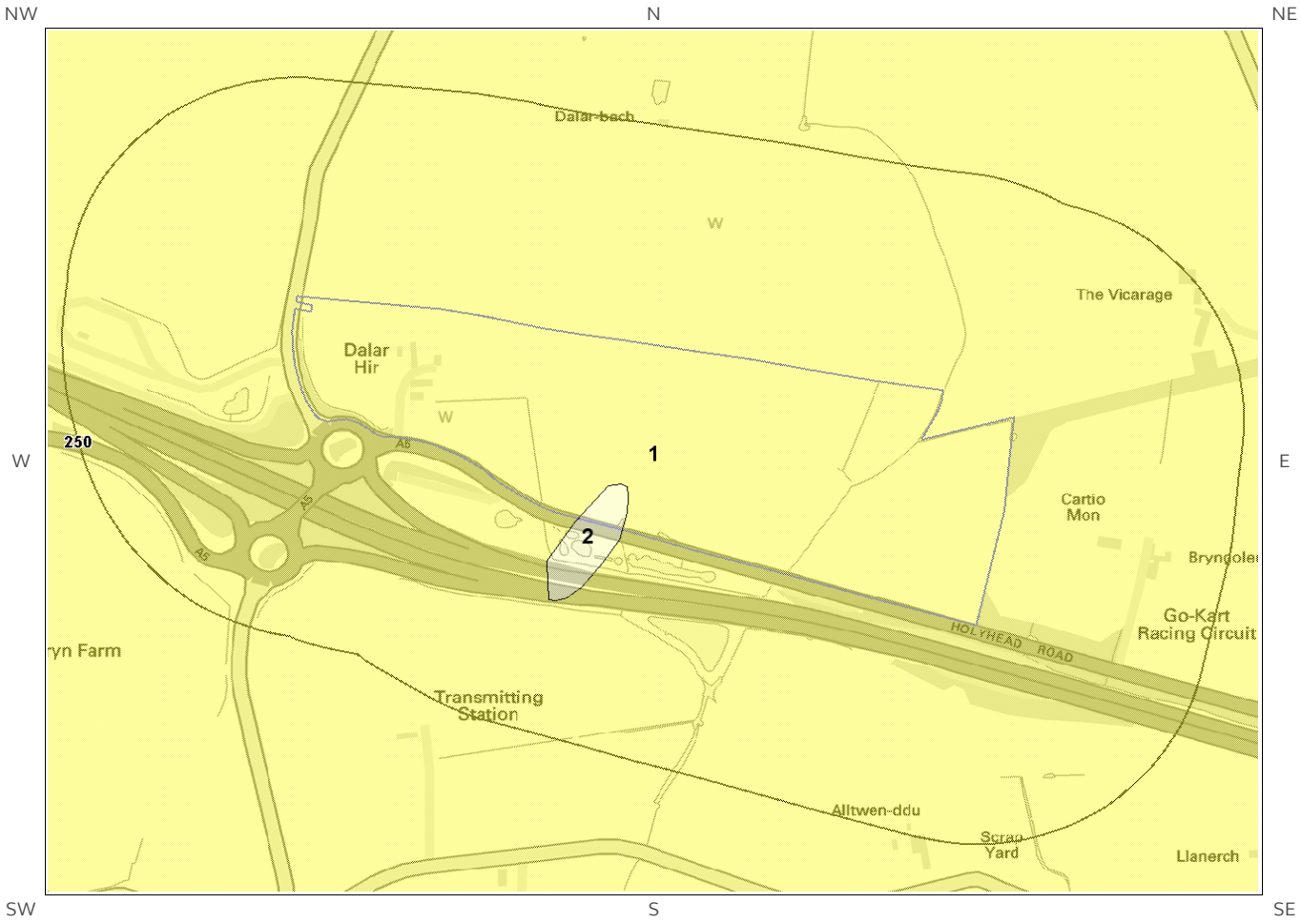
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

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

Database searched and no data found.

4 Natural Ground Subsidence

4.1 Shrink-Swell Clay Map



Shrink Swell Clay Legend

Mapping sourced from Ordnance Survey

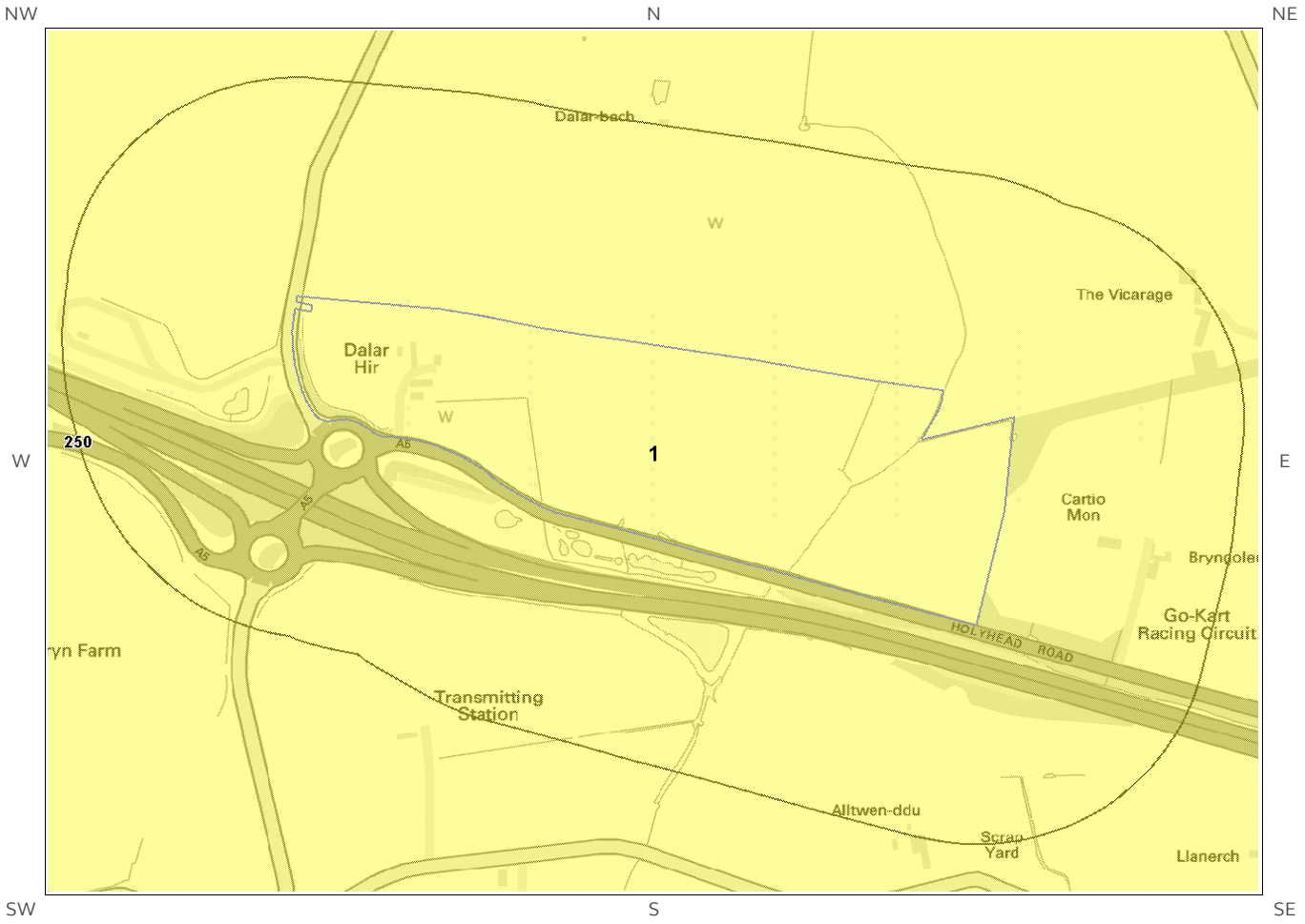
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.2 Landslides Map



Landslides Legend

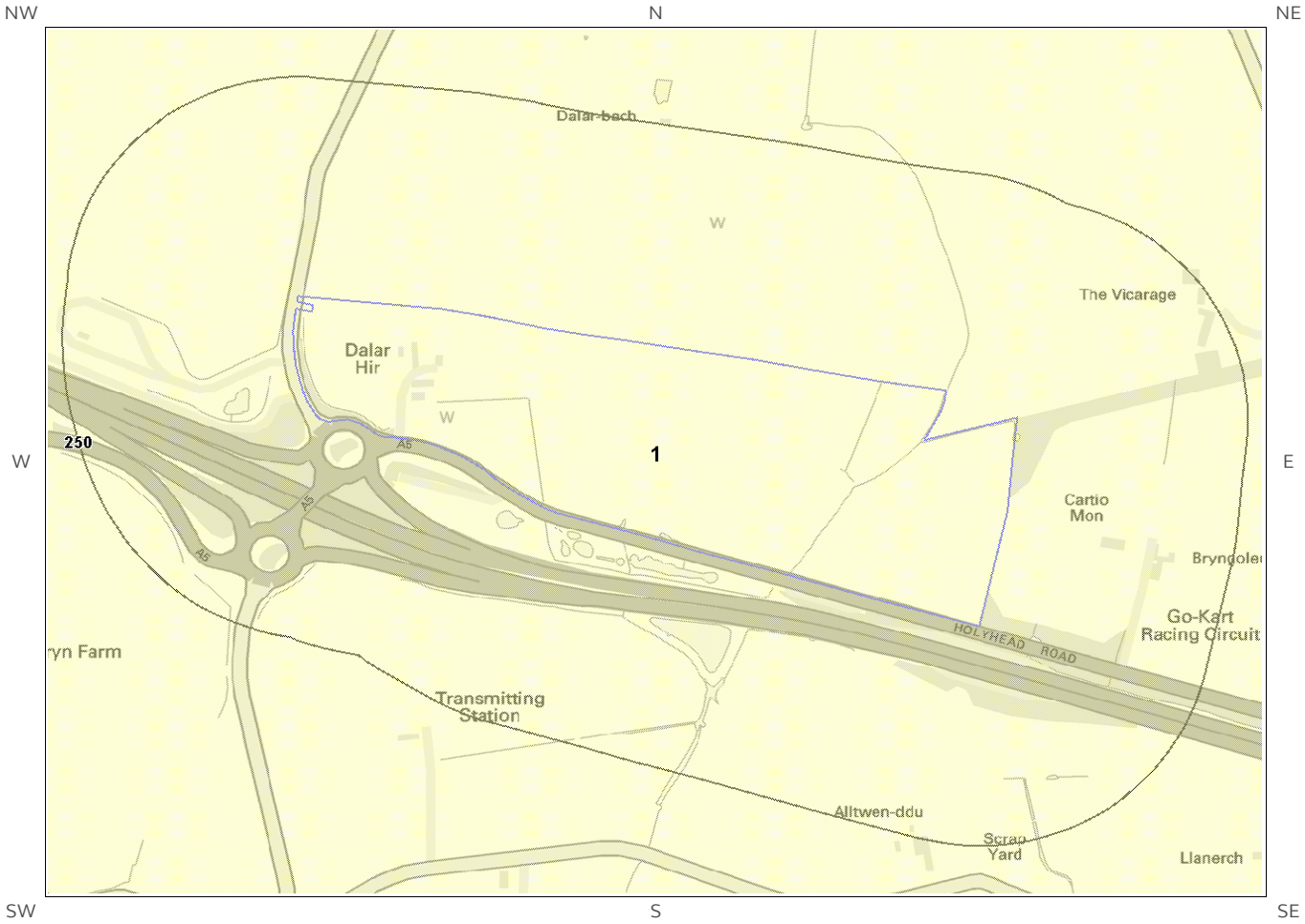
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.3 Ground Dissolution Soluble Rocks Map



Ground Dissolution Soluble Rocks Legend

Mapping sourced from Ordnance Survey®

Site Outline

125
250
Search Buffers (m)

No Data / Null

Negligible

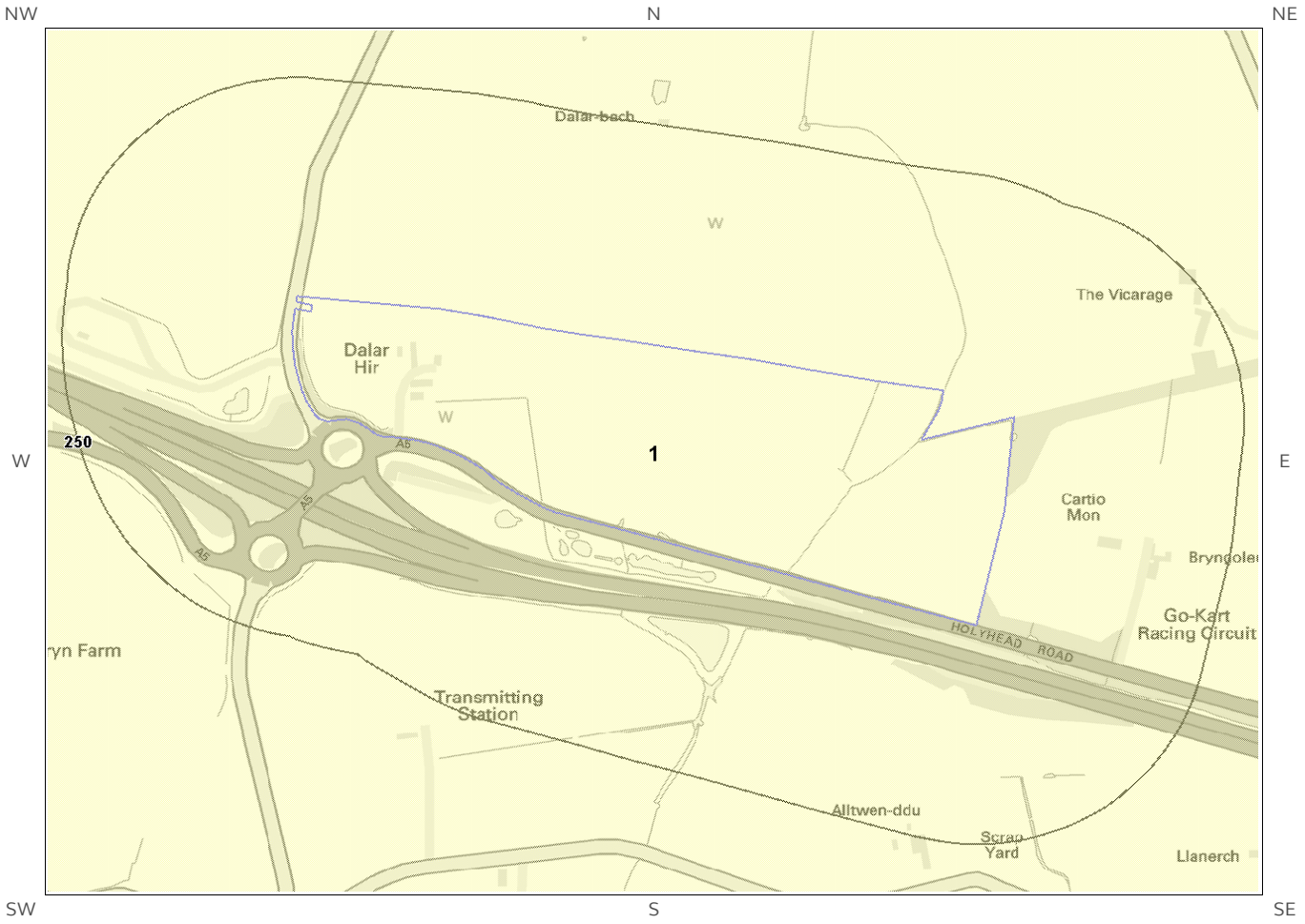
Very Low

Low

Moderate

High

4.4 Compressible Deposits Map



Compressible Deposits Legend

Mapping sourced from Ordnance Survey

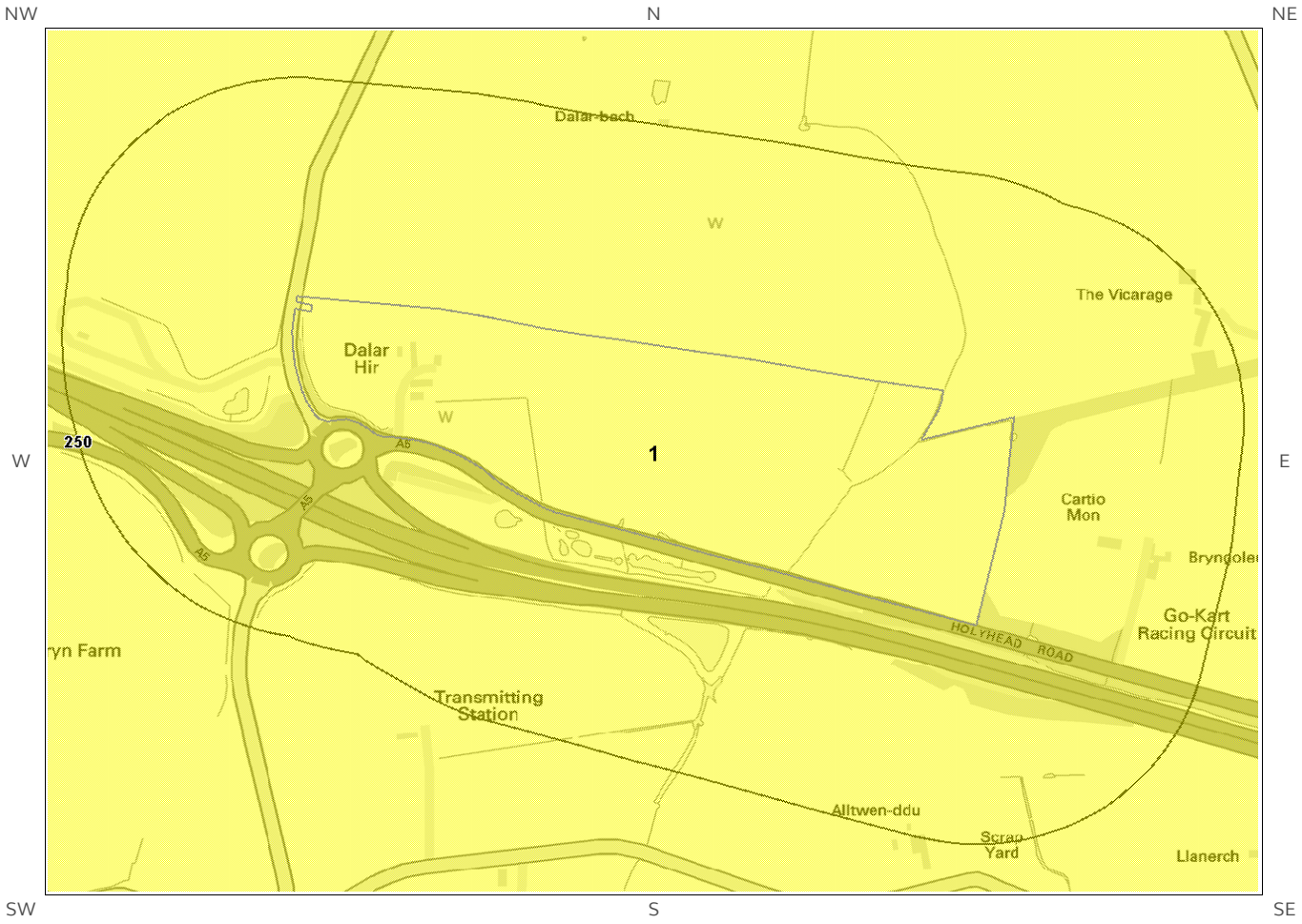
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.5 Collapsible Deposits Map



Collapsible Deposits Legend

Mapping sourced from Ordnance Survey

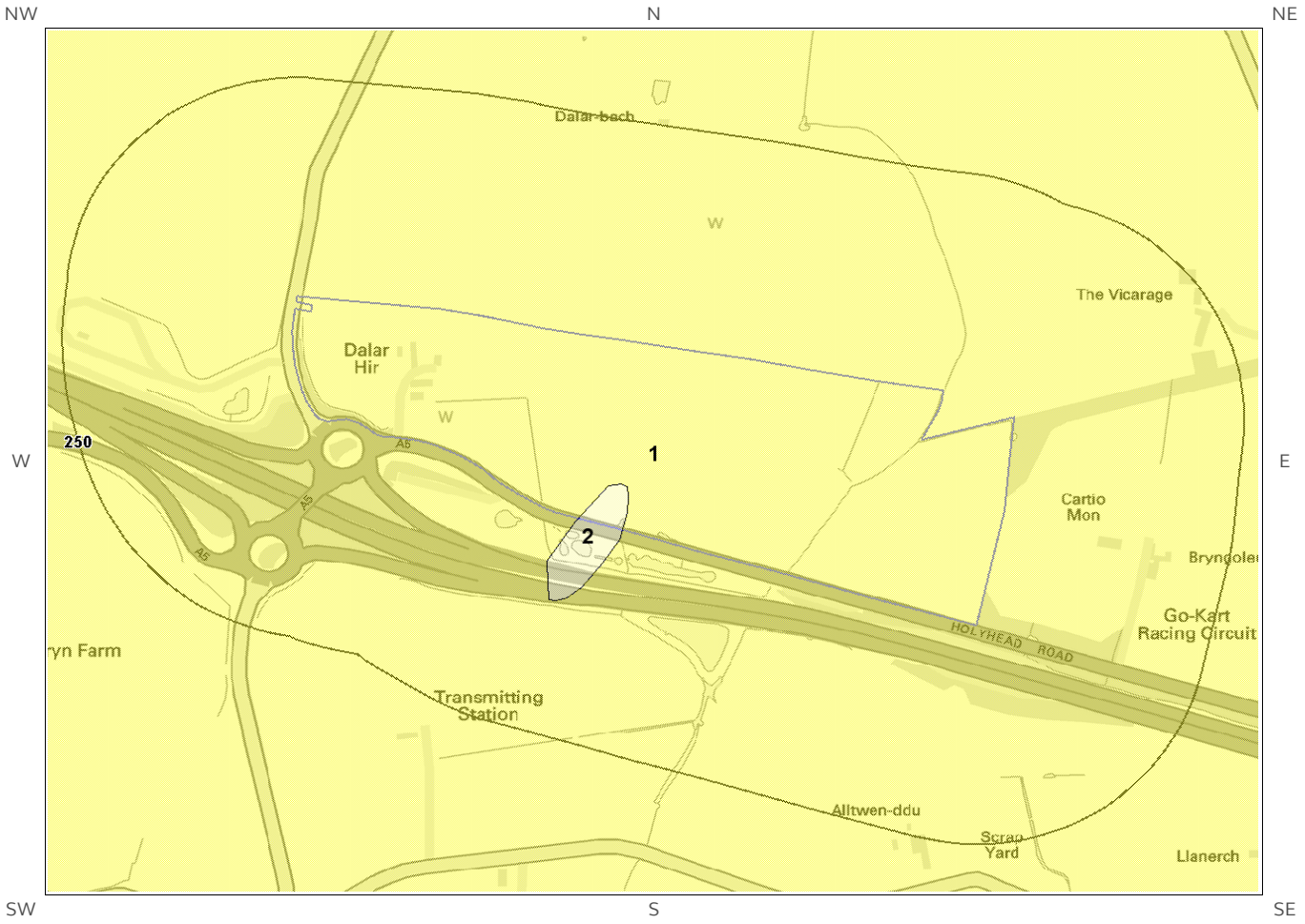
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.6 Running Sand Map



Running Sand Legend

Mapping sourced from Ordnance Survey

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site** boundary? Very Low

4.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
2	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

4.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

4.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

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

4.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible ground identified. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.

4.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

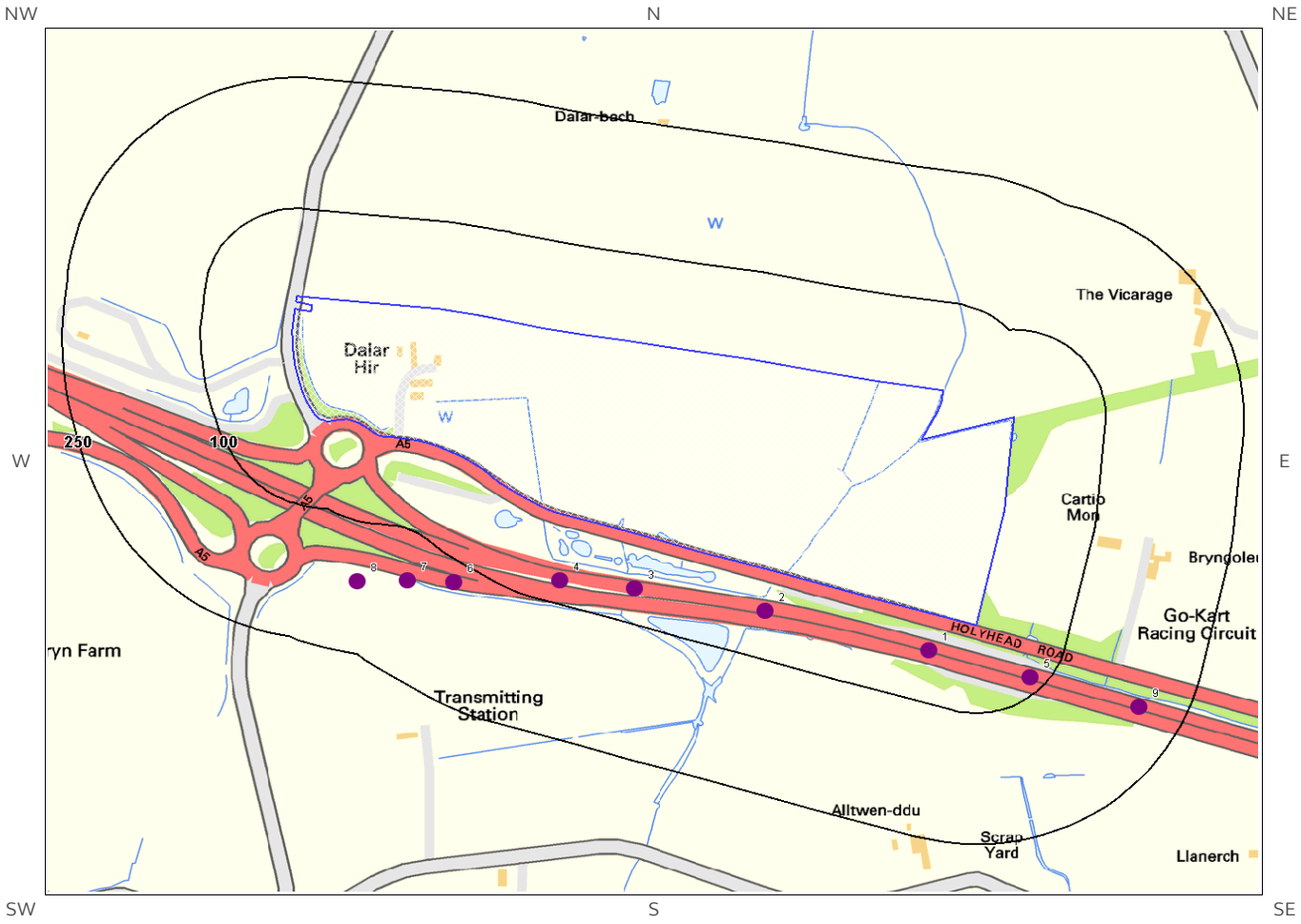
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

4.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

5 Borehole Records Map



Borehole Records Legend

Mapping sourced from Ordnance Survey

Site Outline

Borehole Locations

125
250
Search Buffers (m)

5 Borehole Records

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

Records of boreholes within 250m of the study site boundary: 9

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	42.0	S	233132 378161	SH37NW55	2.0	A55 ANGLESEY STAGE 2 TP 260
2	47.0	S	232955 378206	SH37NW56	4.0	A55 ANGLESEY STAGE 2 TP 261
3	61.0	S	232813 378232	SH37NW38	2.0	A55 ANGLESEY STAGE 2 177
4	75.0	S	232732 378241	SH37NW57	4.0	A55 ANGLESEY STAGE 2 TP 262
5	83.0	SE	233242 378130	SH37NW37	5.0	A55 ANGLESEY STAGE 2 176
6	124.0	SW	232617 378239	SH37NW39	7.0	A55 ANGLESEY STAGE 2 178
7	151.0	SW	232566 378241	SH37NW58	3.0	A55 ANGLESEY STAGE 2 TP 263
8	169.0	S	232512 378240	SH37NW44	1.0	A55 ANGLESEY STAGE 2 TP IC410
9	200.0	SE	233361 378096	SH37NW43	0.0	A55 ANGLESEY STAGE 2 TP IC409

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/135710
#2: scans.bgs.ac.uk/sobi_scans/boreholes/135711
#3: scans.bgs.ac.uk/sobi_scans/boreholes/135693
#4: scans.bgs.ac.uk/sobi_scans/boreholes/135712
#5: scans.bgs.ac.uk/sobi_scans/boreholes/135692
#6: scans.bgs.ac.uk/sobi_scans/boreholes/135694
#7: scans.bgs.ac.uk/sobi_scans/boreholes/135713
#8: scans.bgs.ac.uk/sobi_scans/boreholes/135699
#9: scans.bgs.ac.uk/sobi_scans/boreholes/135698

6 Estimated Background Soil Chemistry

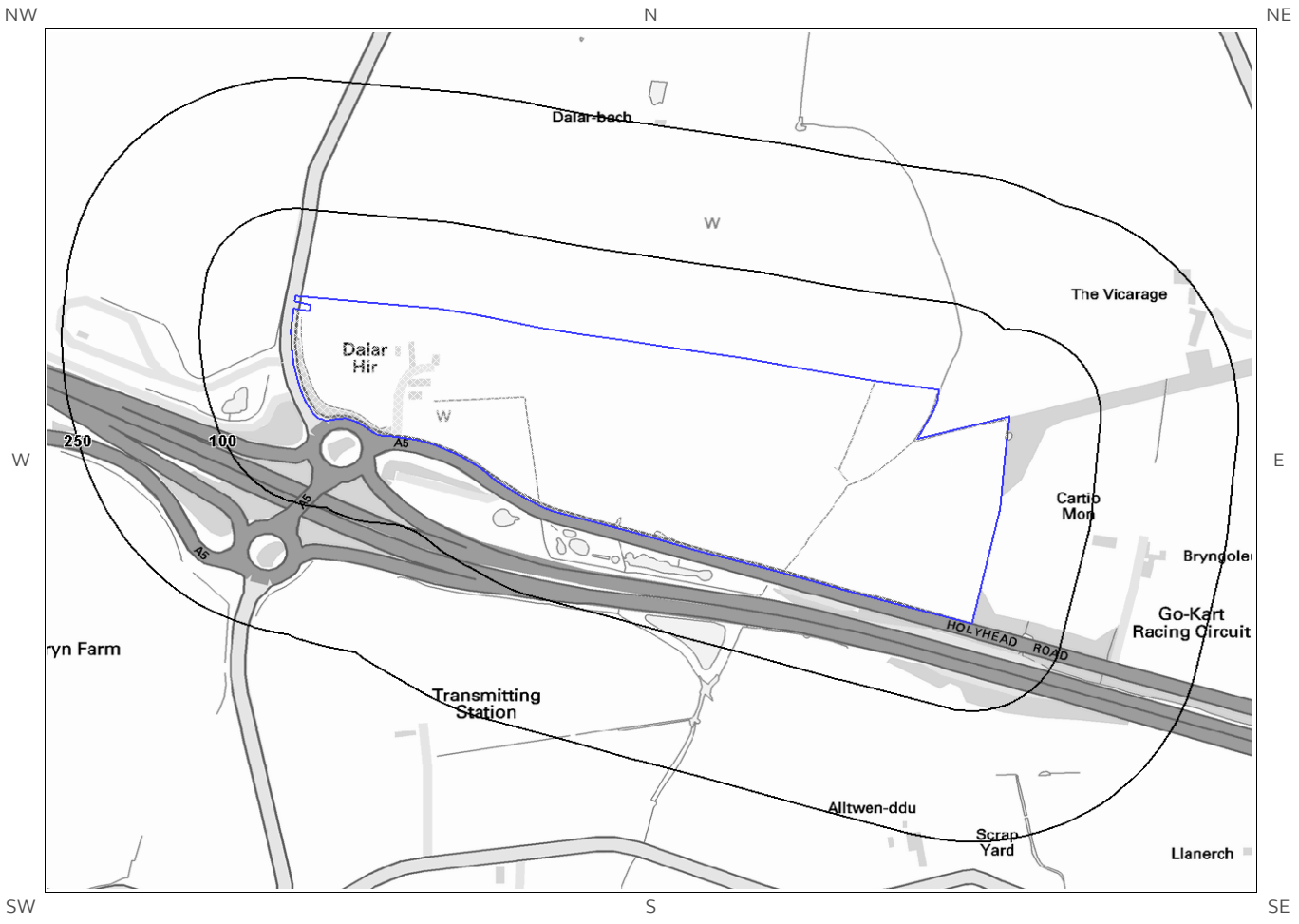
Records of background estimated soil chemistry within 250m of the study site boundary: 27

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

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
3.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
16.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
16.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
18.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
59.0	NE	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
71.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
159.0	SE	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
187.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
190.0	S	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
197.0	S	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
232.0	S	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
232.0	S	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

7 Railways and Tunnels Map



Railways and Tunnels Legend

Mapping sourced from Ordnance Survey

- Site Outline
- 250 / 500 Search Buffers (m)
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

7 Railways and Tunnels

7.1 Tunnels

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

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

Database searched and no data found.

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

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

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

Database searched and no data found.

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

7.2 Historical Railway and Tunnel Features

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

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

Database searched and no data found.

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

7.3 Historical Railways

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

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

Database searched and no data found.

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

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

7.4 Active Railways

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

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

Database searched and no data found.

Note: multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

7.5 Railway Projects

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

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

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

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

Contact Details

Groundsure Helpline

Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
Main switchboard: 020 7654 8000

Johnson Poole & Bloomer Limited

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Brierley Hill, West Midlands
DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS

Tel: 08456 050505
Website: http://www.ordnancesurvey.co.uk/

Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
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Website:**http://www1.getmapping.com/**

Peter Brett Associates

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Waterman Place
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Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Contact Details

Standard Terms and Conditions

1 Definitions

I**n these terms and conditions unless the context otherwise requires:**
"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.
"Client" means the party or parties entering into a Contract with Groundsure.
"Commercial" means any building or property which is not Residential.
"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than
(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and
(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).
"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.
"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.
"Third Party Data Provider" means any third party providing Third Party Content to Groundsure.
"Data Reports" means reports comprising factual data with no accompanying interpretation.
"Fees" has the meaning set out in clause 5.1.
"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.
"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.
"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.
"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.
"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.
"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.
"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.
"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.
"Residential" means any building or property used as or intended to be used as a single dwelling.
"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.
"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.
"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.
"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.
"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.
2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.
2.3 Subject to clause 7.3 the Client acknowledges that it has not relied on any statement or representation made by or on behalf of Groundsure which is not set out and expressly agreed in writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.
2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.
2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.
2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and
(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and
(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.
3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.
3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.
3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.
3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.
3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.
4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;
(i) the Beneficiary,
(ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate),
(iv) the first purchaser or first tenant of the Site, and
(v) the professional advisers and lenders of the first purchaser or tenant of the Site.
4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.
4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services (together "Fees").
5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.
5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to
(i) full payment of all relevant Fees and
(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.
6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure

acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.
6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.
6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, copyright or other proprietary marking belonging to Groundsure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

(iii) not create any product or report which is derived directly or indirectly from the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);

(iv) not combine the Services with or incorporate such Services into any other information data or service;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.
6.6 The Client shall procure that any person to whom the Services are made available shall notify Groundsure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.
7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.
7.4 Groundsure shall not be liable for

(i) loss of profits;
(ii) loss of business;
(iii) depletion of goodwill and/or similar losses;
(iv) loss of anticipated savings;
(v) loss of goods;
(vi) loss of contract;
(vii) loss of use;
(viii) loss or corruption of data or information;
(ix) business interruption;
(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;
(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;
(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;
(xiii) loss or damage to a computer, software, modem, telephone or other property; and
(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.
7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.
8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 days of the Payment Date; or

(ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an administration order made against it or if a receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or

(iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or

(iv) the Client or the Beneficiary breaches any term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.
9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event
(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) Groundsure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) the Client shall pay to Groundsure all and any Fees payable in respect of the performance of the Services up to the date of termination or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.
12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.
12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.
12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.
12.5 Save as expressly provided in this Contract, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.
12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
12.7 Groundsure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:

(i) the Client or Beneficiary's failure to provide facilities, access or information;
(ii) fire, storm, flood, tempest or epidemic;
(iii) Acts of God or the public enemy;
(iv) riot, civil commotion or war;
(v) strikes, labour disputes or industrial action;
(vi) acts or regulations of any governmental or other agency;
(vii) suspension or delay of services at public registries by Third Party Data Providers;
(viii) changes in law; or
(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

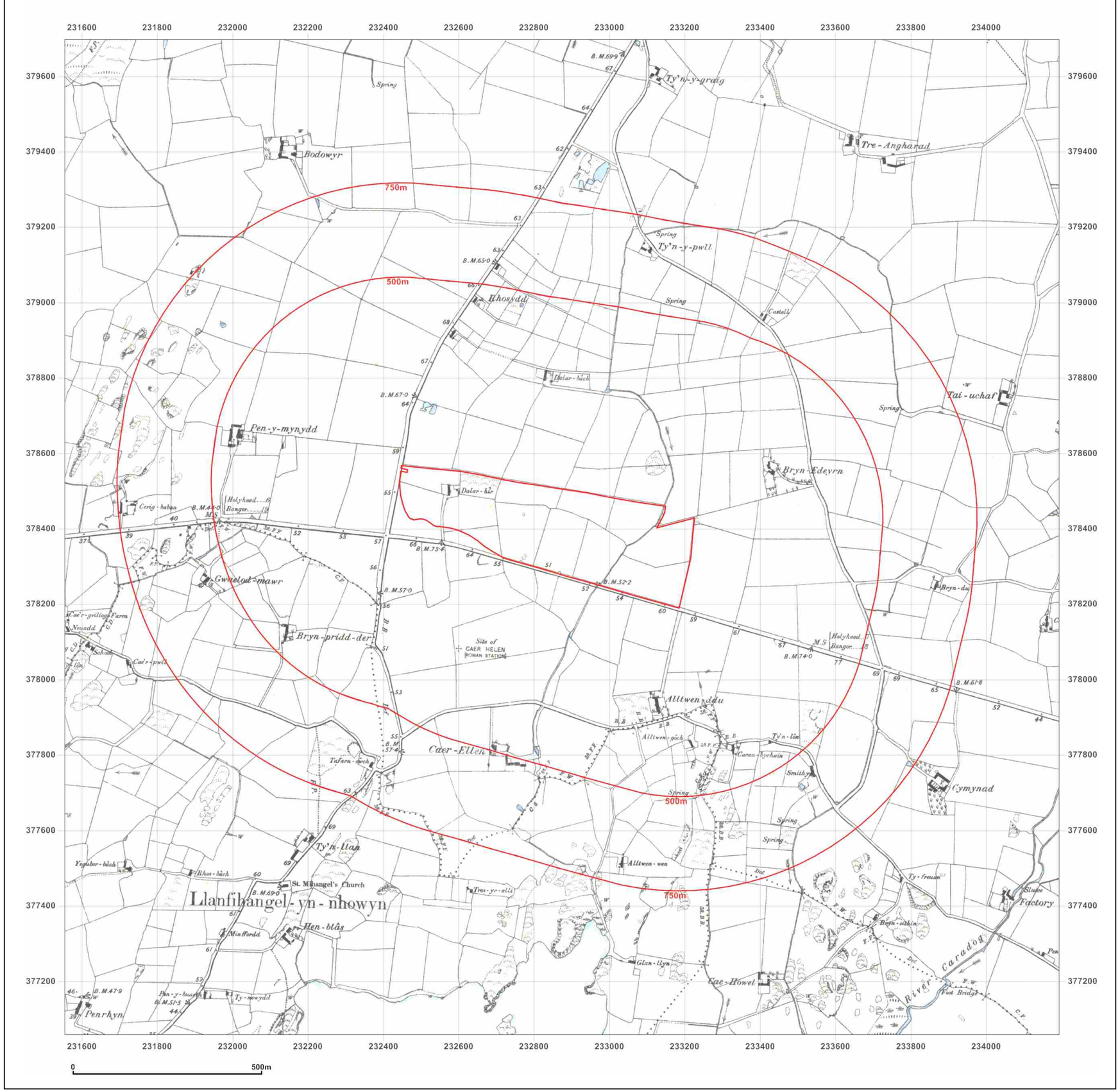
12.11 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner.

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent
required by law



Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: County Series

Map date: **1887**

Scale: 1:10,560

Printed at: 1:10,560

N
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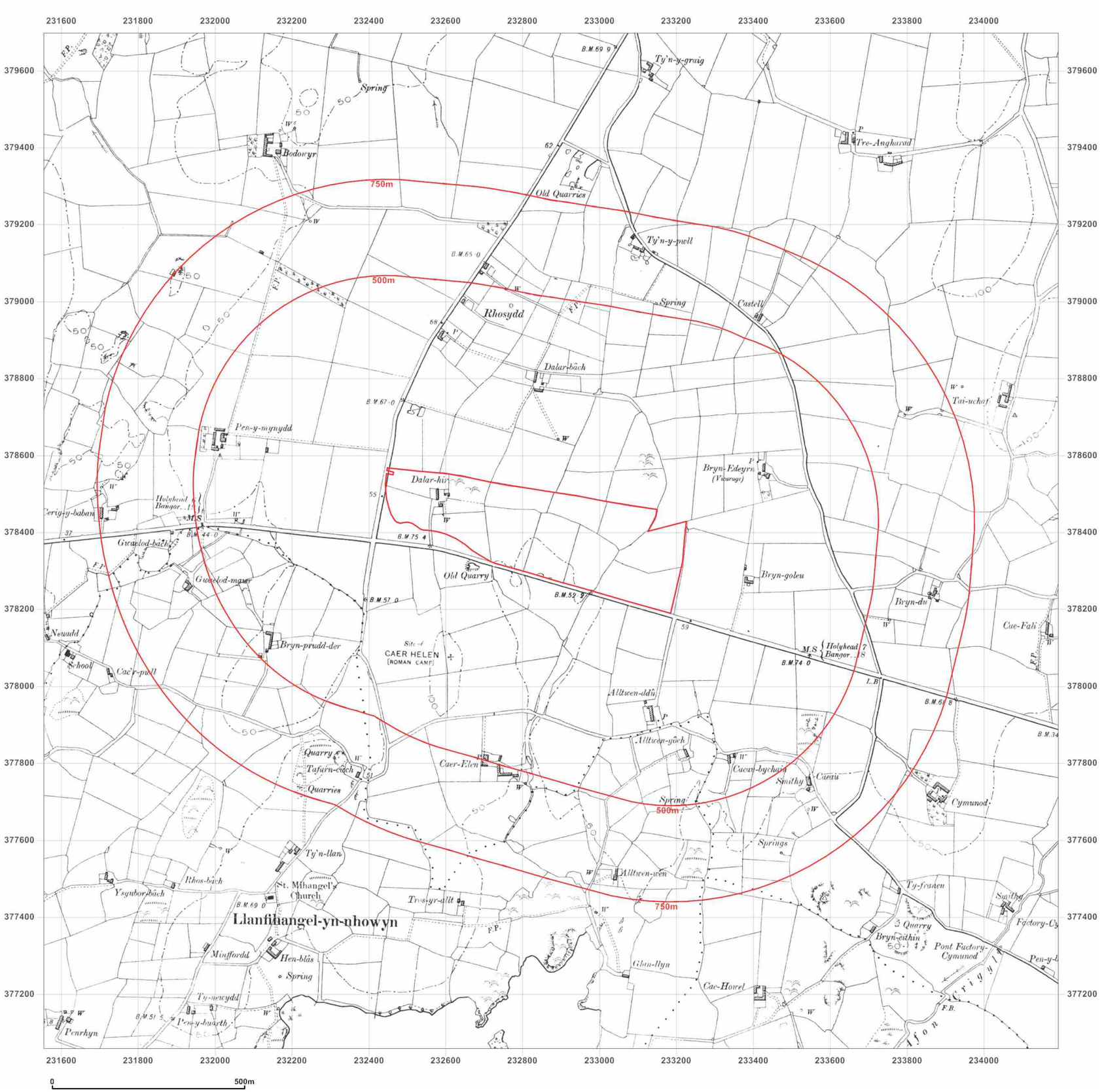
Surveyed 1887
Revised 1887
Edition N/A
Copyright N/A
Levelled N/A

Ordnance Survey Licensed Partner

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 03 August 2015

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: County Series

Map date: **1899**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1887
Revised 1899
Edition N/A
Copyright N/A
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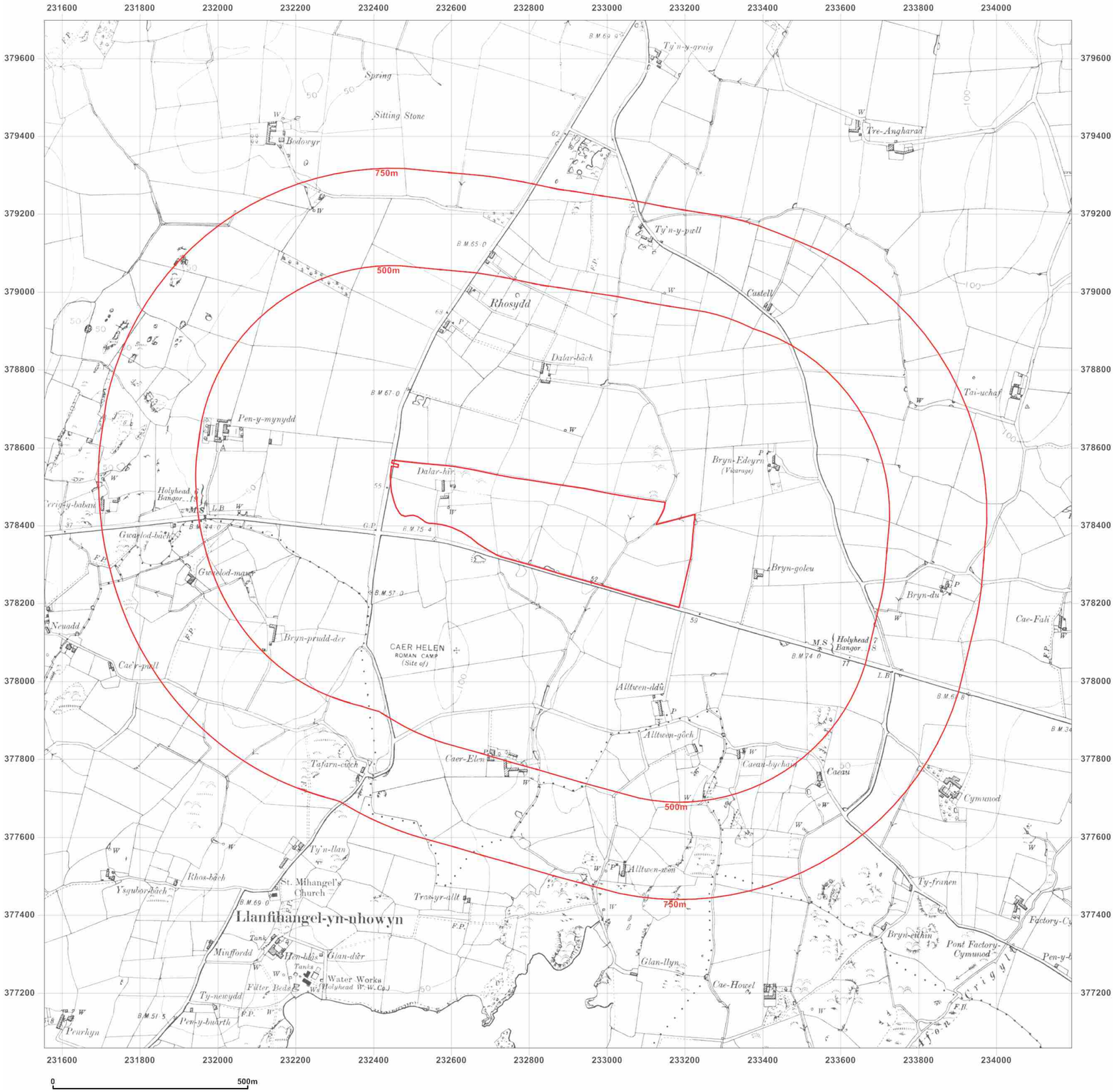

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: County Series

Map date: **1926**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1887
Revised 1926
Edition 1926
Copyright N/A
Levelled N/A

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Production date: 03 August 2015

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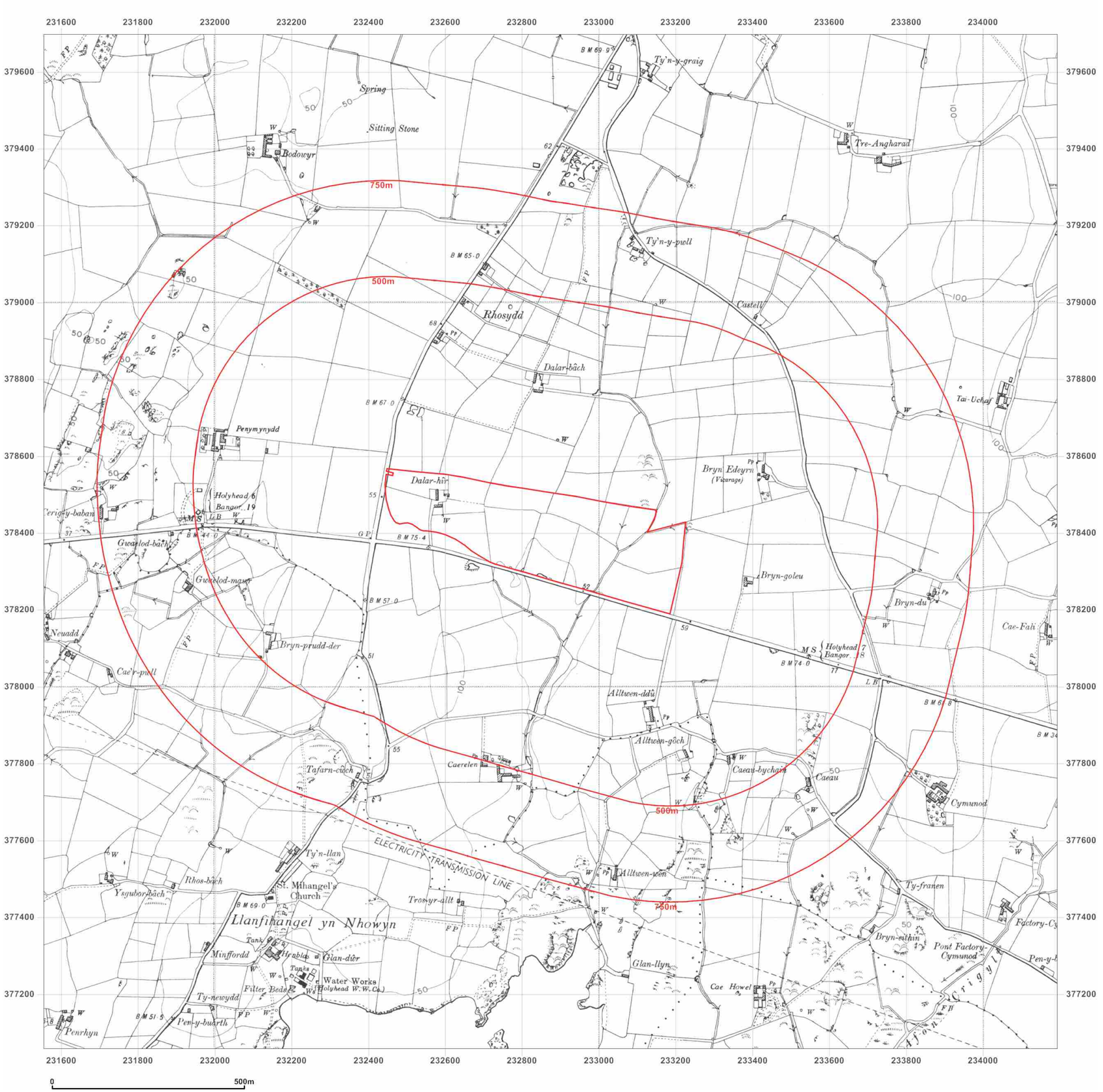

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: County Series

Map date: **1949**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1887
Revised 1949
Edition N/A
Copyright N/A
Levelled N/A

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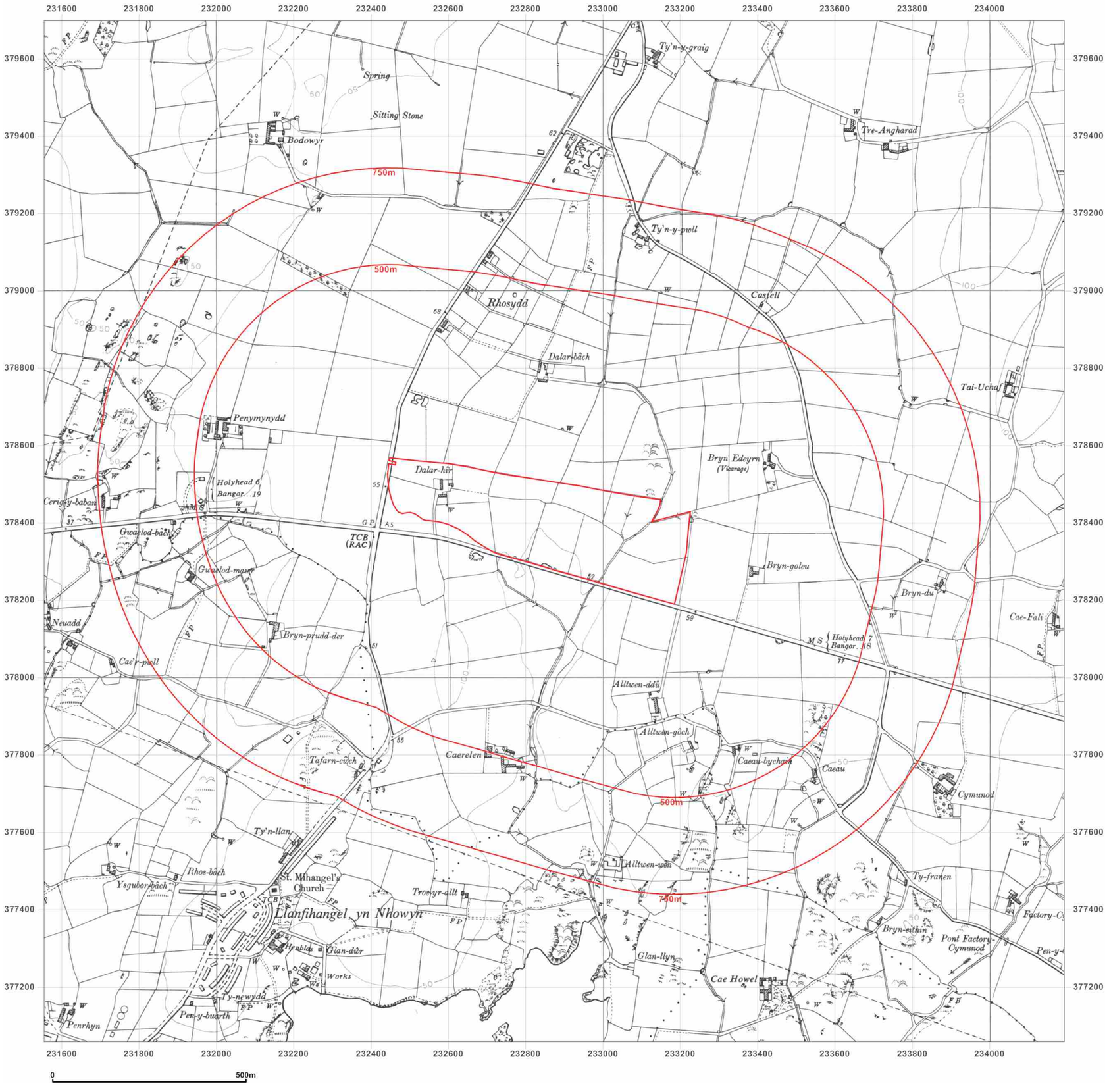

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: Provisional
Map date: **1959**
Scale: 1:10,560
Printed at: 1:10,560

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Surveyed 1959
Revised 1959
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 03 August 2015

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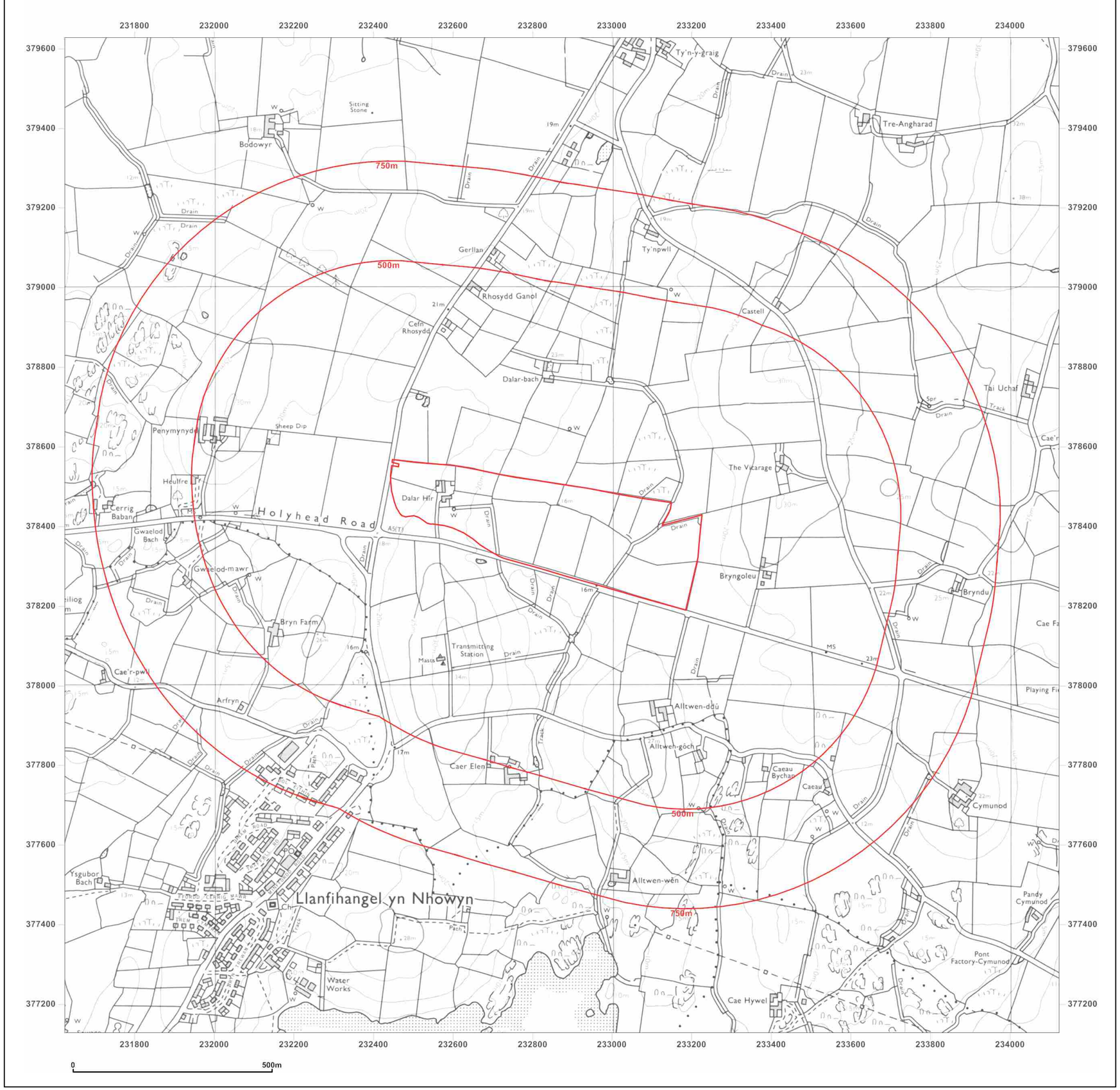

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: National Grid

Map date: **1977**

Scale: 1:10,000

Printed at: 1:10,000

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Surveyed 1973
Revised 1977
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 03 August 2015

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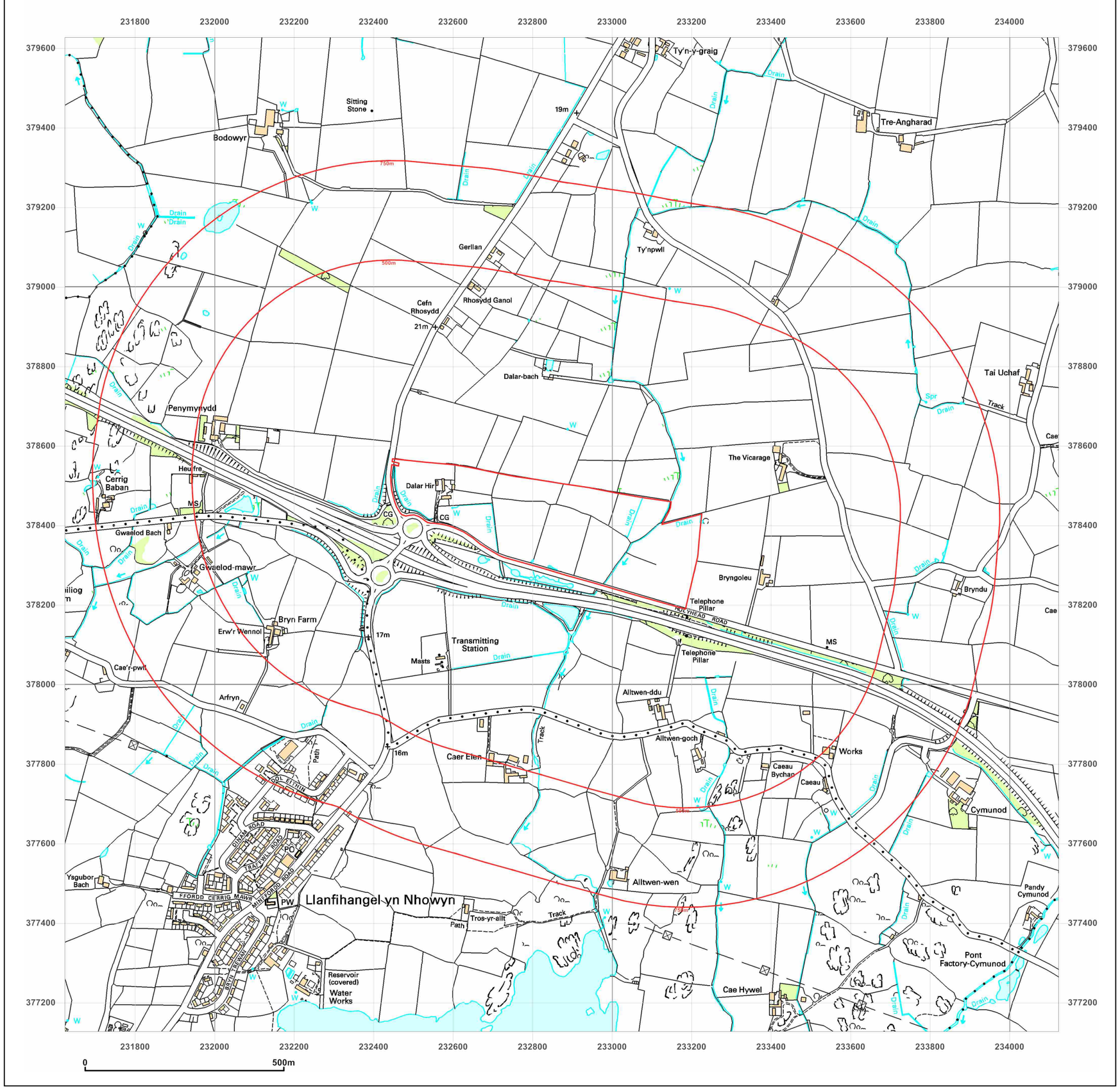

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

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2002

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Production date: 03 August 2015

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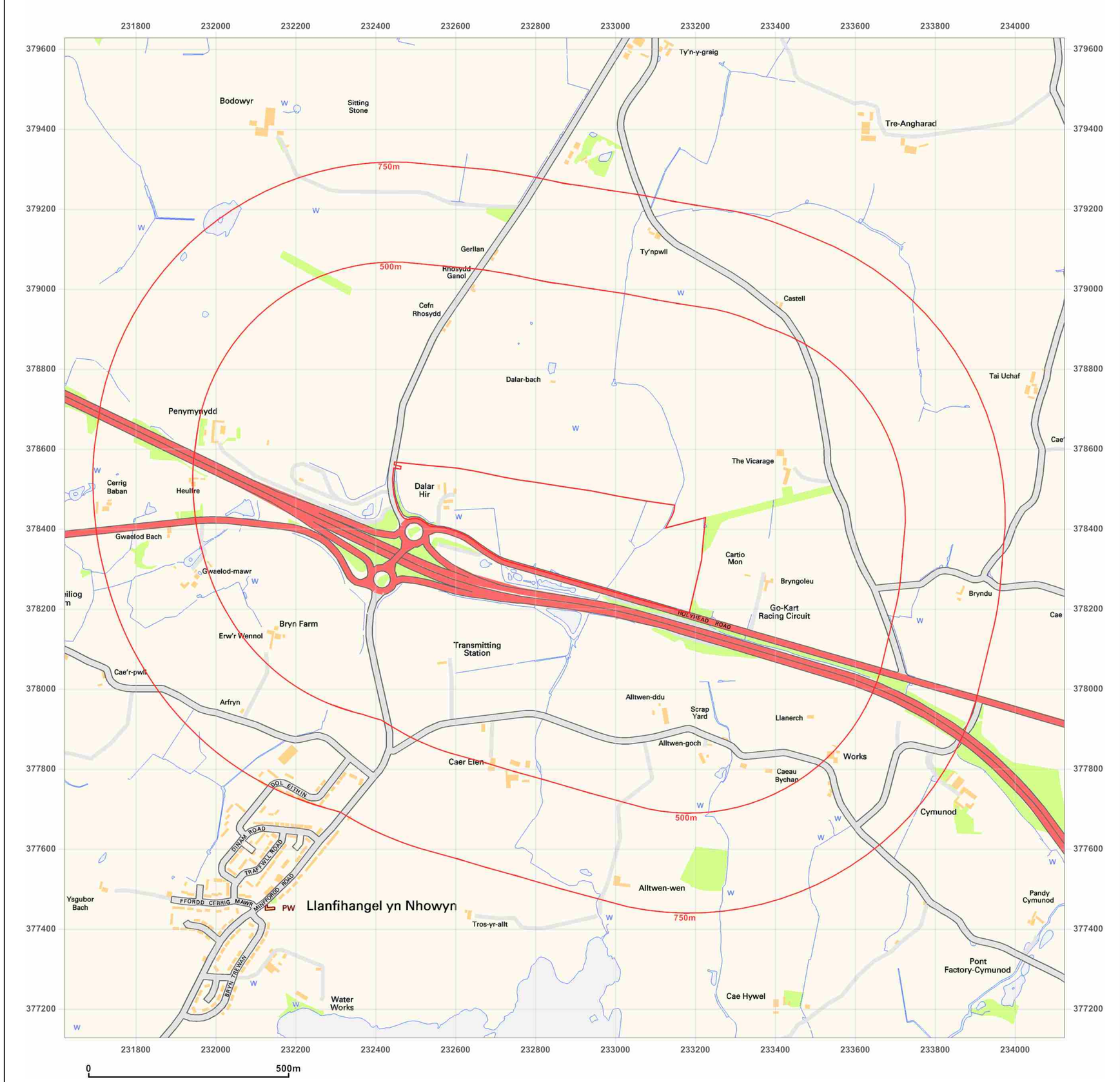

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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2010

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Production date: 03 August 2015

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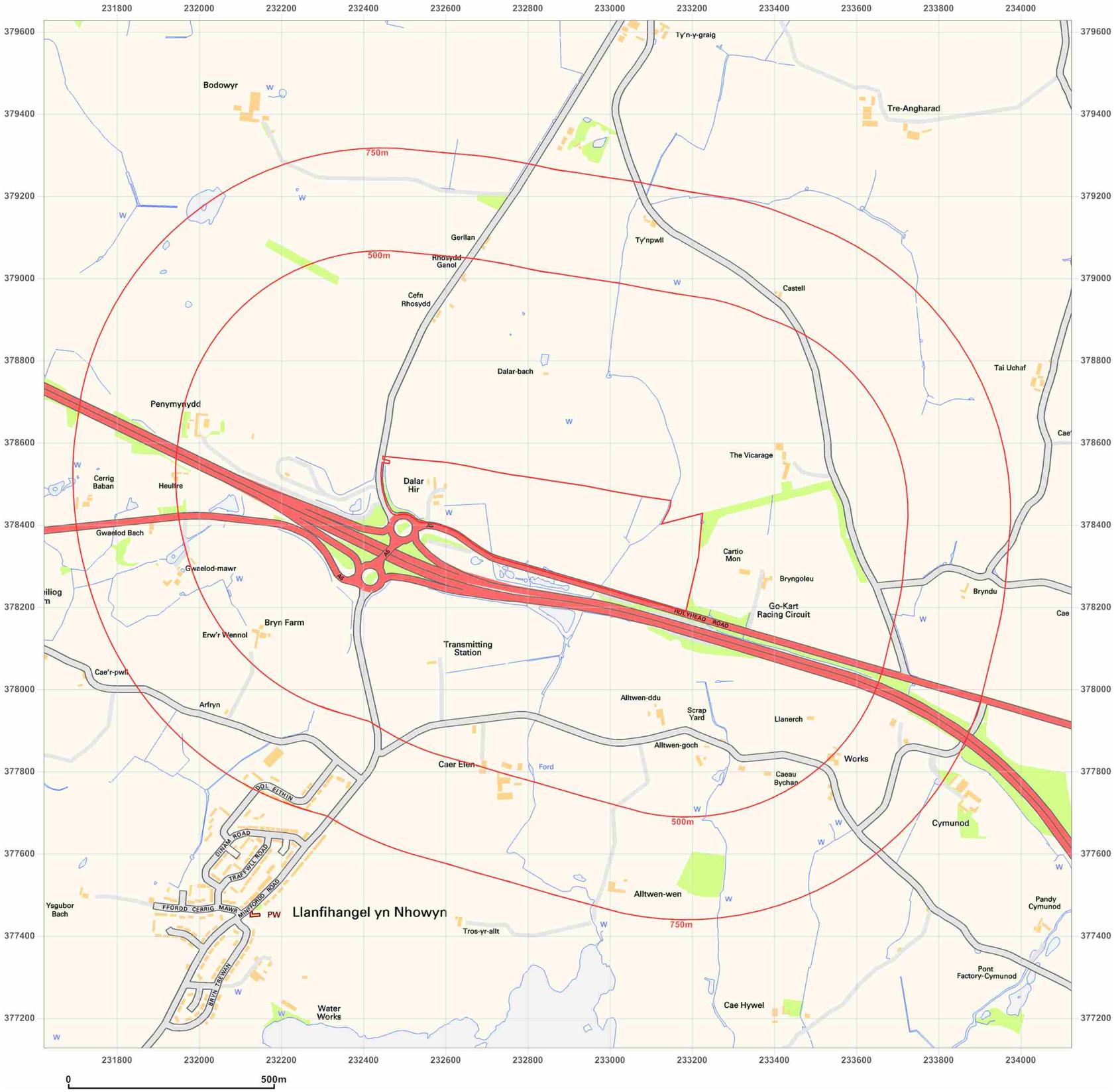

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785
Grid Ref: 232873, 378377

Map Name: National Grid
Map date: **2014**
Scale: 1:10,000
Printed at: 1:10,000

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2014

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Production date: 03 August 2015

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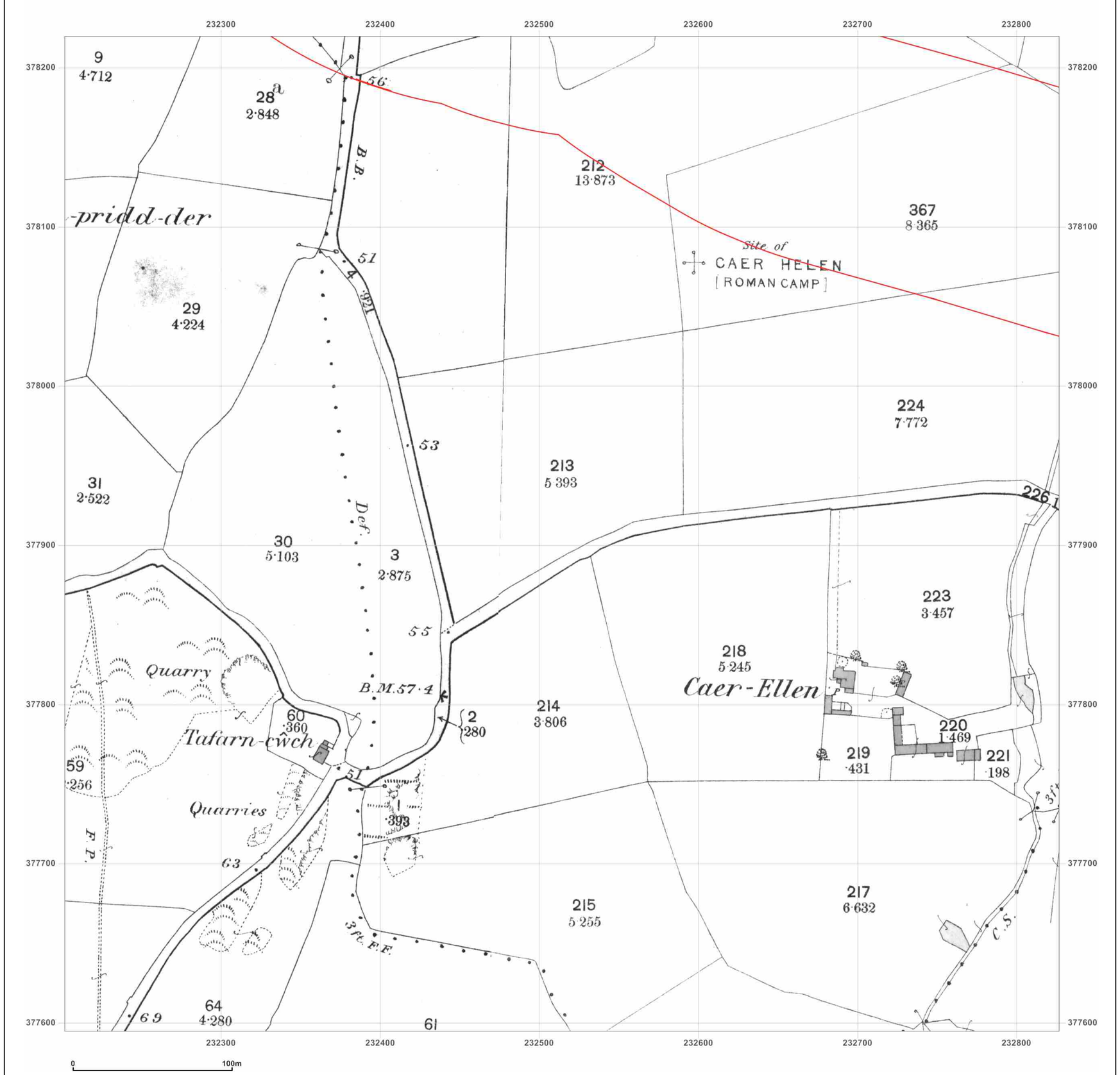
Groundsure INSIGHTS

1:2500 Scale Grid Index



Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_1
Grid Ref: 232514, 377907

Map Name: County Series

Map date: **1888**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1888
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1888
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A

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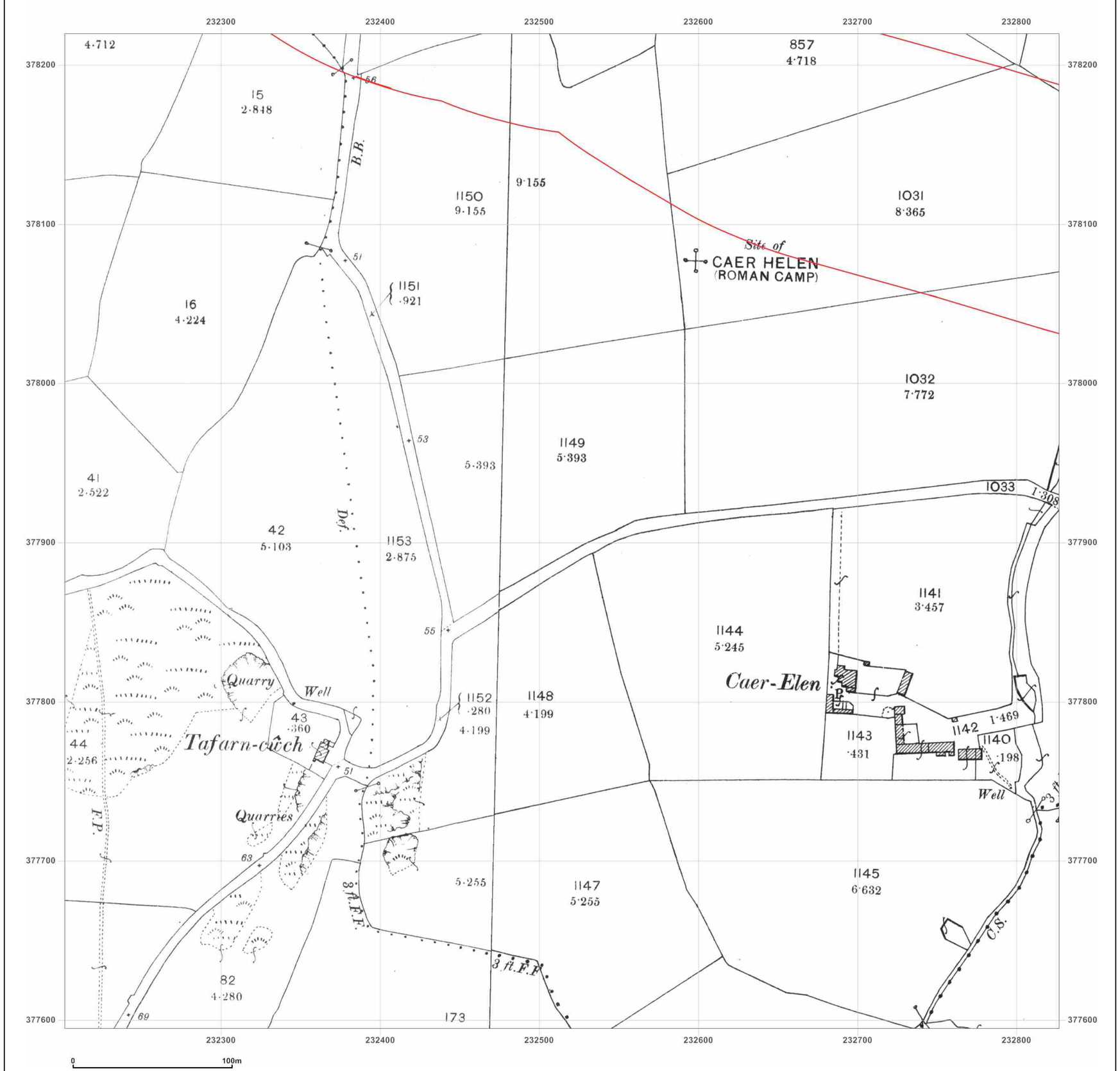
W: www.groundsure.com

Production date: 03 August 2015

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_1
Grid Ref: 232514, 377907

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

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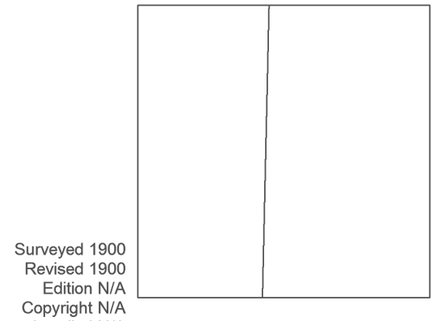

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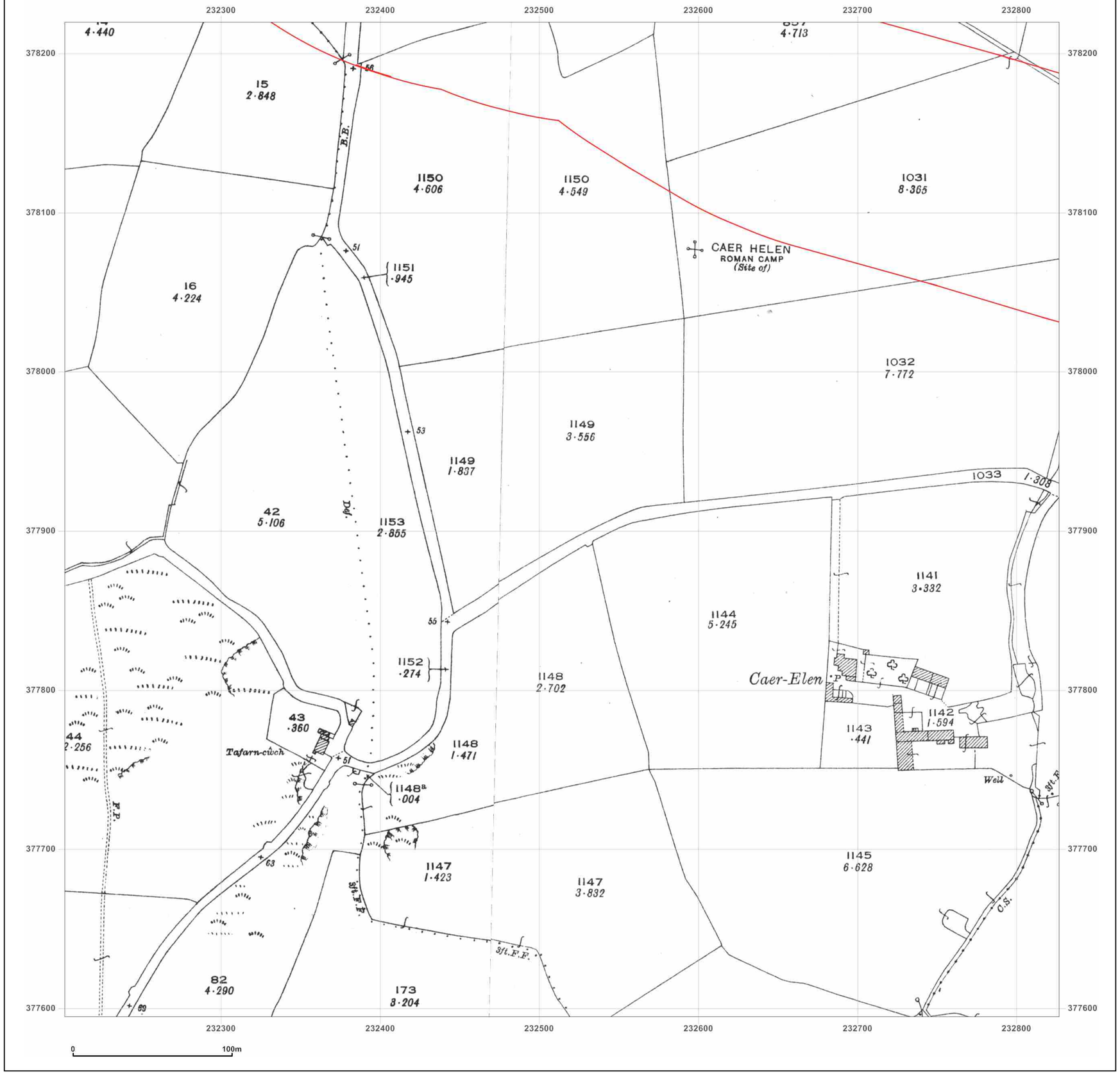

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_1
Grid Ref: 232514, 377907

Map Name: County Series
Map date: **1924**
Scale: 1:2,500
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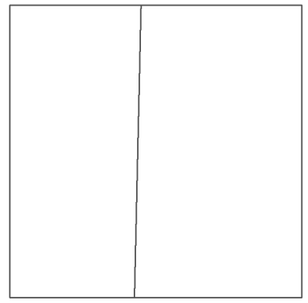

Surveyed 1924
Revised 1924
Edition N/A
Copyright N/A
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Revised 1924
Edition N/A
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Production date: 03 August 2015

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Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_1
Grid Ref: 232514, 377907

Map Name: National Grid

Map date: **1973**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1973
Revised 1973
Edition N/A
Copyright 1974
Levelled 1960

Surveyed 1973
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Edition N/A
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Levelled 1955

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Production date: 03 August 2015

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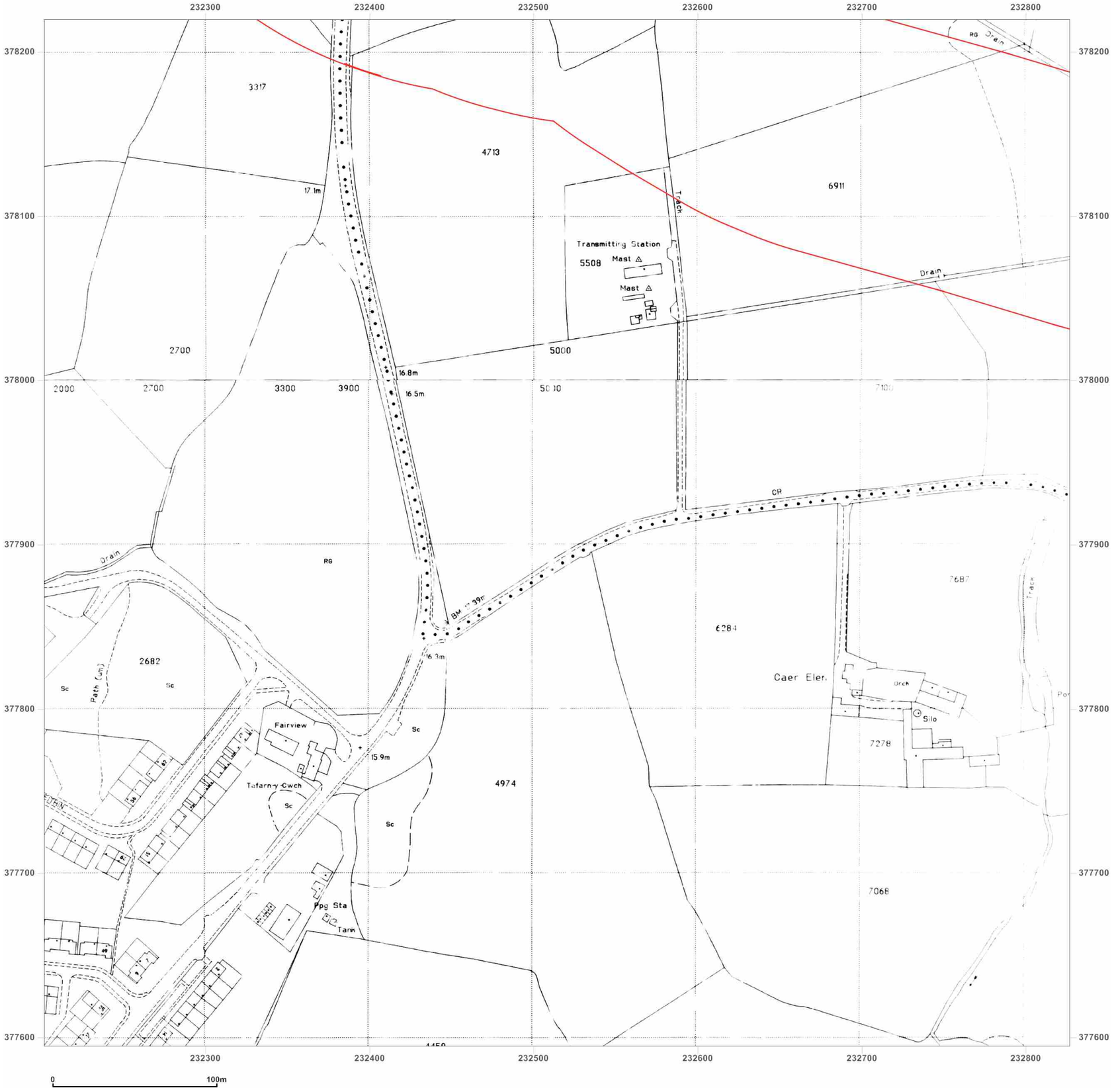

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Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_1
Grid Ref: 232514, 377907

Map Name: National Grid

Map date: **1995**

Scale: 1:2,500

Printed at: 1:2,500

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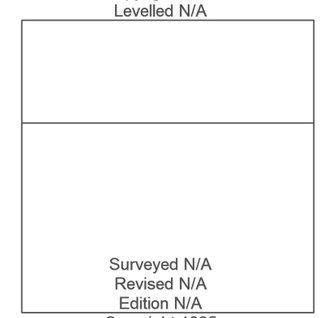

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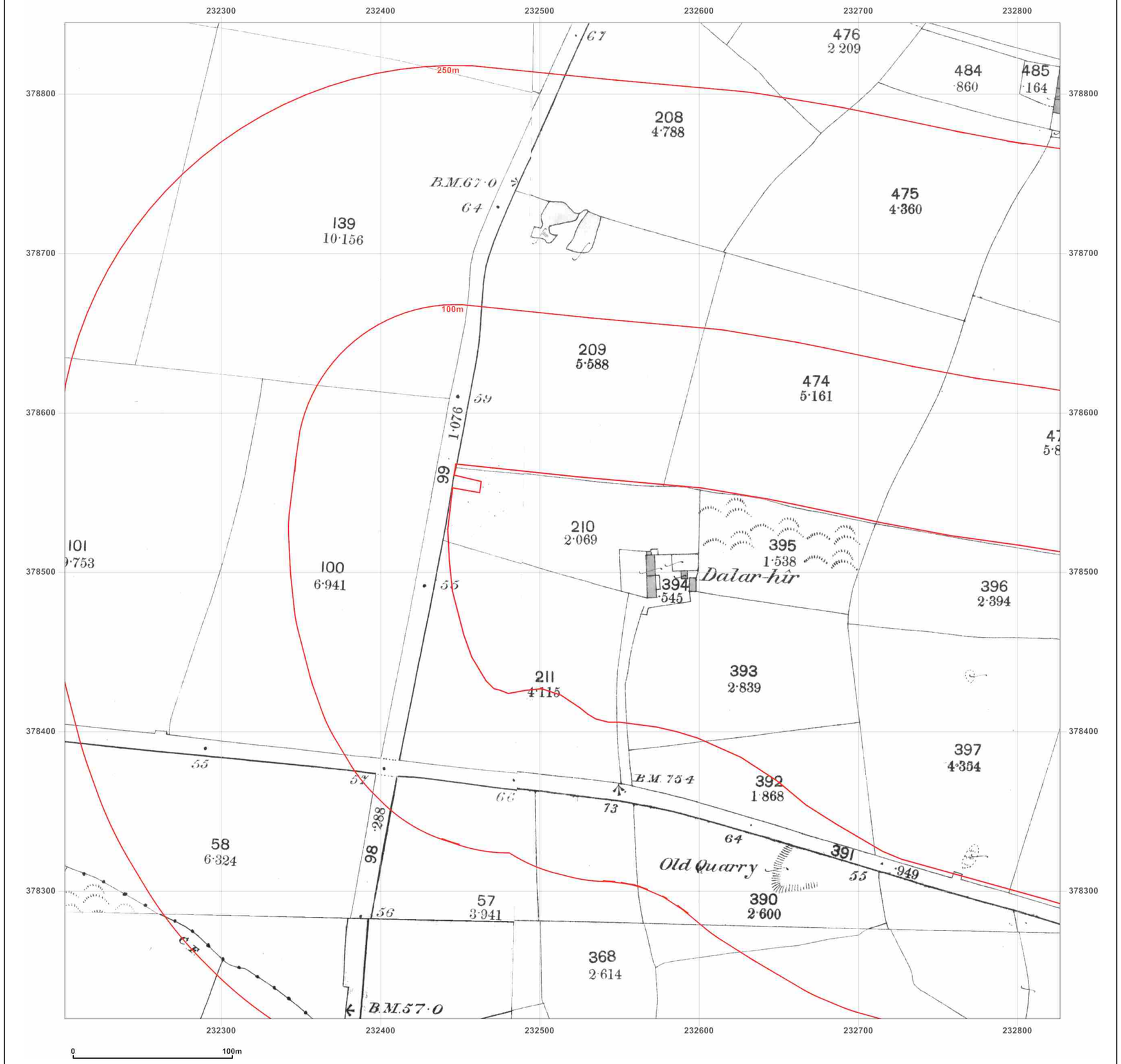

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_2
Grid Ref: 232514, 378532

Map Name: County Series

Map date: **1888**

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Printed at: 1:2,500

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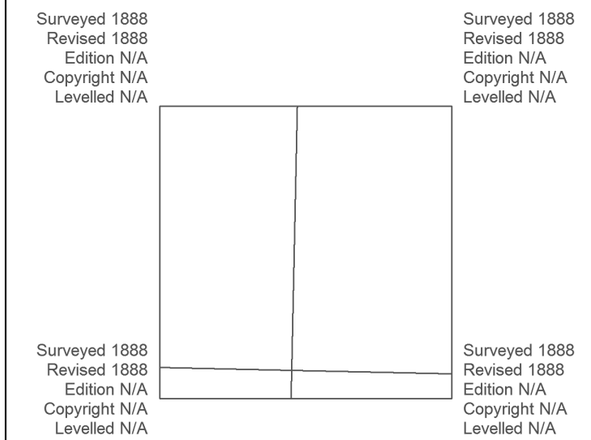

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Production date: 03 August 2015

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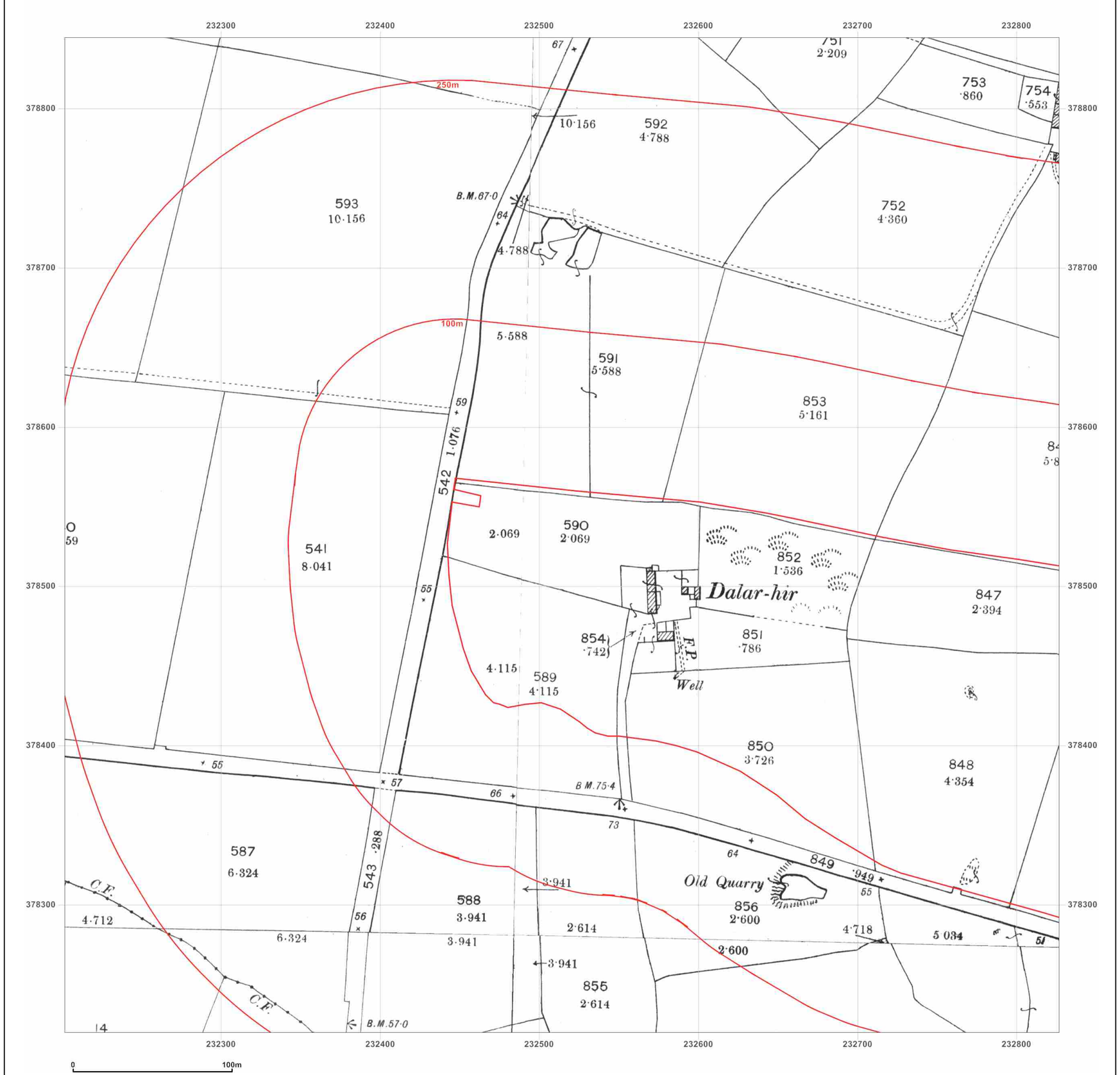

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Grid Ref: 232514, 378532

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

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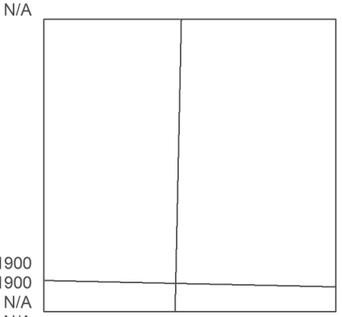
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A



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Levelled N/A

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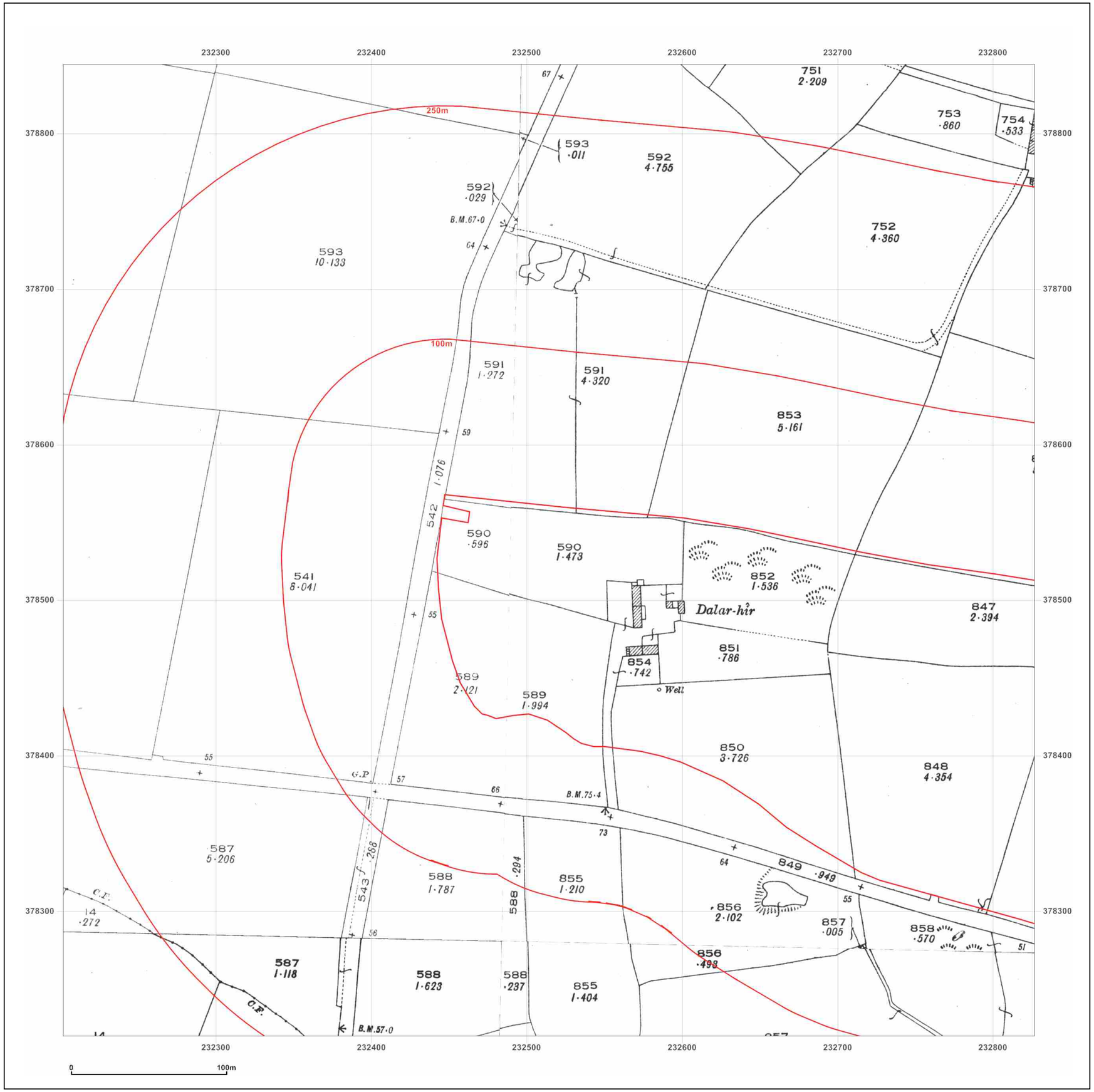

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_2
Grid Ref: 232514, 378532

Map Name: County Series

Map date: **1924**

Scale: 1:2,500

Printed at: 1:2,500

N
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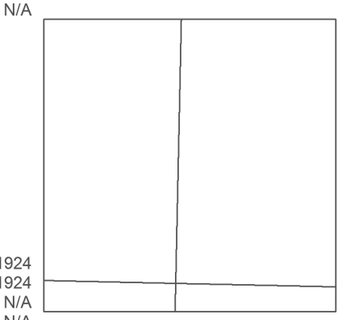
Surveyed 1924
Revised 1924
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1924
Revised 1924
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1924
Revised 1924
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1924
Revised 1924
Edition N/A
Copyright N/A
Levelled N/A

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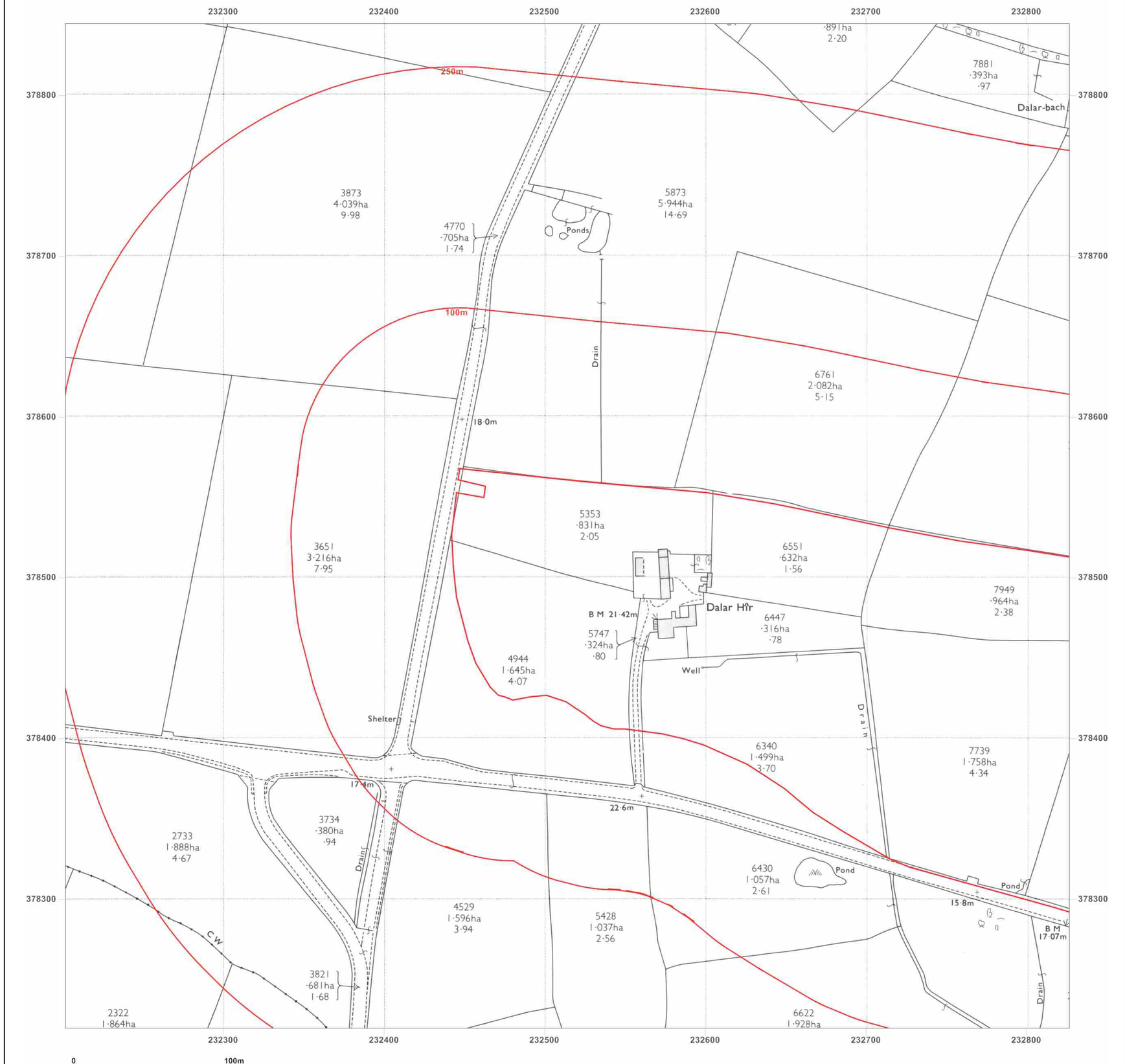
Production date: 03 August 2015

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_2
Grid Ref: 232514, 378532

Map Name: National Grid

Map date: **1973**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1973
Revised 1973
Edition N/A
Copyright 1974
Levelled 1960

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Production date: 03 August 2015

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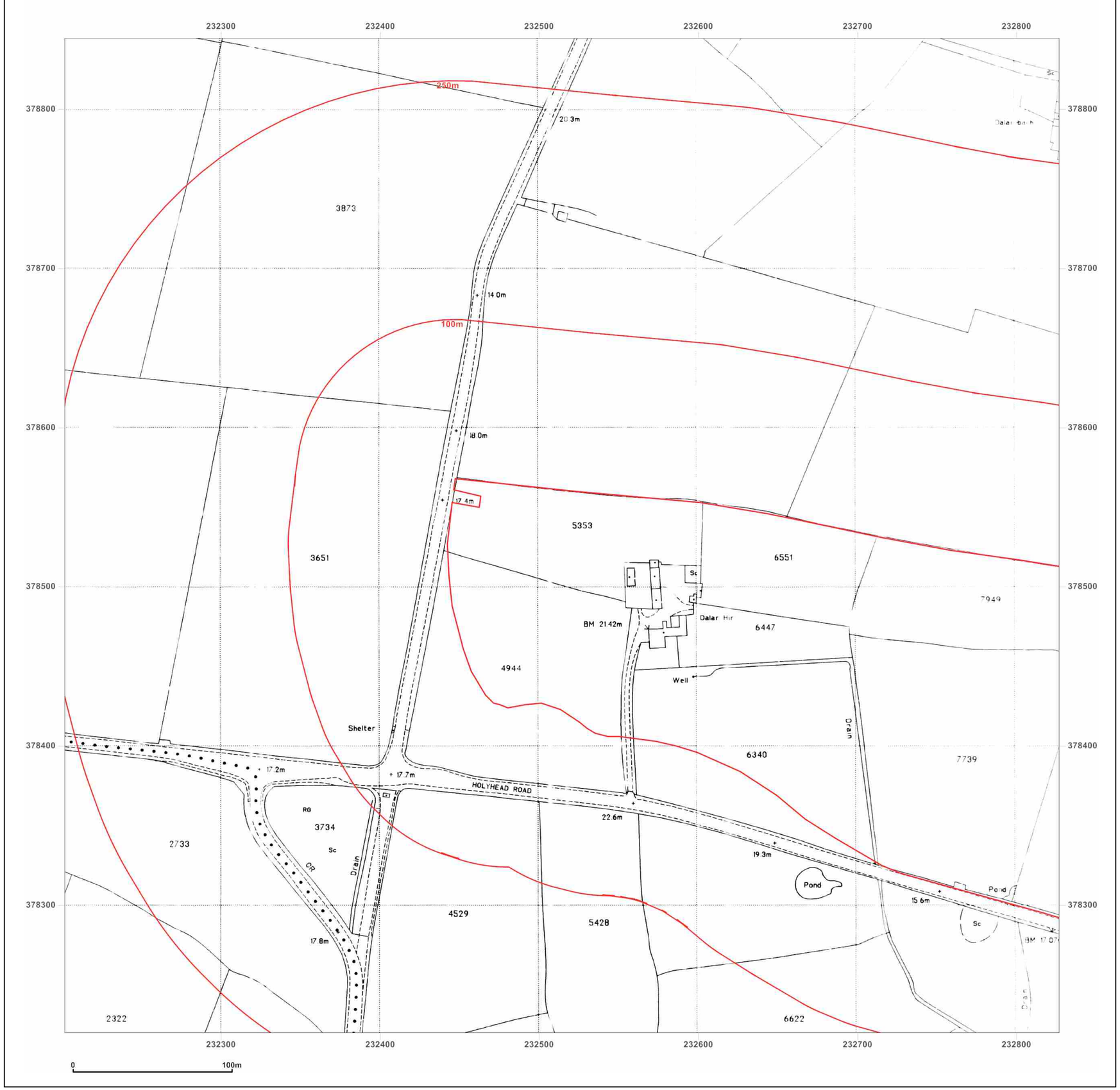

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_2_2
Grid Ref: 232514, 378532

Map Name: National Grid

Map date: **1995**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
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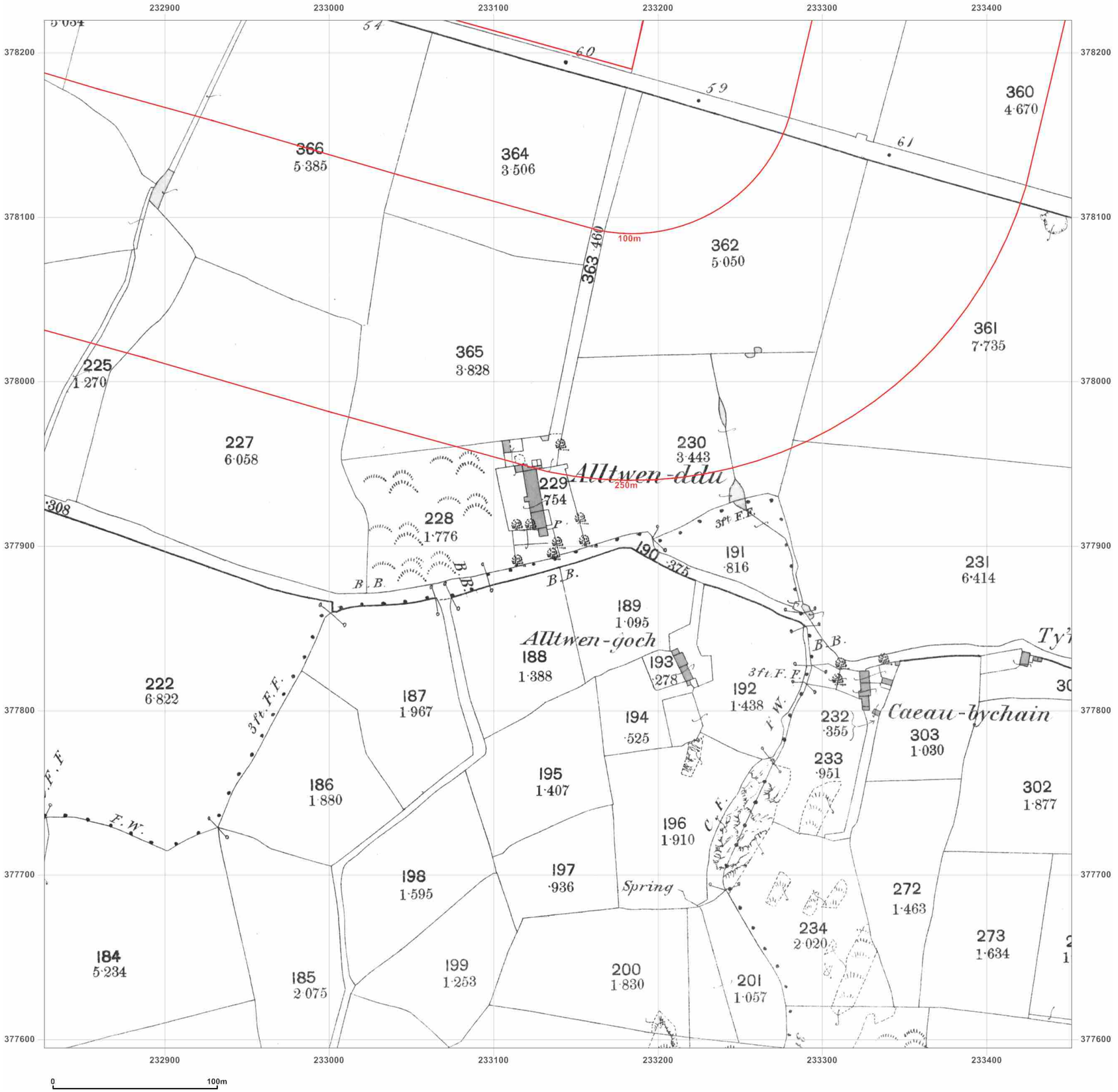

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_3_1
Grid Ref: 233139, 377907

Map Name: County Series

Map date: **1888**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1888
Revised 1888
Edition N/A
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Levelled N/A

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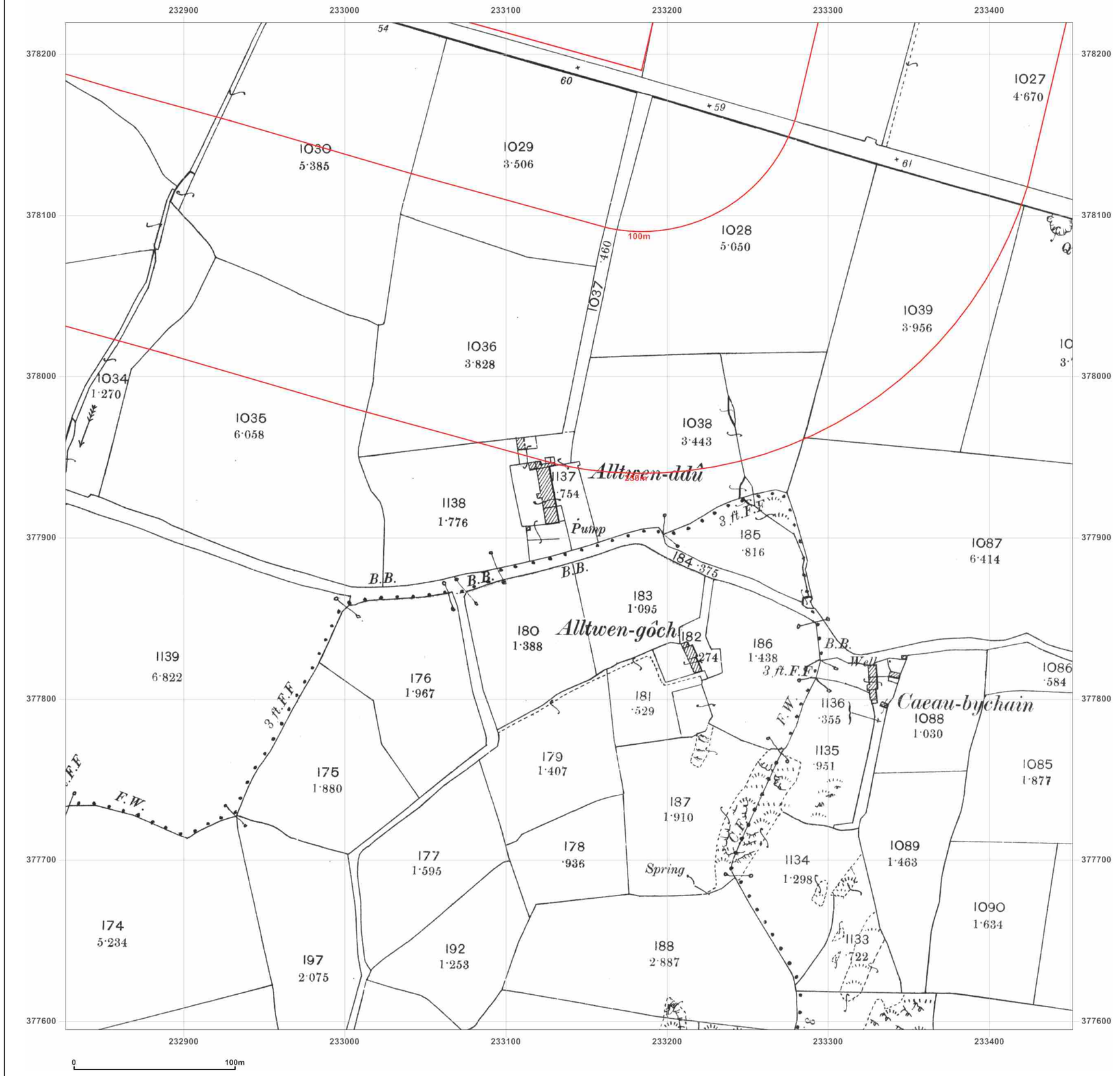

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Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_3_1
Grid Ref: 233139, 377907

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
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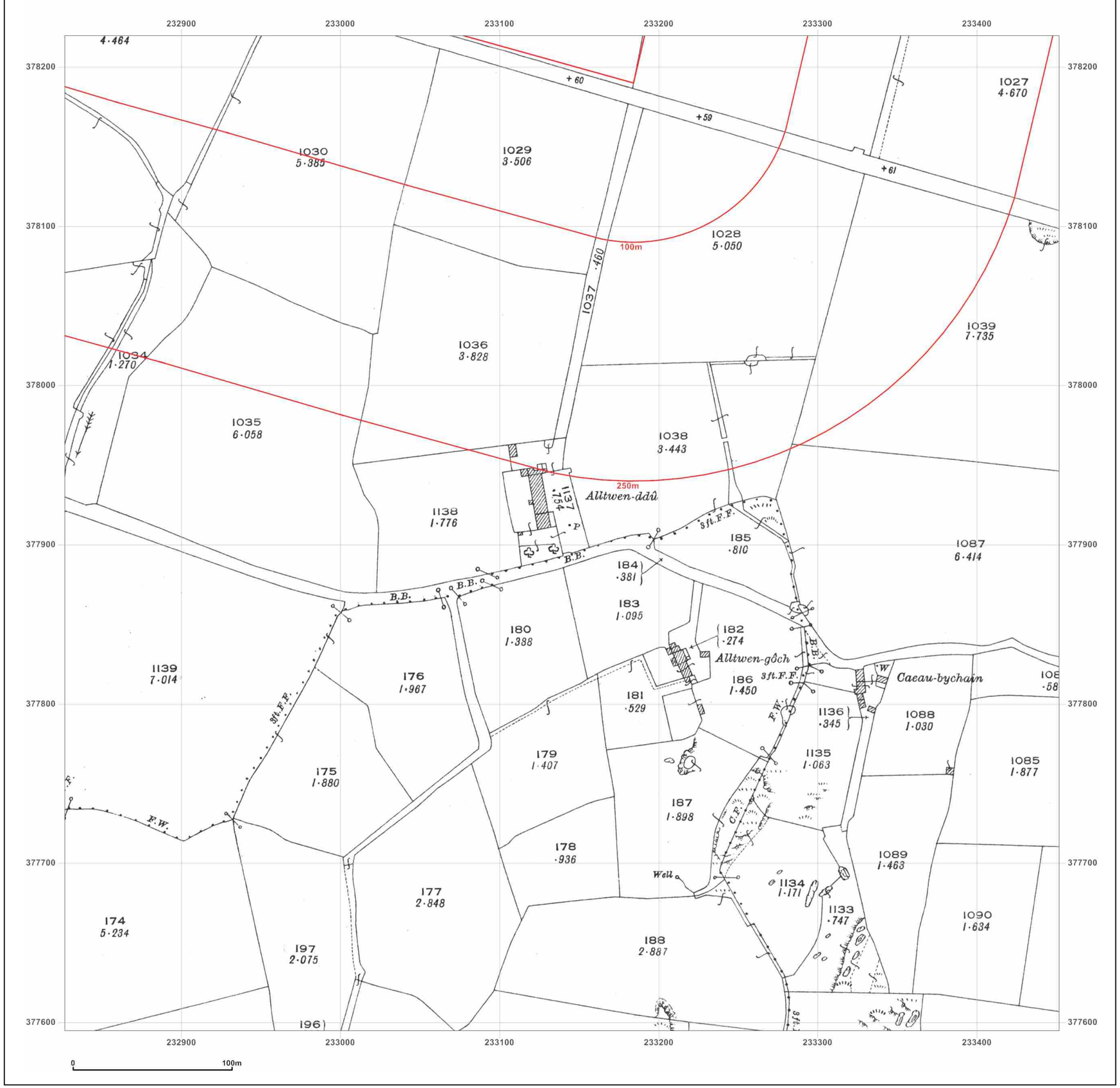

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_3_1
Grid Ref: 233139, 377907

Map Name: County Series

Map date: **1924**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1924
Revised 1924
Edition N/A
Copyright N/A
Levelled N/A

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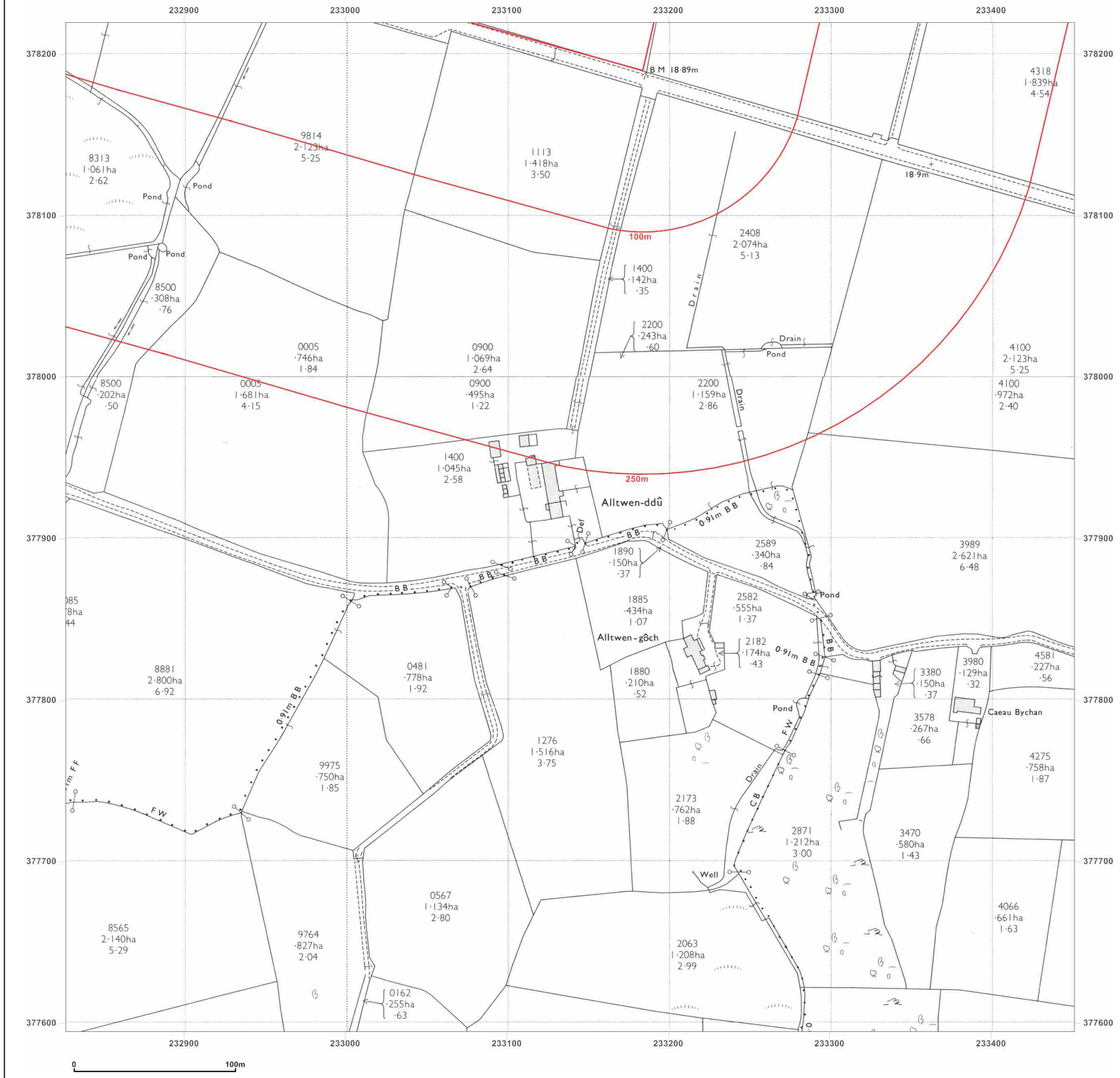

Groundsure INSIGHTS

Site Details:

Dalar Hir

Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_3_1
Grid Ref: 233139, 377907

Map Name: National Grid

Map date: **1973**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1973
Revised 1973
Edition N/A
Copyright 1974
Levelled 1960

Surveyed 1973
Revised 1973
Edition N/A
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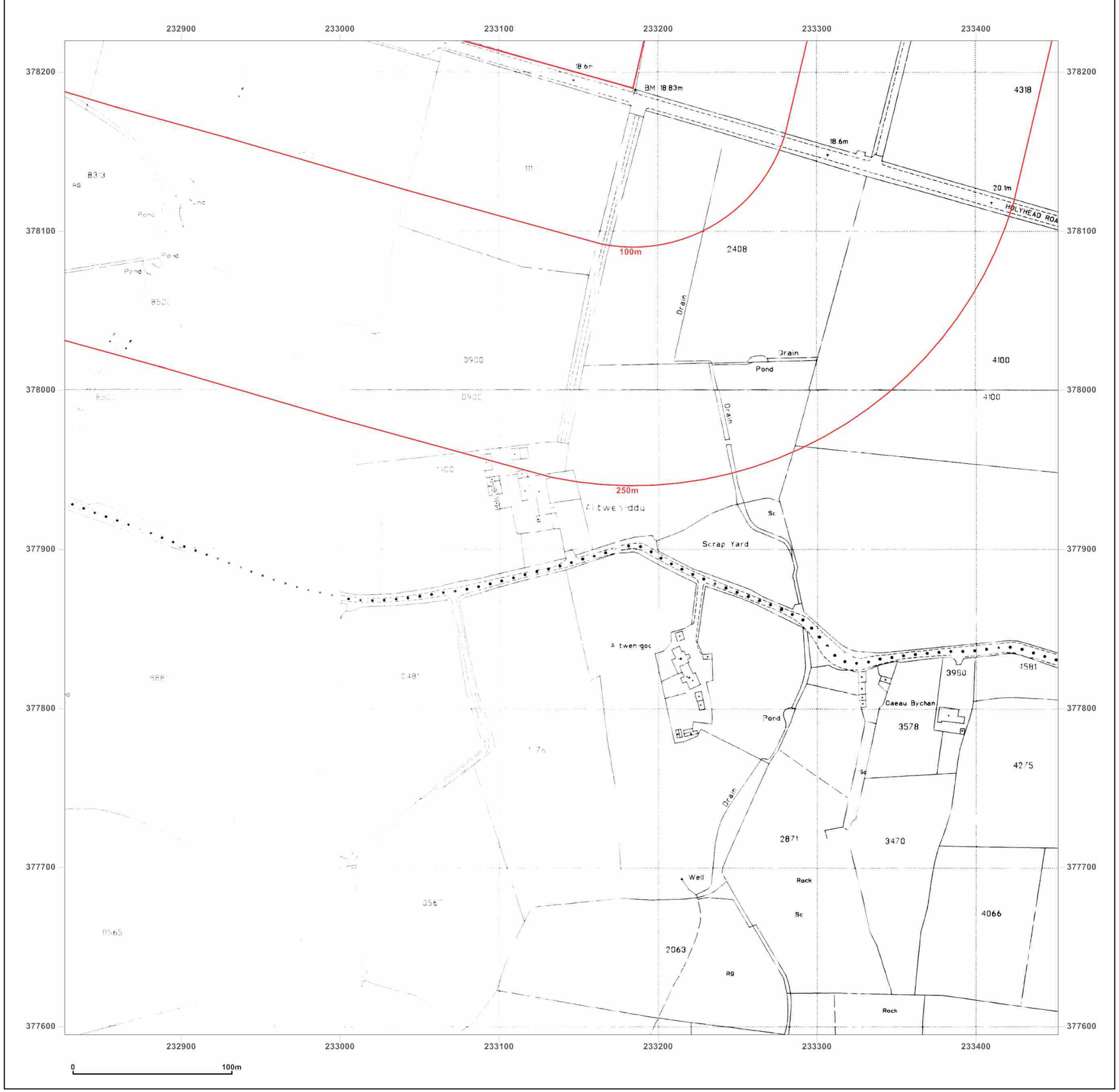

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Grid Ref: 233139, 377907

Map Name: National Grid
Map date: **1995**
Scale: 1:2,500
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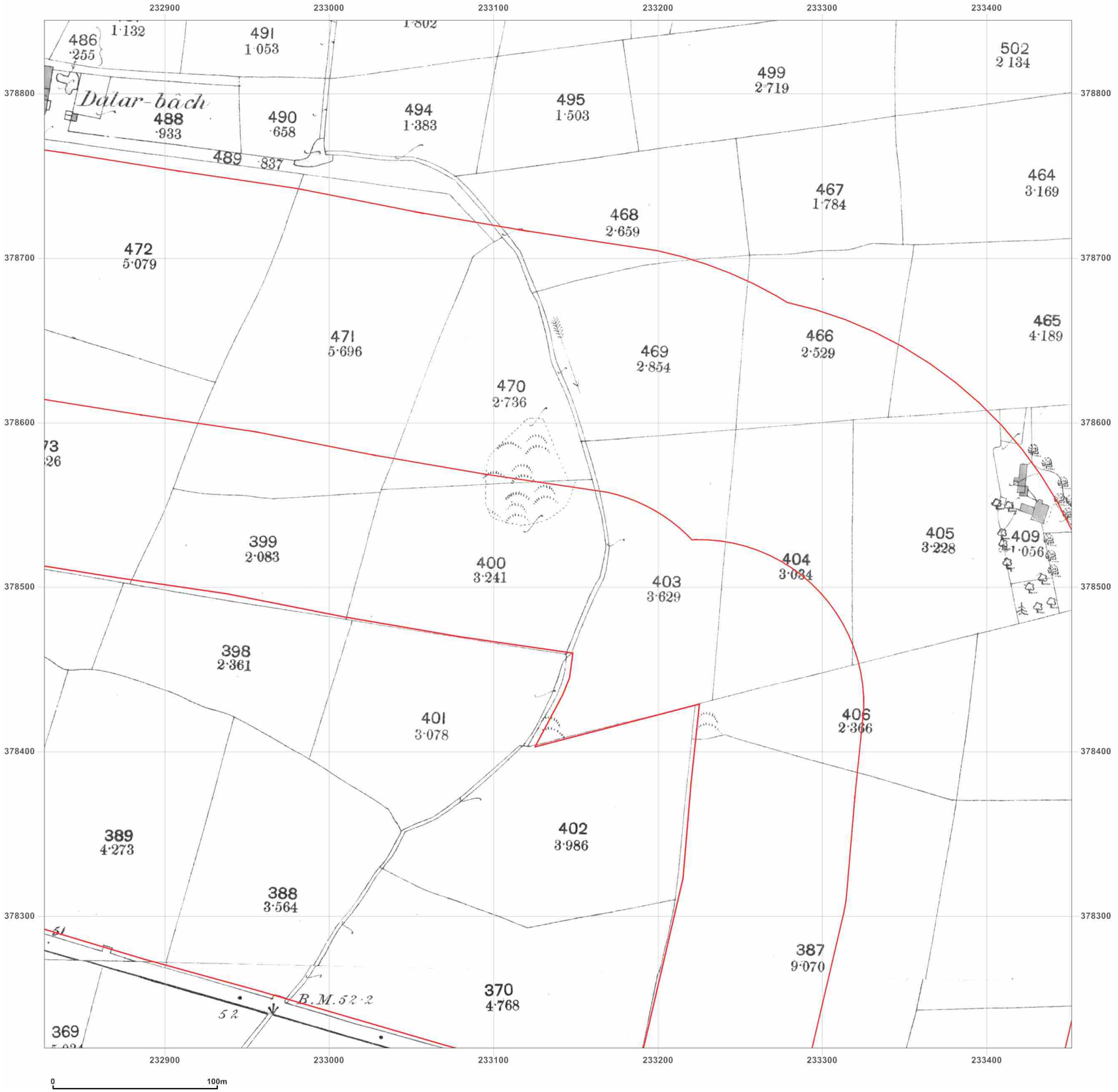

Groundsure INSIGHTS

Site Details:

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Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_3_2
Grid Ref: 233139, 378532

Map Name: County Series

Map date: **1888**

Scale: 1:2,500

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Revised 1888
Edition N/A
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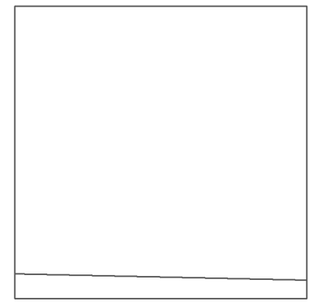

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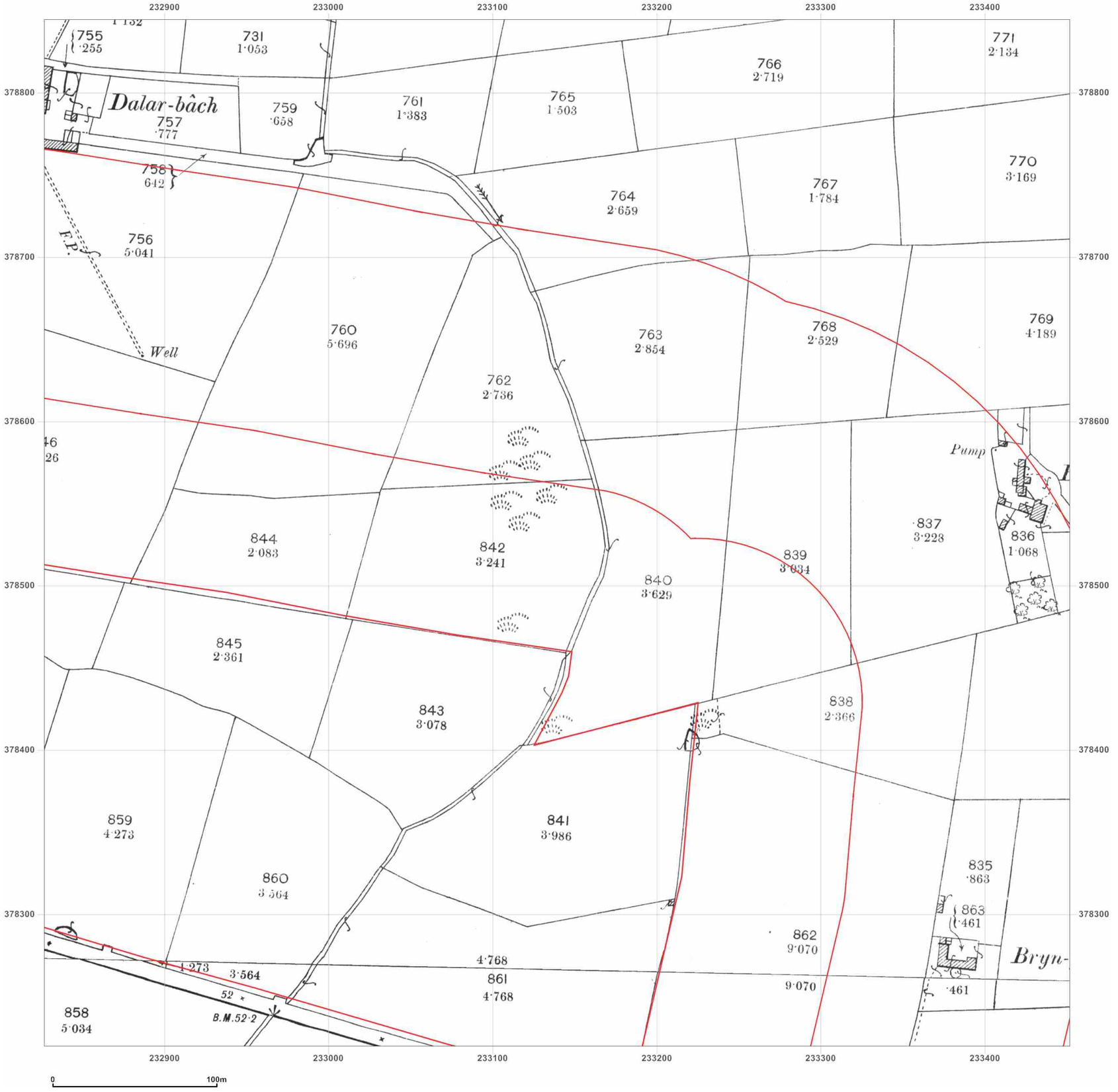

Groundsure INSIGHTS

Site Details:

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Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_3_2
Grid Ref: 233139, 378532

Map Name: County Series
Map date: **1900**
Scale: 1:2,500
Printed at: 1:2,500

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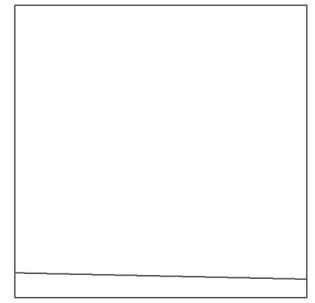
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A



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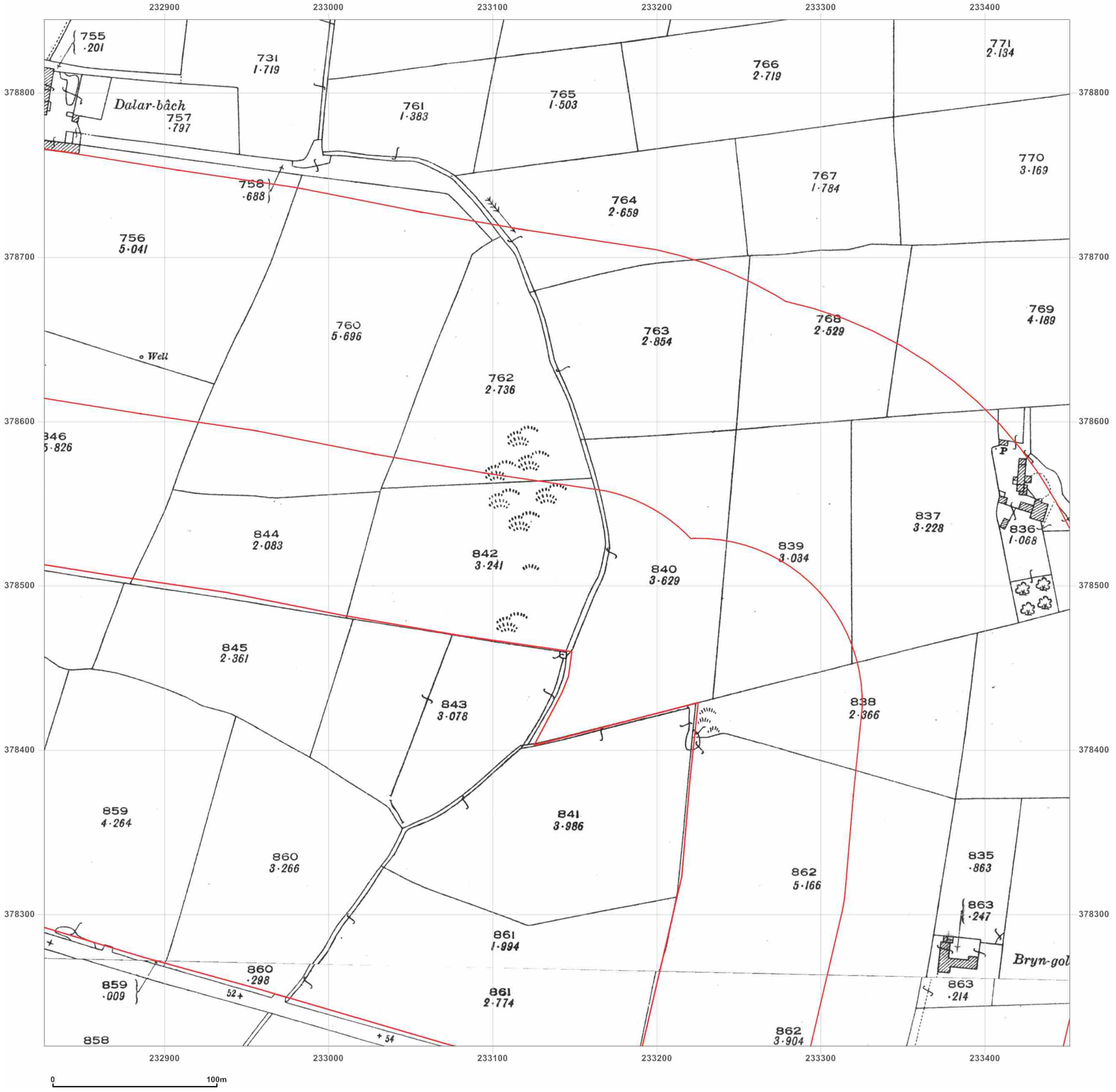

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Site Details:

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Client Ref: Jacobs_Engineering_60PO804200000001
Report Ref: GS-2319785_LS_3_2
Grid Ref: 233139, 378532

Map Name: County Series
Map date: **1924**
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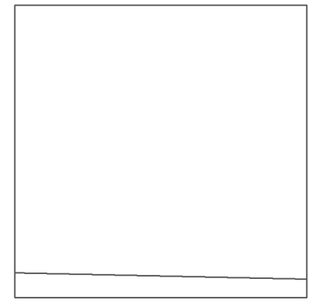

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Site Details:

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Report Ref: GS-2319785_LS_3_2
Grid Ref: 233139, 378532

Map Name: National Grid

Map date: **1973**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1973
Revised 1973
Edition N/A
Copyright 1974
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Report Ref: GS-2319785_LS_3_2
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Map Name: National Grid
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Edition N/A
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Edition N/A
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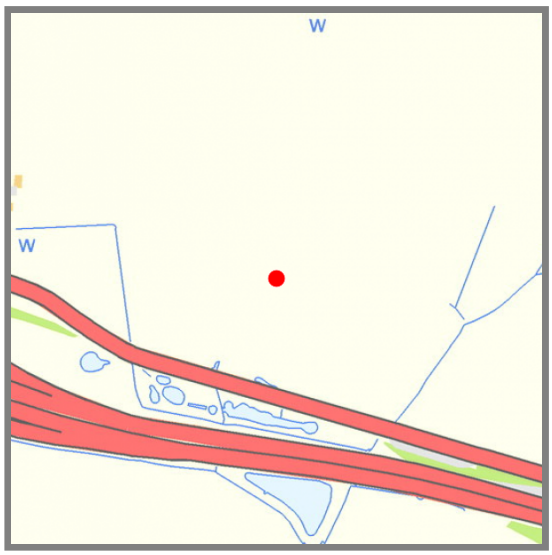
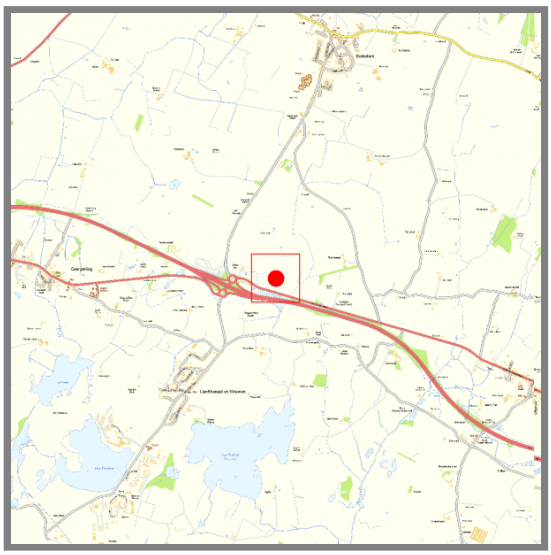
Appendix E. Preliminary Unexploded Ordnance Risk Assessment

BombRisk.com BACTEC | Globally Trusted Locally Dependable

Preliminary Unexploded Ordnance Risk Assessment





Project: **Dalar Hir**

Groundsure Ref: GS-2753074

FIND PROFESSIONAL MAPPING INTELLIGENCE

Groundsure LOCATION INTELLIGENCE

BACTEC a Dynasafe Group Company

Report prepared by BACTEC International Limited and FIND Mapping Limited for Groundsure Limited

Report reference: 501656

Preliminary Unexploded Ordnance Risk Assessment

in respect of

Dalar Hir

Contents

1. Introduction

Established in 1991, BACTEC International Limited supports the UK construction industry by assessing the risk of encountering items of unexploded ordnance (UXO) during intrusive works. BACTEC's specialist advice provides essential information for risk assessment, improves safety, enhances reputation and helps contractors to avoid costly delays.

The risk of encountering UXO on most sites in the UK is low. However, where a site is at increased risk it will be necessary to take measures to mitigate that risk. The factors affecting risk assessment are based upon the history and previous usage of a site and its surroundings.

In 2009, the Construction Industry Research and Information Association (CIRIA) established a set of guidelines to assist industry professionals. CIRIA recommends a four stage risk management process:

- Preliminary risk assessment
- Detailed risk assessment
- Risk mitigation
- Implementation

The preliminary risk assessment enables a non-UXO specialist to place a site in context and to identify where a more detailed assessment is necessary. The assessment is based upon data obtained from desktop reviews of the site's history and its proximity to potential indicators for UXO contamination.

There are two principal sources of UXO risk within the UK:

- Ministry of Defence (MoD) activities
- Bombs and projectiles from WWI and WWII

MoD activities include munitions deposited during training exercises, munitions dumped or disposed of ineffectively, Allied wartime activities, defensive installations etc.

- Abandoned Bombs
- Historic Army Camps
- Army Explosive Ordnance Clearance Tasks/Recces
- Bombing Decoy Sites
- Heavy Anti-Aircraft Batteries
- Military Airfield Sites

- Press Articles regarding UXO Finds
- Military Training Areas and Firing Ranges
- BACTEC Desk-top Threat Assessments
- Prisoner of War Camps
- Sites related to the Manufacture of Explosives and Explosive Ordnance
- BACTEC Unexploded Ordnance
- WWII Bombing Density
- WWII Defence Related Positions & Pillboxes
- Pipe Mined WWII Airfields
- Miscellaneous WWII Pipe Mined Locations
- BACTEC On-Site Support Services

Established in 2006, FIND Maps Limited is a pioneering web mapping and spatial data technology company offering online mapping and consultancy services.

www.findmaps.co.uk is an excellent example of what FIND can deliver. The portal currently provides detailed mapping and a wealth of data sets to hundreds of the UK's top property, environmental and design/build companies.

FIND's consultancy services provide bespoke internet mapping solutions to a range of businesses, enabling them to manage their spatial data more effectively.

While working closely with a wide range of reputable data providers including Ordnance Survey and the Environment Agency, FIND works independently of these organisations. A similar arm's-length relationship is maintained in terms of software and hardware providers. This enables the team at FIND to offer truly independent advice.

Methodology

BACTEC and FIND have compiled a geo-referenced database of potential sources of UXO risk within the UK. From this information a range of risk zones have been defined. The weighting of these zones is based upon the influence of all relevant factors. An airfield, for example, has a far greater zone of influence than a single anti-aircraft battery.

An online preliminary automated UXO risk assessment will determine the potential level of UXO risk relating to a site. The assessment will list all factors contributing to this weighting. Importantly, it will also give appropriate recommendations for further action where this is indicated.

2. Search Results

Within 10km of the site the following potential sources of explosive ordnance have been recorded:

Source	Number within 10km
Military Airfield Sites	2
WWII Defence Related Positions & Pillboxes	17
Historic Army Camps	1
Military Training Areas and Firing Ranges	1
Army Explosive Ordnance Clearance Tasks/Reccess	3
Sites Related to the Manufacture of Explosives and Explosive Ordnance	1
BACTEC Desk-top Threat Assessments	1
Bombing Decoy Sites	None recorded
Abandoned Bombs	None recorded
Press Articles regarding UXO Finds	None recorded
Prisoner of War Camps	None recorded
Heavy Anti-Aircraft Batteries	None recorded
Pipe Mined WWII Airfields	None recorded
Miscellaneous WWII Pipe Mined Locations	None recorded
BACTEC Unexploded Ordnance Finds	None recorded
BACTEC On-Site Support Services	None recorded

None of these sources are deemed significant enough to be a risk and therefore do not warrant further research.

3. Conclusions

Risk levels - British unexploded ordnance

Negligible

There are no potential sources of UXO recorded in BACTEC's historical database in close proximity to the site. If there is any empirical evidence of actual or potential contamination, BACTEC should be contacted for advice. Otherwise, the risk on site from UXO is considered to be Negligible.

Risk levels – UXB based on bombing density

Negligible

Historical records indicate a negligible level of bombing density from WWII. If there is empirical evidence of UXB risk (i.e. anecdotal evidence) then please contact BACTEC for further advice.

This preliminary assessment has identified a Negligible risk from air-delivered unexploded bombs at this site.

Highest overall risk and recommendation

Negligible

This preliminary assessment has resulted in an overall Negligible risk from UXO. Unless any empirical evidence of actual or potential UXO contamination is available, BACTEC recommend no further action on this site, however, it would be prudent to consider an Explosive Ordnance Safety Awareness briefing provided by a suitably experienced UXO Specialist.

Risk of UXO based on bombing density

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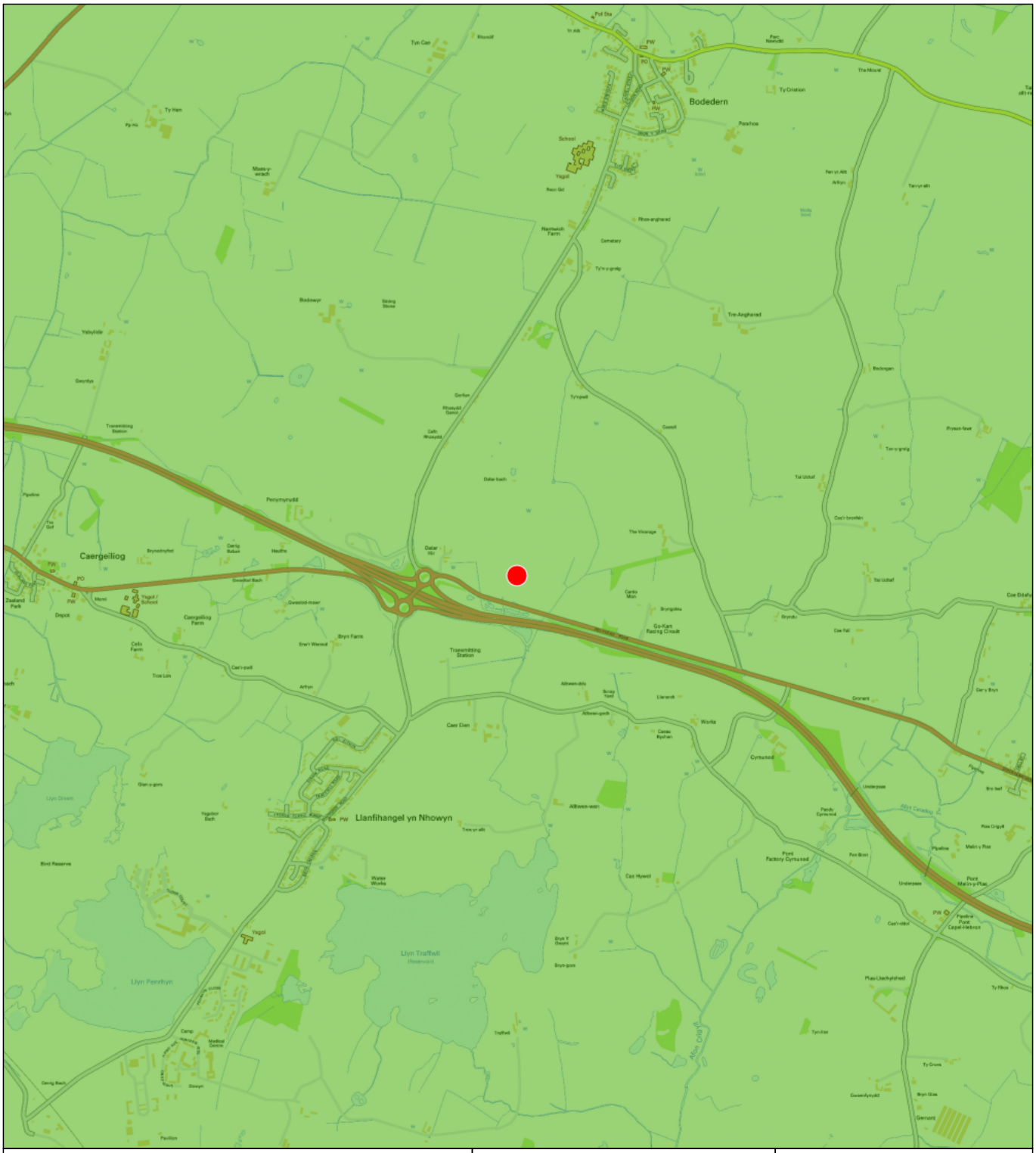

Map data

FIND
PROFESSIONAL MAPPING INTELLIGENCE

BACTEC
a Dynasafe Group Company

BombRisk.com

- Negligible
- Low
- Medium
- High

Report reference: 501656

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