PHASE 1 CONTAMINATED LAND ASSESSMENT

ALTCAR MOSS, WEST LANCASHIRE

For

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PHASE 1 CONTAMINATED LAND RISK ASSESSMENT
ALTCAR MOSS, WEST LANCASHIRE

NON-TECHNICAL SUMMARY

Envireau Water has been commissioned by Aurora Energy Resources Limited (AER) to prepare a Phase 1 contaminated land risk assessment for their proposed for a Proposed Development at their Altcar Moss (AM) well site at Altcar Moss, Sutton's Lane, Great Altcar, West Lancashire ("the Site"). The Site is located in Petroleum Exploration and Development Licence (PEDL) 164.

AER proposes to develop the Site for use as a compound for exploratory hydrocarbon drilling and associated hydraulic fracturing and, depending on the results of the exploration, either abandonment and reinstatement of the Site or commercial production subject to further planning permissions.

Currently, the Site comprises intensively cultivated agricultural land. Surrounding land use is agricultural. There are numerous engineered field drainage channels which depress shallow groundwater levels. A nearby surface water pumping station is managed by the Environment Agency.

Historical land use at the Site has been agricultural and the Site is undeveloped. Historical land use in the surrounding area has been agriculture.

The Site is underlain by superficial deposits which are classified as an 'Unproductive' aquifer which is underlain by a ~250m thickness of Mercia Mudstone Group mudstones with a low water resource value and which is classified as a 'Secondary B' aquifer.

Based on the findings of the desk-based assessment and site walkover, the following potential sources of contamination were identified from current or historical uses of the Site and surroundings:

- Naturally occurring hydrocarbons from the Formby Oilfield close to the Site;
- Natural ground gases from superficial deposits at and close to the Site;
- Contaminated soils associated with a disused railway corridor and diffuse contamination from surrounding agricultural land.

The preliminary Conceptual Site Model indicates that a number of plausible Source-Pathway-Receptor (S-P-R) linkages exist at the Site based on current land use and the Proposed Development. However, a qualitative risk assessment has shown that:

- The S-P-R linkages identified are unlikely to present a significant risk or would lead to the Site being designated as contaminated land under Part 2a of the Environmental Protection Act 1990, based on the current land use; and
- When taking in to consideration existing Site conditions and the Proposed Development, there is an overall Low to Very Low risk to the identified receptors which include the atmosphere, human health and controlled waters.

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PHASE 1 CONTAMINATED LAND RISK ASSESSMENT

ALTCAR MOSS, WEST LANCASHIRE

1 INTRODUCTION

Envireau Water has been commissioned by Aurora Energy Resources Limited (AER) to prepare a Phase 1 contaminated land risk assessment to support a planning application for a Proposed Development at their Altcar Moss (AM) well site at Altcar Moss, Sutton's Lane, Great Altcar, West Lancashire ("the Site"). The Site is located in Petroleum Exploration and Development Licence (PEDL) 164.

1.1 Background

The Proposed Development comprises the construction of a new well site and access track, and the drilling of two exploratory wells to evaluate the hydrocarbon potential from the Carboniferous-age Bowland Shale and Hodder Mudstone sequence. A vertical well will be drilled and cored to a depth of approximately 3,000 metres True Vertical Depth (mTVD) followed by the drilling of a second well with a horizontal section approximately 1,500m in length.

Both wells will be hydraulically fractured and flow tested. If the exploratory works are unsuccessful, both boreholes will be decommissioned and abandoned, and the Site restored. If successful, then any future works would be the subject of a separate planning application.

1.2 Report Context

This contaminated land risk assessment has been prepared following the principles described in Part 2A of The Environmental Protection Act 1990, the Environment Agency 'Model Procedures for the Management of Land Contamination', CLR11. 2004 and the National Planning Policy Framework (NPPF).

The principal objectives of this assessment are to:

- Develop a preliminary conceptual model for the Site;
- Identify potential ground contamination constraints associated with the proposed use of the Site for exploration drilling;
- Assess risks to human health, controlled waters and other potential receptors; and
- Provide recommendations on an appropriate scope of further assessment, if required.

The assessment is supported by data from an Envirocheck report (Appendix A) and intrusive ground investigation reports for the Site (Appendix B) produced by Opus in 2017. Both of these information sources have been cross referenced and supplemented where necessary with reference to other data sources.

Envireau Water has produced a flood risk assessment (FRA), hydrogeological risk assessment (HRA) and a groundwater monitoring plan (GMP) for the Proposed Development [Ref.1, 2 & 3], which should be read in conjunction with this report. The technical assessments produced by Envireau Water are intended to form technical appendices to an Environmental Impact Assessment (EIA) being prepared by others that will be submitted to the local Mineral Planning Authority (MPA) as part of the planning application.

2 SITE DESCRIPTION

2.1 Location and Topography

The Site is located approximately 1km north of the village of Great Altcar and approximately 2km east of the outskirts of the town of Formby. The coastline is approximately 6km to the west of the Site.

The historic Formby Oilfield is located approximately 1km northwest of the Site. The presence of oil was noted from seeps at ground surface although the oilfield was formally identified in 1939 and commercially exploited until 1965. The location of the Formby Oilfield is shown on Figure 1.

The Site is rectangular in shape and covers approximately 1.73ha of land, including the well site and access track. The centre of the Site is at approximately NGR SD 32685 07530 and is at an elevation of approximately 2m above Ordnance Datum (AOD). The surrounding land is relatively flat lying, rising to 10mAOD approximately 2km southeast of the Site at New Hill House.

The Site will be accessed by a private road off Sutton's Lane. The access route is presented on Figure 1.

2.2 Proposed Development

The Proposed Development would comprise several phases and involves the construction of a site compound and access track, the drilling and coring of a vertical borehole and the drilling of a horizontal borehole to evaluate hydrocarbon resources, subsequent hydraulic fracture stimulation and testing and, depending on the results of the exploration, either abandonment and reinstatement of the Site or further works subject to further planning permissions.

The construction activities at the Site are described in more detail in the HRA [Ref.2] and fully in Chapter 4 of the Environmental Statement.

2.3 Land Use

2.3.1 Current Land Use

The Site is located in a rural location and comprises agricultural land, with surrounding land predominantly used for agriculture. Sutton's Lane borders the south-eastern boundary of the Site. Surrounding land use is agricultural, comprising arable fields and woodland. The closest residential dwellings are located at Tyrer's Farm and Formby's Farm, both located approximately 1km southwest of the Site.

2.3.2 Historical Land Use

A summary of the historical land use of the Site and its immediate surroundings, taken mainly from historical Ordnance Survey maps, is presented in Table 1. Historical maps of the Site have been obtained from an Envirocheck report (Appendix A). The ground investigation report (Appendix B) describes the Site as being agricultural land.

Table 1 Summary of Historical Land Use at the Site and Surroundings

Map Date	Site Features and Land Use	Surrounding Land Use
1847 - 1849	Site at northeast end of Sutton's Lane (track). On agricultural land overlaying three different fields.	Agricultural fields and drainage systems surround the Site. The New Cut (beck) located approximately 0.2km northwest. New Cut "dog-legs" 0.5km northeast of the Site, one section runs in a northeast-southwest orientation and the other section runs in a northwest-southeast orientation. The village of Great Altcar is located approximately 1km south of the Site.
1894	No change.	Cheshire Lines Brook is now present, runs in a northwest-southeast orientation, approximately 0.8km northeast of the Site at its closest. Running parallel to the Cheshire Lines Brook is a railway line. The Barton & Halshall Station is present along this railway line approximately 0.9km north of the Site. Moss plantation of rough pasture and mixed woodland expanded, located at its closest 0.6km west of the Site.
1909	No change.	No change.
1928	Five fields on and around the Site merged in to two larger fields.	Pumping station along Downholland Brook now present, located approximately 1.2km north of the Site.
1955	No change.	No change.
1974	No change.	Railway running parallel to Cheshire Lines Brook no longer present. Electricity transmission line with pylon, flare stack or lighting tower runs with a general west-east orientation. At its closest approximately 0.1km south of the Site. Moss Plantation split in to Moss Heath (northern department) and Moss Wood (southern department).
1993, 1999, 2006, 2018	No change.	No change.

2.4 Soils

The ground investigation report (Appendix B) describes the soil profile at the Site as follows:

- 0.2m to 0.3m thick topsoil comprising clayey sand and clayey gravelly sand; underlain by
- 0.55m to 1.45m thick alluvium comprising soft clay with varying proportions of silt and sand, as well as clayey sand, down to 1.7m below ground level (mbgl); underlain by
- 0.2m to 1.35m thick peat comprising plastic pseudofibrous peat with varying proportions of clay and sand, down to 2.6mbgl; underlain by
- 0.15m to 2.8m thick Downholland Silt comprising soft to very soft clay with varying proportions of silt and sand, down to 1.5 to 4.7mbgl; underlain by
- 0.3m to 5.5m thick Shirdley Hill Sand Formation comprising very loose to very dense sand with varying proportions of clay and silt, down to 7mbgl.

No Glacial Till or bedrock (Mercia Mudstone Formation) was encountered in any of the exploratory hole locations.

The above description of the soils at the Site is broadly consistent with the description from the LandIS Soilscapes website, developed by Cranfield University (accessed on 07/09/2017 [Ref. 4]) which describes two soil types at the Site:

- The soils in the eastern part of the Site are described as 'fen peat soils' with a 'peaty texture' and are 'naturally wet'. The soils are described as draining to 'local groundwater'. As a result of the naturally wet conditions 'cultivated soils are drained. Shallow groundwater and marginal ditches to most fields mean that the water resource is vulnerable to pollution from nutrients applied to the land. Drainage of peat containing sulphides will release extremely acid drainage water' [Ref. 4].
- The soils in the western part of the Site are described as 'loamy and sandy' with a 'peaty surface' and 'with naturally high groundwater' and are 'naturally wet'. The soils are described as draining to the 'local shallow groundwater'. As a result of the naturally wet conditions and high groundwater levels the 'soils are mostly drained. Shallow groundwater and marginal ditches to most fields mean that the water resource is vulnerable to pollution from nutrients, pesticides and wastes applied to the land' [Ref. 4].

The ground investigation report (Appendix B) presents results of soil chemistry samples taken from windowless sample probeholes in an area immediately northeast of the Site and which are considered to be representative of the soil at the Site due to the comparable nature of the material. The report notes that the soils are rich in organic content (up to 73%). This high organic content is expected given the Site's agricultural setting and peaty deposits present in the surrounding area. A complete set of soil chemistry analytical results are presented in Appendix B and summarised in Table 2.

The soil chemistry analytical results have been compared to the background soil concentration ranges of metals in soils estimated by the British Geological Survey (BGS) (Appendix A) and summarised in Table 2. The data presented in Table 2 show that the observed range in concentration of substances are consistent with the ranges estimated by the BGS.

The local area is known for its naturally occurring shallow hydrocarbon deposits and oil seeps at ground surface. Background concentrations of hydrocarbons are observed in the soils at the Site however, none of the compounds listed in Table 2 exceeded the Opus Tier 1 soil screening values.

Table 2 Summary of BGS Estimated Soil Geochemistry and Observed Soil Geochemistry at the Site

Substance	BGS Estimated Concentration in soil	Observed Range of Concentrations in soil
Arsenic (mg/kg)	15 - 25	5 - 32
Cadmium (mg/kg)	<1.8	<1
Chromium (mg/kg)	60 - 90	10 - 48
Lead (mg/kg)	<100	6 - 65
Nickel (mg/kg)	15 - 30	10 - 39
Copper (mg/kg)	Not estimated	6 - 29
Vanadium (mg/kg)		12 - 71
Barium (mg/kg)		19 - 76
Zinc (mg/kg)		23 - 95
Organic matter (%)		1.1 - 73
Sulphate (SO_4) (Extraction 2:1) (mg/l)		<10 - 690
Salinity (%)		1.8 – 2.3
pH		<4 – 7.7
TPH (C10-C12 Aliphatic) (mg/kg)	Not estimated	4
TPH (C12-C16 Aliphatic) (mg/kg)		6 - 22
TPH (C16-C21 Aliphatic) (mg/kg)		1 - 94
TPH (C21-C35 Aliphatic) (mg/kg)		2 - 95
TPH (C8-C10 Aromatic) (mg/kg)		0.13
TPH (C10-C12 Aromatic) (mg/kg)		12
TPH (C12-C16 Aromatic) (mg/kg)		2 - 40
TPH (C16-C21 Aromatic) (mg/kg)		3 - 27
TPH (C21-C35 Aromatic) (mg/kg)		1 - 93

2.5 Geology

The geological sequence at the Site is described in detail in the HRA for the Proposed Development [Ref.2] and is summarised in Table 3.

Table 3 Summary of Geology at the Site

Geological Stratum	Description	Thickness	Aquifer Designation
Alluvium	Clay, silt, sand and gravel	1.5m	Unproductive
Peat	Organic-rich clay	0.5m	
Downholland Silt (historically named "Scrobicularia Clay")	Silt, silty clay and some sand beds.	5m	
Shirdley Hill Sand Formation	Sand with peat layers		
Glacial Till ("Boulder Clay")	Diamicton.	11m	
Sidmouth Mudstone Formation (Keuper Marl), Mercia Mudstone Group	Silty mudstones, siltstones and some sandstones.	250m	Secondary "B" aquifer
Tarporley Siltstone Formation (Keuper Waterstones), Mercia Mudstone Group	Micaceous siltstones and mudstones interbedded with fine sandstones.	47m	Secondary "B" aquifer

Geological Stratum	Description	Thickness	Aquifer Designation
Helsby Sandstone Formation (Keuper Sandstone, Ormskirk Sandstone), Sherwood Sandstone Group.	Sandstone with occasional siltstone and mudstone.	270m	Principal aquifer
Wilmslow Sandstone Formation (Bunter Formation, Bunter Sandstone/Upper Mottled Sandstone), Sherwood Sandstone Group.	Sandstone with mudstone interbeds.	200m	Principal aquifer
Chester Formation (Bunter Pebble Beds), Sherwood Sandstone Group.	Sandstone with pebbles.	200m	Principal aquifer

The Site lies on a downfaulted block bounded by the Hillhouse Fault to the northeast and the Ince Blundell Fault to the southwest. Summary details of the fault zones are as follows:

- Hillhouse Fault zone - The fault is mapped 200m to the northeast of the Site on the Formby BGS map sheet [Ref. 5], which also shows the fault trending northwest-southeast and having a normal displacement, downthrowing the strata to the southwest. However, resistivity tomography data obtained by AER suggests that the Hillhouse Fault passes further to the east of the Site and has an orientation closer to north-south.
- Ince Blundell Fault zone - The fault is mapped as dying out ~800m to the northeast of the Site on Formby BGS map sheet [Ref. 5], which also shows the fault trending northwest-southeast and having a normal displacement, downthrowing the strata to the northeast by around 80-90m. Resistivity tomography data obtained by AER suggests that the Ince Blundell Fault is present approximately 600m west of the Site.

2.6 Hydrogeology and Hydrology

The hydrogeology and hydrology of the Site is presented in detail in the HRA for the Proposed Development [Ref.2] and is summarised in Table 4.

The Site is situated in a low-lying floodplain. Water is actively drained and managed by a local network of arterial drainage dykes and pumping stations managed by the Environment Agency.

The general flow direction of the main surface water drainage channels is south-westerly with minor engineered drainage channels showing varying flow directions. The minor drainage channels surrounding the Site show that surface water flow is generally towards the northeast towards the New Cut Pumping Station (Figure 2). Water is pumped into the Cheshire Lines Brook, which drains to the Downholland Brook that flows west towards the sea.

As long as surface water levels continue to be managed by the New Cut Pumping Station, surface water flows in proximity of the Site will continue to be towards the northeast. As a consequence, shallow groundwater flows which are locally influenced by the drainage channels in the immediate surroundings of the Site, are highly likely to be towards the northeast and the New Cut Pumping Station.

The available groundwater level data, the presence of numerous field drains and the natural low-lying topography all indicate that groundwater is found at shallow depths over much of Altcar Moss. There are likely to be varying potentiometric surfaces and perched groundwaters in the superficial deposits on account of their variable nature.

The water level information obtained from the ground investigation undertaken by Opus in October 2017 (Appendix B) at the Site indicates that groundwater strikes were encountered from 0.8mbgl in some exploratory holes although some of the exploratory holes were noted to be wet from 2 to 3mbgl. Groundwater monitoring at the Site shows that over a 2 week period groundwater levels were between 0.8 and 0.7mbgl. Overall, groundwater levels (and flow) within the superficial deposits are understood to be lowered by the pumped drainage system.

Table 4 Summary of Hydrogeology and Hydrology at the Site

Descriptor	Notes
Groundwater recharge	Recharge to the more permeable horizons within the superficial deposits will be via direct infiltration from surface, however recharge is expected to be limited as the superficial deposits are already largely saturated, have permeable horizons of limited lateral extent and are surrounded by lower permeability clay.
Anticipated groundwater depth	Groundwater elevation is expected to be between 1mAOD to -1mAOD beneath the Site (1mbgl to 3mbgl depending on location, based on current ground levels and exploratory hole water strike information).
Groundwater flow direction	Overall, groundwater flow within the superficial deposits is expected to be towards the southwest which is the general flow direction of surface water drainage in the area. Groundwater flow direction is highly likely to vary on a very localised basis due to the pumped drainage system.
Aquifer designation - superficial deposits	The Site is underlain by soils, peat, silt, clay and sand that are classed as Unproductive.
Aquifer designation - bedrock	The Site is underlain by a Secondary "B" aquifer (Sidmouth Mudstone Formation, part of the Mercia Mudstone Group).
Hydraulic description - superficial deposits	The more permeable horizons within the superficial deposits, e.g. the sands, are likely to support a shallow groundwater system that is connected to and supports field drainage channels. The superficial deposits are therefore considered to have a localised resource value, albeit minor.
Hydraulic description - bedrock	The Sidmouth Mudstone Formation (part of the Mercia Mudstone Group) is a multi-layered aquifer with thin impersistent siltstones and sandstones (skerries) interbedded with low permeability mudstones. The skerries are often less than 1m thick and very well cemented, however they may contain and transmit limited quantities of groundwater through fractures.
Groundwater vulnerability	The Site lies wholly within an area designated as being Unproductive (superficial deposits) and therefore has not been assigned a groundwater vulnerability. The low permeability superficial deposits therefore provide some protection to deeper groundwater systems from any surface pollution.
Source Protection Zone (SPZ)	The Site does not lie within a SPZ. The closest SPZ is located 2.5km to the east of the Site at its closest and is associated with the United Utilities Public Water Supply boreholes at Blundell House Pumping Station.
Drinking Water Protected Area (DrWPA)	The Site does not lie within a DrWPA for surface water or groundwater. The closest DrWPA is located approximately 30km from the Site.

Descriptor	Notes
Licensed water abstraction	There are no licensed groundwater or surface water abstractions within the Site. The closest licensed groundwater abstraction is located at Formby Hall, approximately 2.5km northwest. Water is abstracted from a 'groundwater fed pond' (located on the superficial blown sands deposit) and used for direct spray irrigation. The closest licensed surface water abstraction is located 1.4km west at its closest. The surface water is abstracted from a reach along the Downholland Brook and is used for direct spray irrigation.
Private water supplies	There are no recorded private water supplies within the Site or within 2km of the Site. A review of Ordnance Survey mapping data suggests there could be 2 unrecorded supplies (e.g. at isolated, rural properties) within 2km of the Site, the closest of which is located at Formby Farm, approximately 1km west (upgradient) of the Site that could provide water for agricultural use.
Discharge permit	There are 8 discharge permits within a 2km radius of the Site. All permits are sewage discharges to surface watercourses. The closest permitted discharge is located approximately 1.3km north of the Site and discharges from Fine Jane Depot in to Fine Jane Brook which then flows in to Downholland Brook.
Nitrate Vulnerable Zone (NVZ)	The Site falls within a surface water NVZ. The NVZ spans across the entire area within a 2km radius of the Site.
Groundwater flooding	A flood risk assessment for the Proposed Development shows that the overall risk of flooding to and from the Site is very low, provided that surface water is managed appropriately [Ref. 1].
Surface water flooding	
Surface water catchment and features	The Site lies within a surface water sub-catchment of the larger River Alt catchment. The Site and catchment as a whole are characterised by flat, low lying land drained by numerous interconnecting land drains and. New Cut Pumping Station which controls the water levels in the land drains and discharges to the Cheshire Lines Brook. The overall direction of drainage within the drainage dykes is to the northeast towards the main drain Cheshire Lines Brook. The principal drainage routes from the Site are via pumping from New Cut Pumping Station to the Cheshire Lines Brook. The Cheshire Lines Brook then flows northerly where the water is pumped into Downholland Brook approximately 1.3km north of the Site. Downholland Brook confluences with the River Alt approximately 2.8km southwest of the Site.

2.7 Designated Ecological Sites and Sensitive Land Uses

A summary of designated ecological sites and sensitive land uses close to the Site is presented in Table 5 and locations presented in Appendix A.

Table 5 Summary of Designated Ecological Sites and Sensitive Land Uses Close to the Site

Land Use	Distance (m) and Direction from the Site	Notes
Downholland Moss SSSI	100m north	The area has been designated a SSSI because of its geological significance, giving insight in to sea-level changes from 8,000 to 4,000 years ago. The SSSI is designated due to its geological significance and is not water dependent and is therefore not considered as a receptor in this assessment.
Green Belt	At and surrounding the Site.	Area of Adopted Green Belt.

2.8 Landfills and Pollution Events

Information on historic and active landfills and recorded pollution events within a 2km radius of the Site has been obtained from the Environment Agency and Envirocheck report presented in Appendix A, a summary of which is presented in Table 6.

Table 6 Summary of Landfills and Pollution Events Close to the Site

Feature	Distance (km) and Direction from the Site	Notes
Merseyside County Council and Formby Urban District Council landfill	1.4km north	Closed, historic landfill. Accepted commercial, household, liquids and sludges, and other unspecified special wastes up to January 1980. Type of landfill engineering unknown. The landfill is understood to be located across-hydraulic gradient from the Site with Downholland Brook located in between the landfill and the Site. Any contaminants that may be released in to groundwater or surface water from this landfill would migrate south-westerly under the prevailing groundwater flow direction and also flow in to Downholland Brook which is the main natural water drainage channel.
New Hill House Farm landfill	2km southeast	Closed, historic landfill. Limited information exists for this landfill, only that the material is inert.
Pollution event	0.1km west	Located in field adjacent to the Site, however the accuracy of the recorded position is to 100m and therefore is likely to relate to the New Cut or an unnamed drainage ditch. The pollution incident was recorded on 01/07/1992 as a Category 3 (Minor Incident) and involved sewage sludge impacting on a tributary of the River Alt.

2.9 Potentially Contaminative Land Uses and Activities

There are a number of historic and current potentially contaminative land uses and activities surrounding the Site which are summarised in Table 7.

Table 7 Summary of Potentially Contaminative Land Uses and Activities within 2km of the Site

Land Use/Activity	Distance (km) and Direction from the Site	Description	Notes
Commercially exploited oilfield	0.7km northwest	Formby Oilfield	Although not anthropogenically sourced, natural oil seepages at the ground surface have been noted historically - notably in the Thirty Acre Lane and Downholland Brook area and is associated with the Formby Oilfield. The Formby Oilfield was commercially exploited between 1939 and 1965. Shallow wells encountered oil shows in the Quaternary and Triassic formations with production obtained from these reservoirs down to a depth of approximately 50m [Ref. 2, 8]. The main productive zone was the Tarporley Siltstone Formation. with the seal formed by overlying glacial till. The oil is understood to have originated from a deeper breached Carboniferous trap. Given the close proximity of this oilfield to the Site it is likely that some residual hydrocarbons are present in the subsurface at and surrounding the Site. This is confirmed by analytical results for the soil chemistry at the Site (Section 2.4).
Peat deposits	At and surrounding the Site	Site and surrounding land	Although not anthropogenically sourced, natural ground gases, such as methane, may be present due to the presence of peat deposits within the superficial deposits. It is likely that some ground gases are present at and surrounding the Site.
Agricultural practices	At and surrounding the Site	Site and surrounding agricultural land	Diffuse contamination is likely to be present from use of pesticides, fertilisers and circulating hydrocarbon-powered vehicles. It is likely that shallow (<50mbgl) groundwaters at and surrounding the Site have some residual contaminants from agricultural activities.
Pollution event	0.1km west	Tributary of the River Alt	Sewage sludge impacted on a tributary of the River Alt, however this event occurred in 1992 and flushing of the contaminant will have occurred. It is unlikely that any discernible contamination would be detected at or surrounding the Site as a result of this event.
Railway track	0.8km northeast from the Site at its closest	Historic railway track	Railway track constructed in 1894 and decommissioned by 1974 (Appendix A). Ran parallel to the Cheshire Lines Brook. Barton & Halshall Station present along this railway line approximately 0.9km north of the Site. It is likely that some residual contamination in the subsurface is present along the length of this railway and that it could migrate in shallow groundwater and surface water towards the Site.

Land Use/Activity	Distance (km) and Direction from the Site	Description	Notes
Farms	Various locations, the closest being 1km southwest.	Various farms (Tyrer's Farm and Formby's Farm being the closest)	Potential contamination from use and storage of pesticides, fertilisers and hydrocarbons, and from septic tanks. It is unlikely that there would be any discernible contamination present in the surface water or groundwater at the Site from this source given its distance from the Site. Furthermore, the nearest farm is located 1km southwest from the Site which is considered to be down-hydraulic gradient and downstream from the Site.
Village	1km south	Great Altcar	Great Altcar village comprises mostly of residential properties and farms. It is highly likely that contamination is present in the subsurface and groundwater at Great Altcar from sewage leakage, use of pesticides, fertilisers and circulating hydrocarbon-powered vehicles. It is unlikely that there would be any discernible contamination present in the surface water or groundwater at the Site from this source given the distance from the Site. The village is located 1km south from the Site which is considered to be partly across and down-hydraulic gradient from the Site.
Permitted Discharge	Various locations ranging from 1.3 to 1.9km from the Site.	Permitted discharges into surface watercourses	All permits relate to sewage effluent discharges. It is likely that there is some residual contamination in the effluent discharged to the watercourses. It is unlikely that there would be any discernible contamination present in the surface water or groundwater at the Site from this source given the distance from the Site.
Landfill	1.4km north	Merseyside County Council and Formby Urban District Council landfill.	Closed, historic landfill. Accepted commercial, household, liquids and sludges, and other unspecified special wastes up to January 1980. Type of landfill engineering unknown. It is highly likely that residual contamination in the subsurface and groundwater is present and that landfill gases are migrating through the subsurface and in to the atmosphere. Any contaminants that may be released in to groundwater or surface water from this landfill would migrate south-westerly under the prevailing groundwater flow direction and also flow in to Downholland Brook which is the main natural water drainage channel. Therefore, it is unlikely that there would be any discernible contamination present in the surface water or groundwater at the Site from this source.
Landfill	2km southeast	New Hill House Farm landfill.	Closed, historic landfill. Limited information exists for this landfill, only that the material is inert. Although records state that material disposed of at the landfill was inert it is likely that residual contamination in the subsurface and groundwater is present. It is unlikely significant landfill gases are being generated at this site due to none-putrescible waste content. It is unlikely that there would be any discernible contamination present in the surface water or groundwater at the Site from this source given the distance from the Site.

Land Use/Activity	Distance (km) and Direction from the Site	Description	Notes
Town	2km west	Formby	The outskirts of Formby town comprise of a business/retail park, garden centre, a golf course and some residential properties. It is highly likely that contamination is present in the subsurface and groundwater at Formby from sewage leakage, use of pesticides, fertilisers and circulating hydrocarbon-powered vehicles. It is unlikely that there would be any discernible contamination present in the surface water or groundwater at the Site from this source given the distance from the Site.

3 CONCEPTUAL SITE MODEL

This section of the report presents a conceptual model of the Site which may be used to systematically evaluate risks to the environment and enables uncertainties and further assessment needs or other actions to be identified. The conceptual model is developed from the information presented in previous sections of the report and identifies plausible contaminant source-pathway-receptor (S-P-R) linkages. The conceptual site model is presented schematically in Figure 3.

Where a source, pathway and receptor are present, a pollutant linkage is considered to exist whereby there is a circumstance through which environmental harm could occur and a potential environmental liability is considered to exist. Where there is a source but no pathway or no receptor there is not a complete S-P-R linkage and there is a resultant negligible potential for environmental harm. The 3 components of an S-P-R linkage are defined as follows:

1. Source (S) is a potential or known contaminant source (e.g. a landfill, an industrial discharge, etc.);
2. Pathway (P) is a natural or anthropogenically induced process thorough which a contaminant from a source could migrate (e.g. natural groundwater migration, demolition resulting in airborne dust, etc.); and
3. Receptor (R) is an environmental receptor that has the potential to be adversely affected by a contaminant (e.g. groundwater, a SSSI, humans, etc.).

This conceptual model considers the current status of the Site and its Proposed Development for exploratory drilling and associated site compound. The assessment considers the risks to personnel involved in the Site's development, in addition to controlled waters and other environmental receptors that are identified as part of the conceptual site model.

3.1 Source

Local sources of contamination include historic agriculture and the disused railway track, located up-hydraulic gradient of the Site. Although not anthropogenic contamination, it is worth noting that natural ground gases from superficial deposits (containing peat deposits) are present in the immediate area and may migrate laterally to the Site. Natural oil seeps associated with the nearby Formby Oilfield may give rise to residual hydrocarbons in surface soils and shallow groundwater.

Table 8 provides a summary of the plausible sources of contamination at and in the immediate surroundings of the Site.

Table 8 Sources of Contamination

Potential Source	Potential Contaminants of Concern	Likely/Anticipated Distribution
Formby Oilfield	Hydrocarbons	Oil seeps at the ground surface have been noted historically - notably in the Thirty Acre Lane and Downholland Brook area. The oil was abstracted from the underlying superficial deposits (Shirdley Hill Sand Formation) and Mercia Mudstone Group. Therefore, it is highly likely that there are residual hydrocarbons in the superficial deposits and shallow ground waters and underlying bedrock and groundwater at the Site and surrounding area.
Natural ground gases	Predominantly methane	Mostly in the superficial deposits, which contains peat deposits, at and surrounding the Site. Dissolved methane may be encountered in the shallow groundwaters.
Surrounding agricultural land	Pesticides, fertilisers, hydrocarbons and suspended sediment in surface waters	The Site and its surroundings are dominated by intensively cultivated agricultural land. It is highly likely that pesticides and fertilisers have been used for decades in this area resulting in residual pesticides and fertilisers in soils and shallow groundwaters at and surrounding the Site. Leakage and spillages from hydrocarbon-powered vehicles (e.g. farm vehicles) may also result in residual hydrocarbons in soils and shallow groundwaters at and surrounding the Site. Heavy cultivation of the land may also result in particulates (soil particles and vegetable material) becoming mobilised and flowing in to the surface water drainage system.
Barton & Halshall Station railway line	Hydrocarbons from leakage and accidental release from freight and engines, persistent pesticides such as atrazine used historically to control vegetation on railway tracks	This railway line has been in use since around 1887 up until around 1952. It is likely that there is residual contamination present in the subsurface along the length of this railway which gradually leaches to the groundwater system and migrates down-hydraulic gradient under the prevailing groundwater flow direction.

3.2 Pathways

There are two main potential pathways for contaminants to come into contact with the identified receptors. include:

1. Natural lateral and vertical migration of gas through the subsurface towards the Site which is then mobilised further by proposed earthworks during site construction and restoration; and
2. Groundwaters underneath the Site that are potentially contaminated from off-site sources returning to the ground surface during:
    a. Construction of the drilling cellars, conductor casing, underground water storage tank and groundwater monitoring boreholes; and
    b. Drilling through the Mercia Mudstone and Sherwood Sandstone aquifer.

These main pathways may result in subsidiary pathways as follows:

1. Human uptake via inhalation, dermal sorption and/or ingestion;
2. Contaminants in drilling fluids entering and then migrating from the Site via the surface water system or shallow groundwater in the superficial deposits.

3.3 Receptors

Potential sensitive receptors of contamination originating from the Site include:

1. Site personnel;
2. Adjacent site personnel;
3. Livestock in adjacent fields;
4. Groundwater within the superficial deposits;
5. Groundwater within the Mercia Mudstone and Sherwood Sandstone aquifer;
6. Surface water in the various field drains surrounding the Site;
7. The atmosphere.

3.4 Plausible S-P-R Linkages

Table 9 provides an evaluation of the potential contaminant linkages that are considered to be plausible on the basis of the information currently available for the Site.

Table 9 Source-Pathway-Receptor (S-P-R) Linkage

Source (S)	Pathway (P)	Receptor (R)	S-P-R Linkage
Naturally occurring hydrocarbons associated with the Formby Oilfield in the superficial deposits, Mercia Mudstone Group and Triassic Sandstones	Natural lateral and vertical migration of volatilised hydrocarbons through the subsurface to the Site.	1) Groundwater. 2) Atmosphere. 3) Site personnel. 4) Surface water in field drains surrounding the Site.	Yes
	Lateral migration in groundwater.		Yes
	Migration in surface water drainage channels.		Yes
	During proposed drilling operations at the Site, shallow groundwaters and deeper groundwater with contaminants may be returned to the surface in drilling fluid.		Yes
	Inhalation and dermal sorption of volatilised hydrocarbons and dermal sorption of dissolved hydrocarbons by site personnel.	5) Site personnel.	Yes
Natural ground gases from superficial deposits at and close to the Site	Natural lateral and vertical migration of gas through the subsurface to the Site.	1) Groundwater. 2) Atmosphere. 3) Site personnel.	Yes
	Lateral migration in shallow groundwaters -ground gas may become dissolved in the groundwater.		Yes
	Induced migration of ground gas as a result of excavations/boreholes/disturbance of the superficial deposits.		Yes
	Inhalation and dermal sorption of ground gases by site personnel.	4) Site personnel.	Yes
Contaminated soils associated with railway and diffuse contamination from agricultural land	Contaminants may infiltrate and be leached from soils and enter the groundwater system in the superficial deposits and bedrock and will migrate towards the Site under the prevailing groundwater flow direction: suspended sediment is likely to be filtered out during groundwater migration. Agrochemicals may be retarded in the soils and be leached gradually over time resulting in persistent presence in groundwater. During proposed drilling operations at the Site, shallow groundwaters with contaminants may be returned to the surface in drilling fluid.	1) Groundwater. 2) Surface water in field drains surrounding the Site. 3) Site personnel.	Yes

4 CONTAMINATED LAND RISK ASSESSMENT

4.1 Risk Assessment Methodology

Following the development of the conceptual model and the identification and assessment of potential pollutant linkages, a preliminary qualitative risk evaluation can be made taking account of the approach in CLR 11 [Ref.6] and CIRIA C552 [Ref.7], to determine whether an unacceptable contamination risk is likely to exist. CLR 11 defines risk estimation as predicting the magnitude (or consequence) and probability of the risk occurring that may arise as a result of that hazard.

This is also identified in CIRIA C552 in which the risk assessment methodology uses qualitative descriptors of consequence, probability and thus risk. A similar approach is adopted for this risk assessment.

For each potential pollutant linkage identified in the conceptual model, the potential risk is evaluated qualitatively, based on the methodology criteria presented in Appendix C and the following:

Overall contamination risk = Likelihood of event occurring x Significance of event occurring;

where:

Significance of event occurring = Receptor sensitivity x Magnitude of Impact

Once an overall contamination risk is qualitatively assessed, mitigation may be adopted to reduce the magnitude or likelihood of that risk occurring thereby yielding a residual risk.

The qualitative risk assessment is presented in Table 10.

4.2 Risk Assessment Results

Table 10 shows that there is one residual risk rating of medium for the groundwater beneath the Site. However, it is noted that this residual risk is due to naturally occurring and existing sources of contamination located at the Site and off-site and not due to sources associated with the Proposed Development at the Site. The S-P-R linkage associated with naturally occurring hydrocarbons is highly likely to have been present for the last few hundred years. This source will remain unaffected by the Proposed Development and this S-P-R linkage will continue to exist during and after the Proposed Development at the Site: no mitigation is proposed. Groundwater monitoring will be carried out to establish baseline conditions (see GMP [Ref. 3]).

As part of the Proposed Development at the Site, some potentially contaminated groundwater (contaminated with naturally occurring hydrocarbons, diffuse agricultural pollution and possible contaminants associated with the nearby disused railway corridor up-hydraulic gradient of the Site) beneath the Site could be returned to ground surface in drilling fluids. This is the only pathway from this source identified as a direct result of the Proposed Development at the Site. The following mitigation will reduce the risk associated with this S-P-R linkage:

- Water removed during construction of the drilling cellars, conductor casing, underground water storage tank and groundwater monitoring boreholes will be removed from the Site and disposed of at an approved Environment Agency facility;
- Drilling fluids returned to surface during drilling will be captured at the wellhead and temporarily stored on Site and disposed of at an approved Environment Agency facility;
- The Site will be constructed with a surface water drainage collection system to prevent uncontrolled surface water runoff and allowing the capture of any spillages at the wellhead; and
- The design concept for the proposed wells includes a conductor casing and multiple surface casings that will be cemented in place to prevent water of different qualities mixing and migrating between different geological formations.

The qualitative risk assessment presented in Table 10 shows that:

- When taking in to consideration existing site conditions and the Proposed Development, there is an overall Low to Very Low risk to the atmosphere, human health and controlled waters.

Table 10 Risk Assessment Summary

Source (S)	Pathway (P)	Receptor (R)	Receptor Sensitivity	Magnitude of Impact	Preliminary Significance of Effect	Likelihood of Occurrence	Risk Analysis	Mitigation	Likelihood of Occurrence After Mitigation	Residual Risk
Naturally occurring hydrocarbons associated with the Formby Oilfield in the superficial deposits, Mercia Mudstone Group and Triassic Sandstones	Natural lateral and vertical migration of volatilised hydrocarbons through the subsurface to the Site. Lateral migration in groundwater. Migration in surface water drainage channels. During proposed drilling operations at the Site, shallow groundwaters and deeper groundwater with contaminants may be returned to the surface in drilling fluid. Inhalation and dermal sorption of volatilised hydrocarbons and dermal sorption of dissolved hydrocarbons by site personnel.	Surface water in field drains surrounding the Site	High	Medium	Moderate	Likely	Medium	It is likely that naturally occurring hydrocarbons are already present in groundwater at the Site and surroundings at shallow depths <50m and throughout the bedrock. Drilling operations would create an upwards vertical migration path for these hydrocarbons which could return to the surface in the drilling fluids. The design concept for the wells incorporates a conductor casing and multiple surface casings to prevent shallow hydrocarbons to migrate in to the well and negligible opportunity for the well to change groundwater flow directions and existing	Unlikely	Very low
		Groundwater	High	Medium	Moderate	Likely	Medium			

Source (S)	Pathway (P)	Receptor (R)	Receptor Sensitivity	Magnitude of Impact	Preliminary Significance of Effect	Likelihood of Occurrence	Risk Analysis	Mitigation	Likelihood of Occurrence After Mitigation	Residual Risk
								contaminant pathways. A dedicated Site compound surface water management system is proposed incorporating emplacement of an impermeable geomembrane across the whole Site's ground surface, enclosed perimeter runoff drainage ditches and perimeter earth bunds. The drilling fluids will be captured and stored on site for off-site treatment/ disposal.		
		Atmosphere	Medium	Low	Minor	Likely	Low	None proposed. Any volatilisation of hydrocarbons would be minor and quickly dispersed in the atmosphere.	Likely	Low
		Site personnel	Very high	Very high	Major	Likely	High	Appropriate site induction and PPE will be used as standard during the operations.	Very unlikely	Very low

Source (S)	Pathway (P)	Receptor (R)	Receptor Sensitivity	Magnitude of Impact	Preliminary Significance of Effect	Likelihood of Occurrence	Risk Analysis	Mitigation	Likelihood of Occurrence After Mitigation	Residual Risk
Natural ground gases from superficial deposits at and close to the Site	Natural lateral and vertical migration of gas through the subsurface to the Site. Lateral migration in shallow groundwaters -ground gas may become dissolved in the groundwater. Induced migration of ground gas as a result of excavations/boreholes/disturbance of the superficial deposits.	Groundwater	High	Low	Moderate	Moderate	Low	None proposed. However, groundwater wells will be monitored for gas.	Moderate	Low
		Atmosphere	Medium	Low	Minor	Moderate	Low	None proposed. Gas detection sensors to monitor fugitive gas.	Likely	Very low
		Site personnel	Very high	Very high	Major	Moderate	Medium	A very low permeability geomembrane will be emplaced across the entire site which will reduce fugitive gas emissions through the ground surface at the Site. Gas detection sensors, intrinsically safe equipment and appropriate site induction and PPE will be used as standard during the operations.	Unlikely	Very low
	Inhalation and dermal sorption of ground gases by site personnel.	Site personnel	Very high	Very high	Major	Moderate	Medium		Unlikely	Very low
Contaminated soils and groundwaters associated with the disused railway and diffuse contamination from surrounding	Contaminants may infiltrate and be leached from soils and enter the groundwater system in the superficial deposits and bedrock and will migrate towards the Site under the prevailing groundwater flow direction: suspended sediment are likely to be filtered out during groundwater migration.	Groundwater	High	Low	Moderate	Likely	Medium	It is noted that this S-P-R linkage is likely to have been present since the railway was constructed in the late 1800's and will continue during and following the Proposed	Likely	Medium

Source (S)	Pathway (P)	Receptor (R)	Receptor Sensitivity	Magnitude of Impact	Preliminary Significance of Effect	Likelihood of Occurrence	Risk Analysis	Mitigation	Likelihood of Occurrence After Mitigation	Residual Risk
agricultural land								Development at the Site. No mitigation is proposed for this S-P-R linkage given that is from an off-site source. However, monitoring of groundwater wells to identify off-site derived contaminants will be undertaken.		
	During proposed drilling operations at the Site, shallow (<100mbgl) groundwaters with contaminants may be returned to the surface in drilling fluid.	Surface water in field drains surrounding the Site	Low	Low	Negligible	Moderate	None	The drilling fluids will be captured and stored on site for off-site treatment/ disposal.	Very unlikely	Very low
		Site personnel	Very high	Medium	Major	Moderate	Medium	Appropriate PPE will be used as standard.	Very unlikely	Very low

5 CONCLUSIONS

The Site may be considered to be in an area of generally low environmental sensitivity as the Site is underlain and bordered by superficial deposits classified as an 'Unproductive Aquifer' and around a 250m thickness of bedrock (mainly mudstones) classified as a 'Secondary B Aquifer' with overall low resource value.

The desk study has identified three potential existing sources of contamination that have the potential to affect the Site:

1. Naturally occurring hydrocarbons associated with the Formby Oilfield;
2. Natural ground gases which may be migrating from peat deposits in the superficial deposits;
3. Potentially contaminated groundwaters flowing beneath the Site, the contamination of which originates from diffuse agricultural pollution and a disused railway corridor located up-hydraulic gradient of the Site.

This preliminary risk assessment indicates that a number of plausible potential S-P-R linkages exist at the Site based on current land conditions and also taking in to account induced mobilisation of potentially existent contamination as a result of the Proposed Development.

The highest overall contamination risks associated with the Proposed Development are to human personnel at the Site during proposed operations. However, with appropriate PPE these risks have been demonstrated to have a Very Low residual risk.

The qualitative risk assessment has shown that:

- The S-P-R linkages identified are unlikely to present a significant risk or would lead to the Site being designated as contaminated land under Part 2a of the Environmental Protection Act 1990, based on the current land use; and
- When taking in to consideration existing Site conditions and the Proposed Development, there is an overall Low to Very Low risk to the atmosphere, human health and controlled waters.

Envireau Water
08/03/2019

6 REFERENCES

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Ref.2 Envireau Water, March 2019. Hydrogeological Risk Assessment - Altcar Moss, West Lancashire. Unpublished report prepared by Envireau Ltd. for Aurora Energy Resources Ltd.

Ref.3 Envireau Water, March 2019. Groundwater Monitoring Plan - Altcar Moss, West Lancashire. Unpublished report prepared by Envireau Ltd. for Aurora Energy Resources Ltd.

Ref.4 Soilscapes (Cranfield University) Cranfield Soil and AgriFood Institute, December 2016. http://www.landis.org.uk/soilscapes/

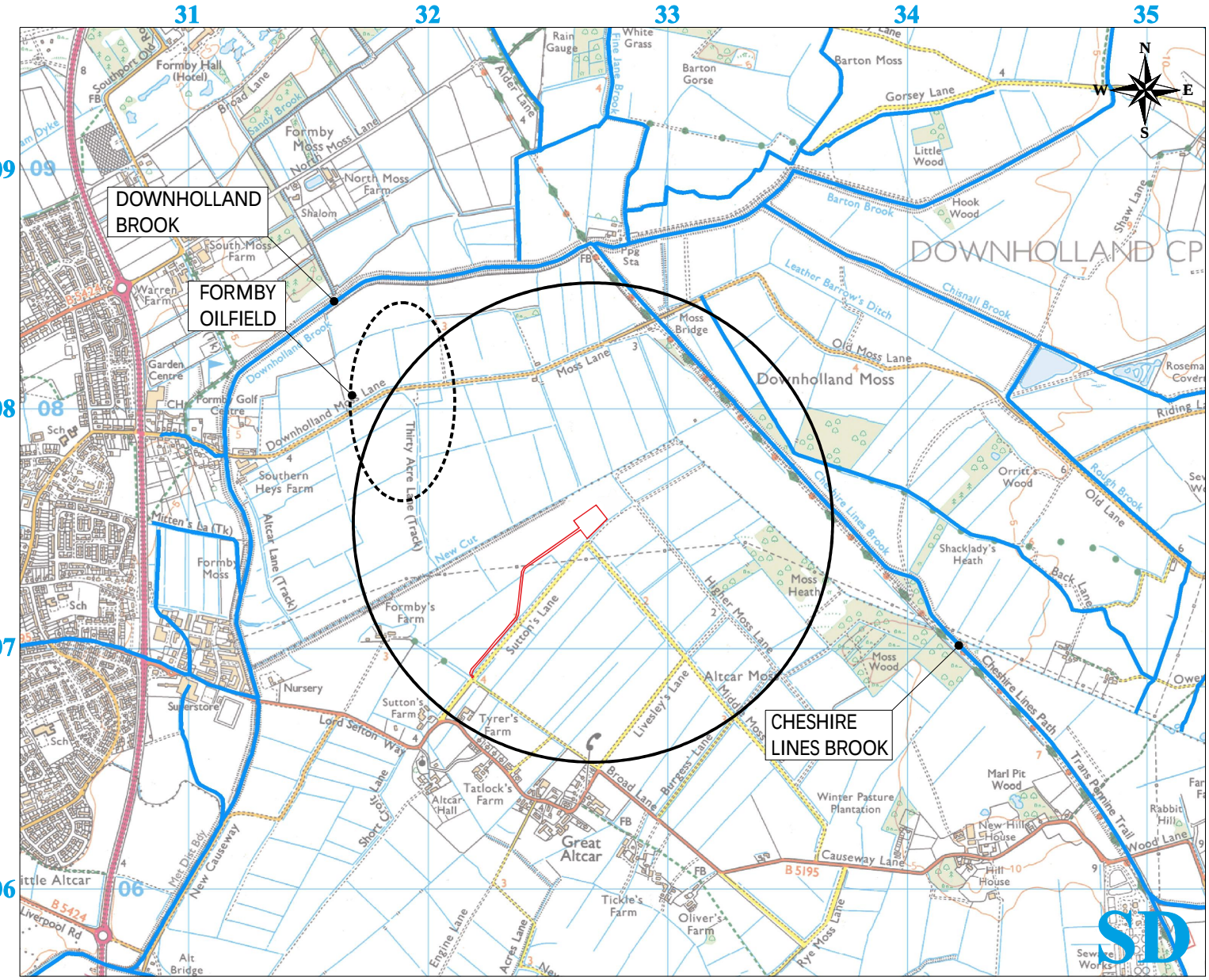
Ref.5 British Geological Survey. 1942. Formby. England and Wales Sheet 83. Bedrock and Superficial. 1:50 000.

Ref.6 Environment Agency, 2004. Model Procedures for the Management of Land Contamination. Contaminated Land Report 11 (CLR11), Environment Agency, September 2004.

Ref.7 Rudland, D.J., Lancefield, R.M. and Mayell, P.N., 2001. Contaminated land risk assessment - a guide to good practice. Report C552, Construction Industry Research and Information Association (CIRIA), 2001.

Ref.8 Minchin, D.J., McEvoy, F.M., Harrison, D.J., Cameron, D.G., Evans, D.J., Lott, G.K., Hobbs, S.F. and Highley, D.E., 2006. Mineral Resource Information in Support of National, Regional and Local Planning: Merseyside (comprising City of Liverpool and Boroughs of Knowsley, Sefton, St Helens and Wirral). British Geological Survey Commissioned Report, CR/05/129N.

FIGURES



KEY

- Planning application boundary (Site centre NGR SD 32685 07530)
- River network
- 1km radius from site centre

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Scale 1 : 25,000 (at A4)

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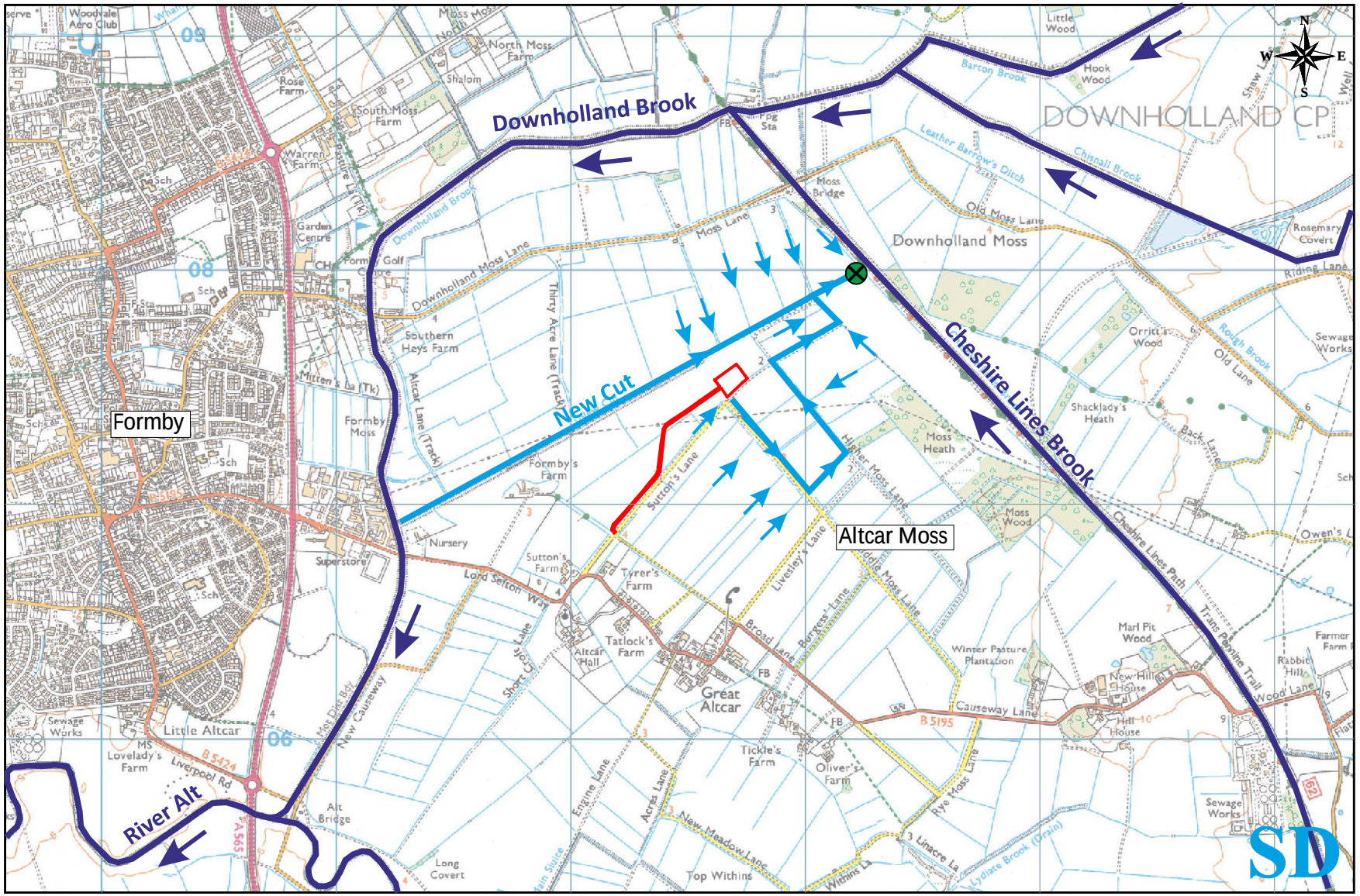
Ref: 2357\Aurora Energy Altcar Moss\FIG 1 - Site Location and Setting CL Date: 14/12/2018	Aurora Energy Resources - Altcar Moss
Figure 1	Site Location and Setting



KEY

- Planning application boundary (Site centre NGR SD 32685 07530)
- Main drain
- Flow direction of main drain
- Arterial drainage dyke (arrow denotes drainage direction)
- New Cut Pumping Station (transfers water from New Cut to Cheshire Lines Brook)

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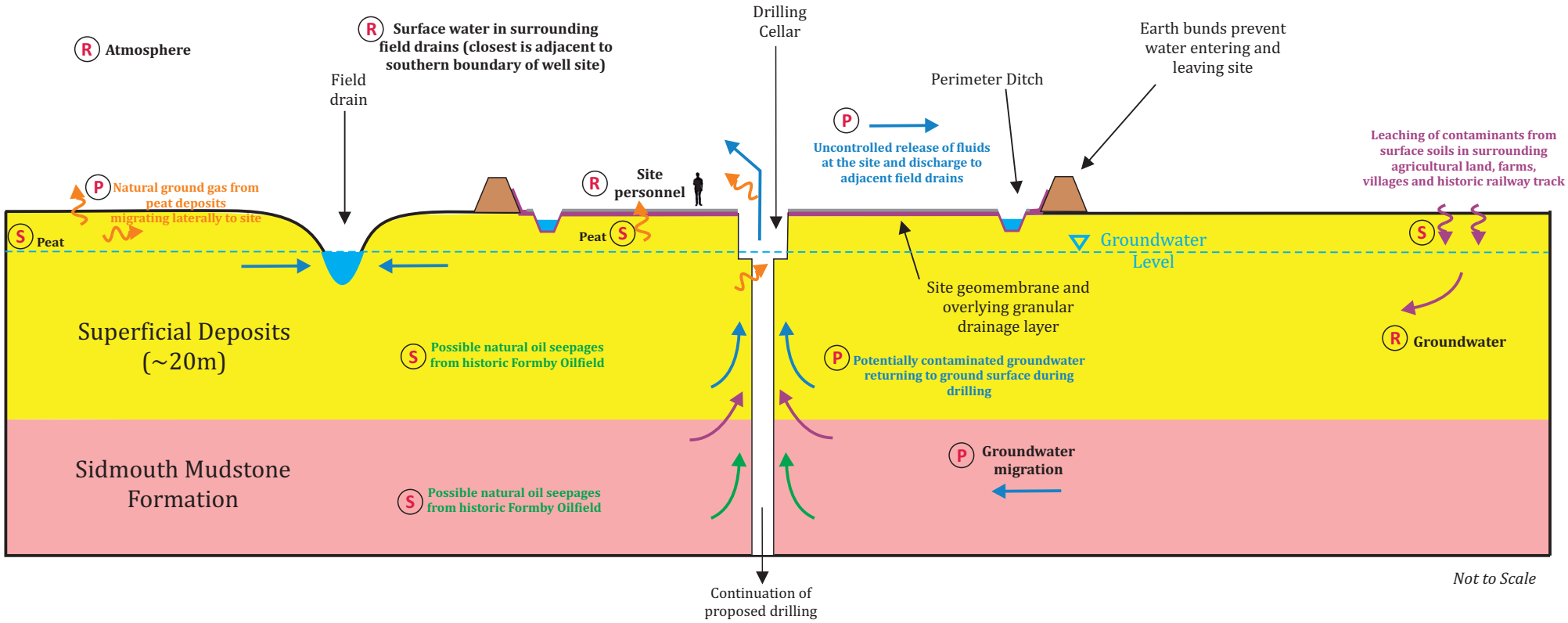
Ref: 2357\Aurora Energy Altcar Moss\FIG 2 - Hydrological Setting CL Date: 14/12/2018	Aurora Energy Resources - Altcar Moss
Figure 2	Hydrological Setting



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Ref: P: 2357\Aurora Energy Altcar Moss\FIG 3 - Schematic Conceptual Site Model CL Date: 07/03/2019	**Aurora Energy Resources - Altcar Moss**
Figure 3	Schematic Conceptual Site Model

APPENDIX A
ENVIROCHECK REPORT

Geology 1:50,000 Maps Legends

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Not Supplied - Holocene
	SSA	Shirdley Hill Sand Formation	Sand	Not Supplied - Devensian
	TILLD	Till, Devensian	Diamicton	Not Supplied - Devensian
	PEAT	Peat	Peat	Not Supplied - Quaternary
	DOS	Downholland Silt	Silt	Not Supplied - Quaternary
	BSA	Blown Sand	Sand	Not Supplied - Quaternary

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	SELF	Sellafield Member	Sandstone	Not Supplied - Anisian
	SNM	Singleton Mudstone Member	Mudstone	Not Supplied - Early Triassic
		Faults		

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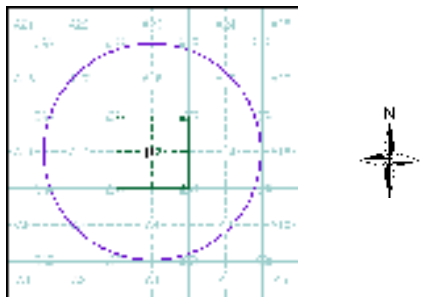
Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	**1**
Map Sheet No:	**083**
Map Name:	**Formby**
Map Date:	**1942**
Bedrock Geology:	**Available**
Superficial Geology:	**Available**
Artificial Geology:	**Not Available**
Faults:	**Not Supplied**
Landslip:	**Not Available**
Rock Segments:	**Not Supplied**

Geology 1:50,000 Maps - Slice A



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Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details:

Site at 332690, 407530

Landmark

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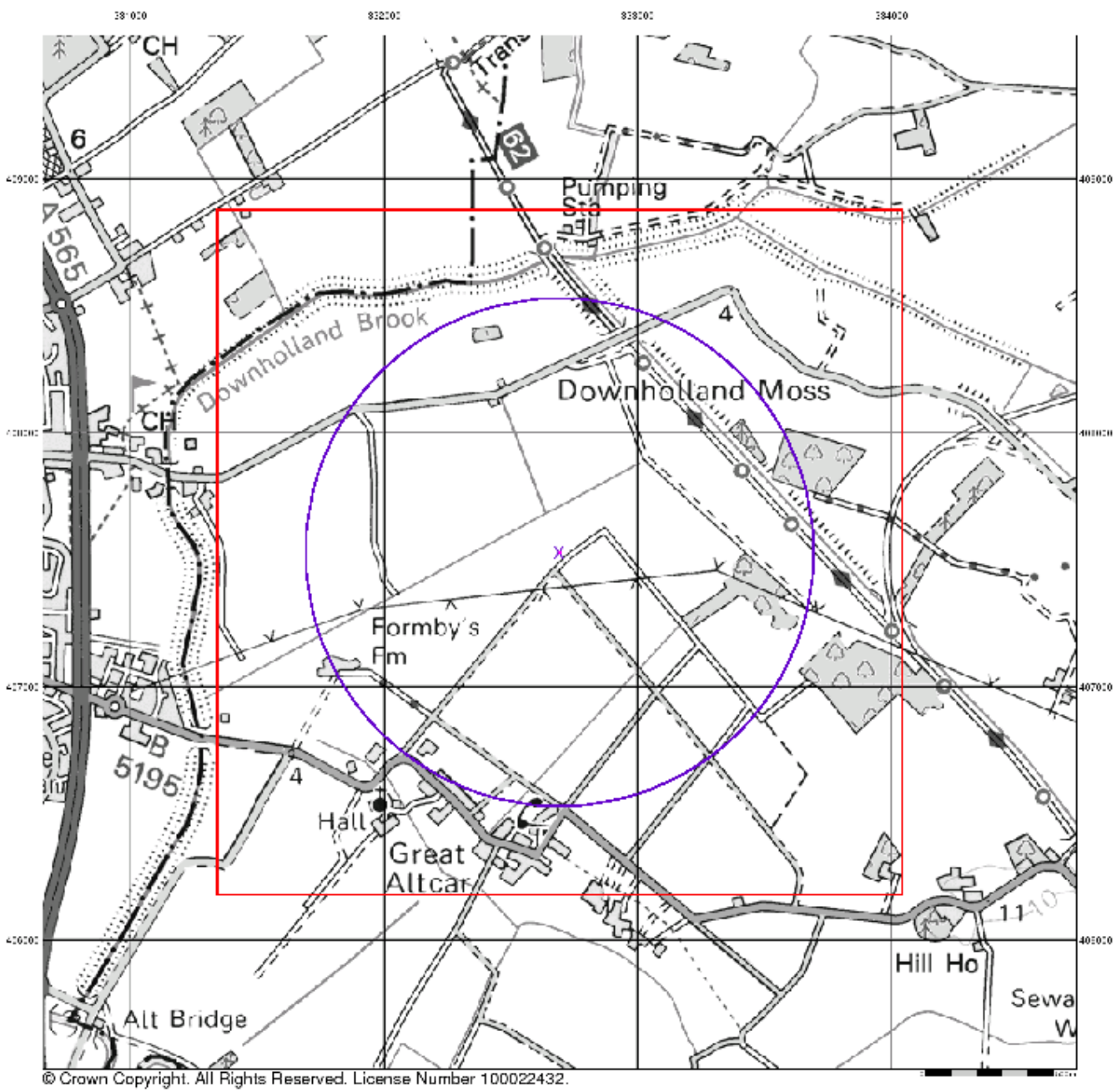
Web: www.envirocheck.co.uk



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Artificial Ground and Landslip

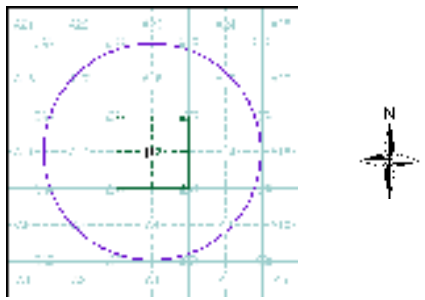
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



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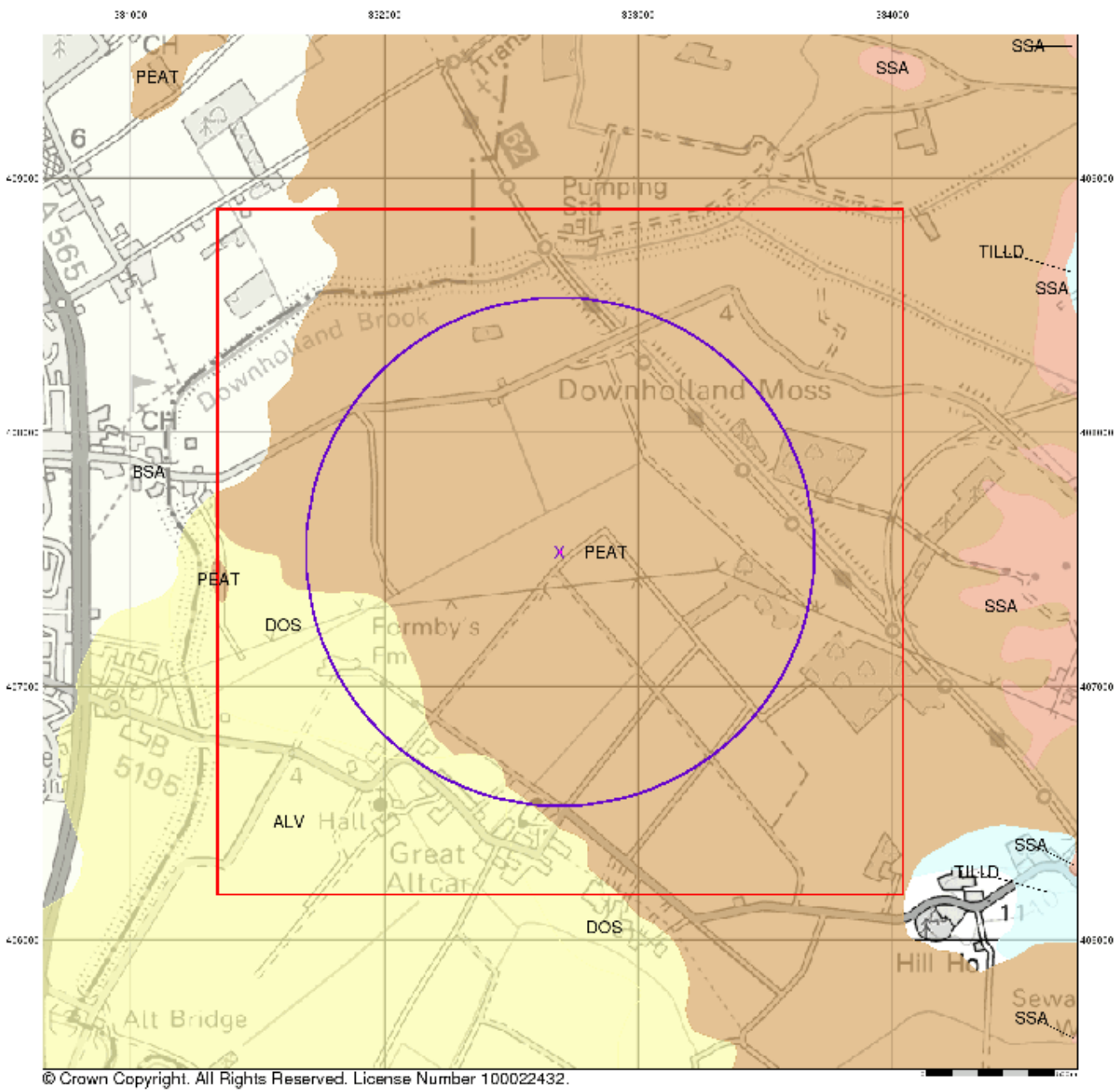

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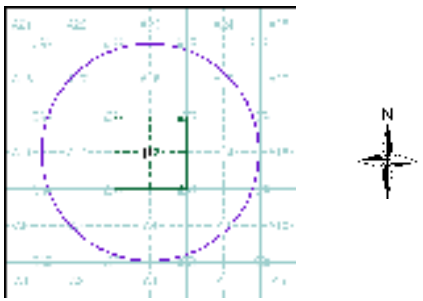
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



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Site Details:

Site at 332690, 407530

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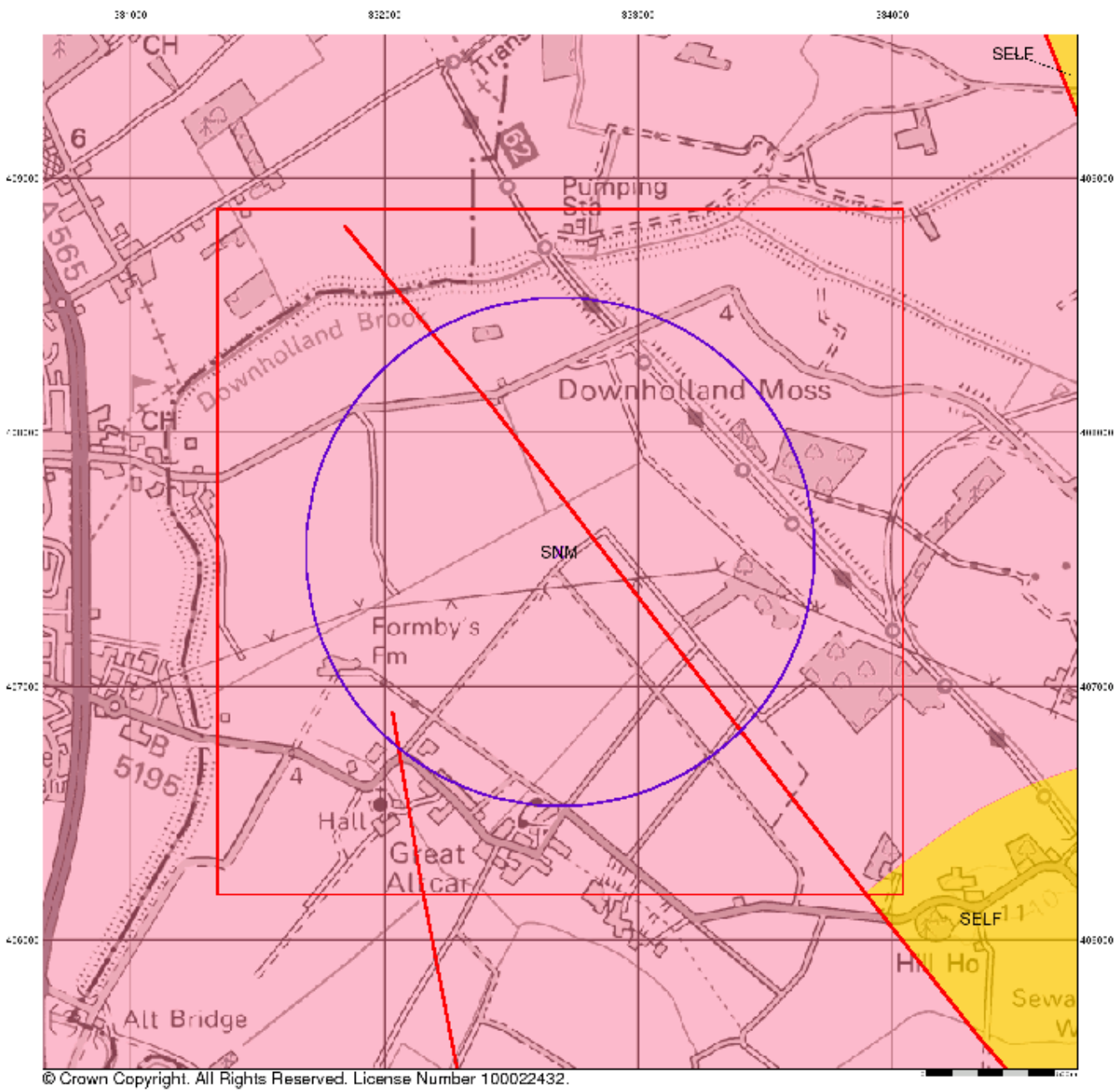

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Bedrock and Faults

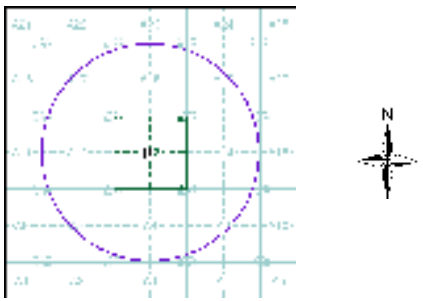
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



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Site at 332690, 407530

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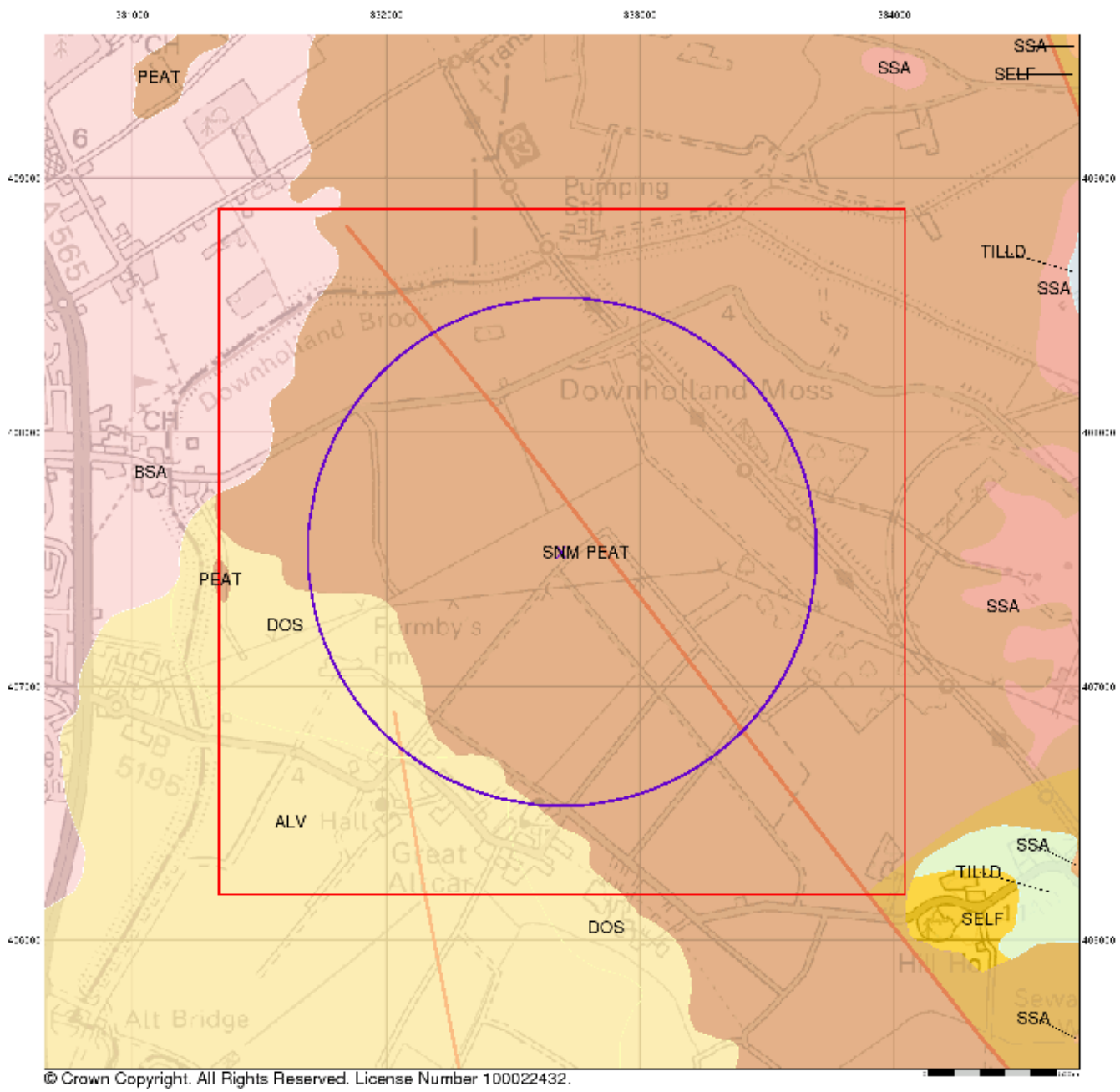

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Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

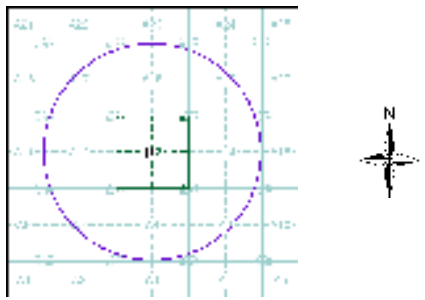
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



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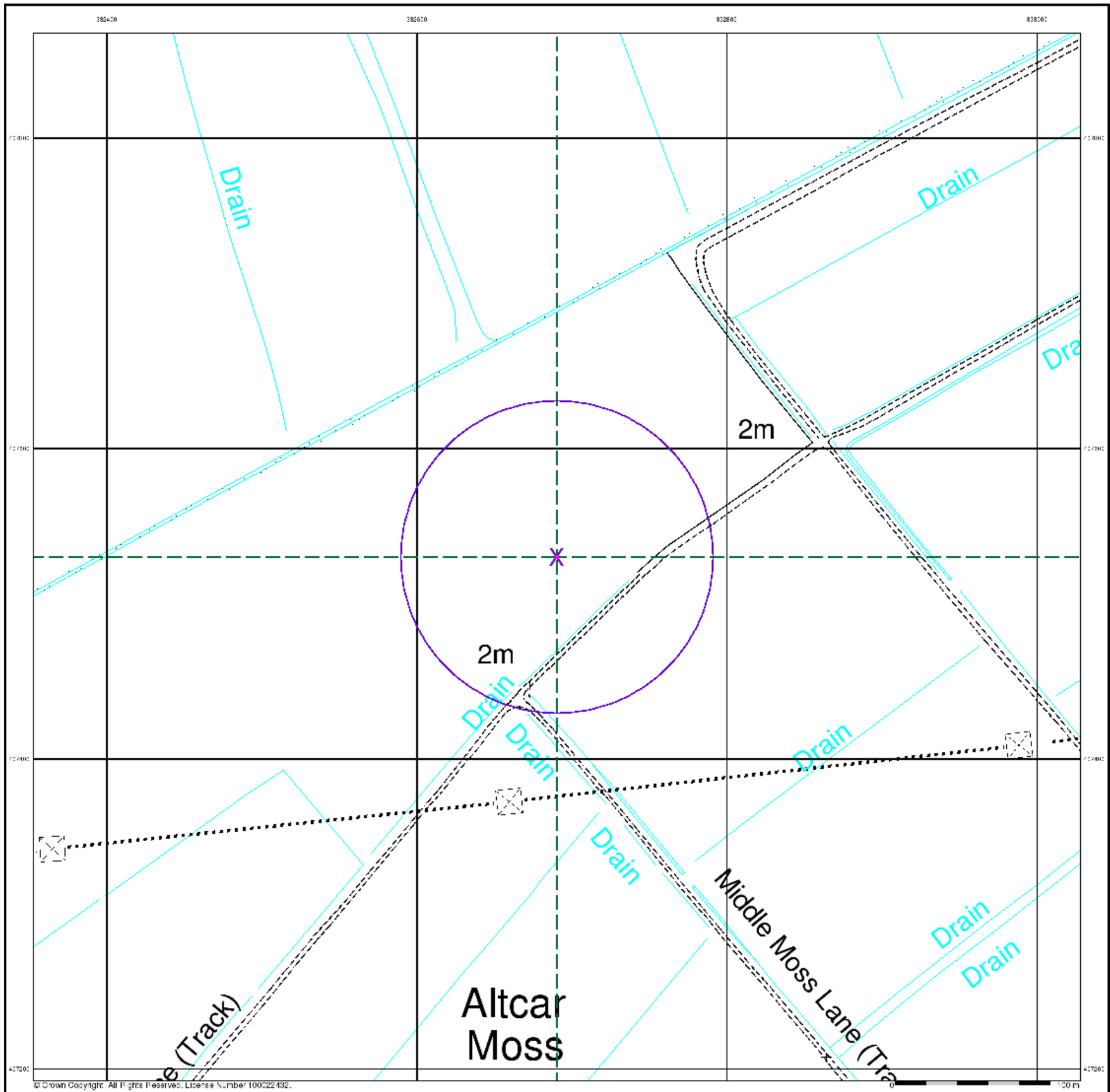

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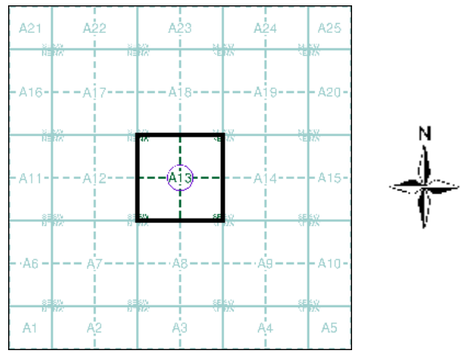
General

Historical Building Plans

Historical Tanks and Energy Facilities

Historical Data Report - Segment A13



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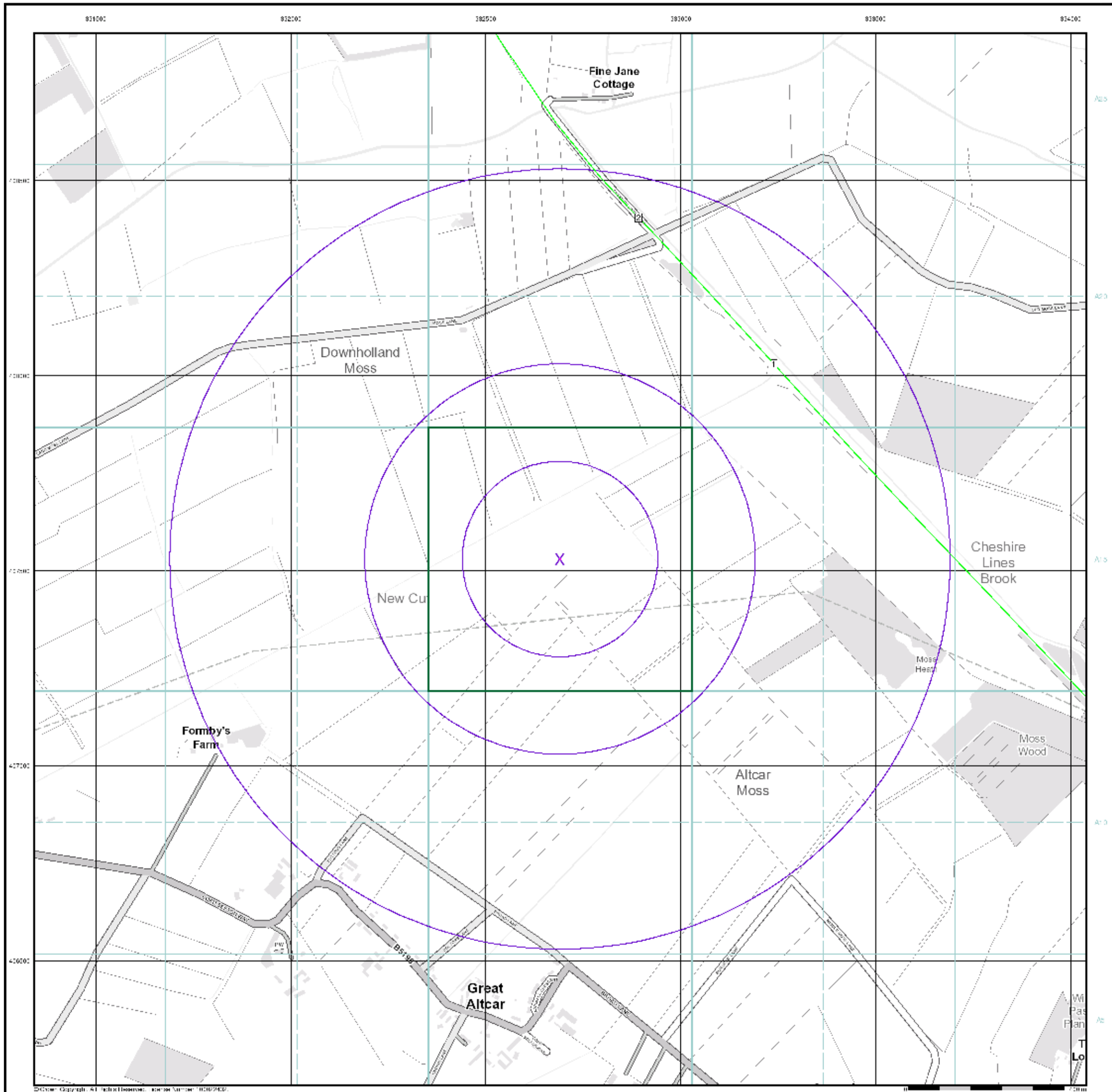

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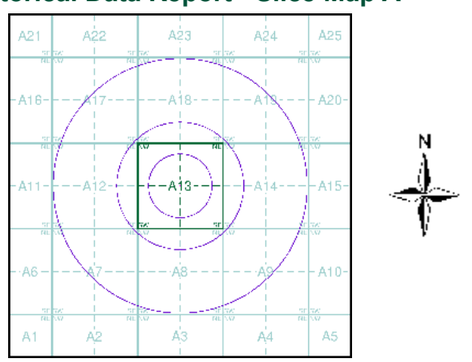
General

Historical Building Plans

Historical Land Use

Historical Data Report - Slice Map A



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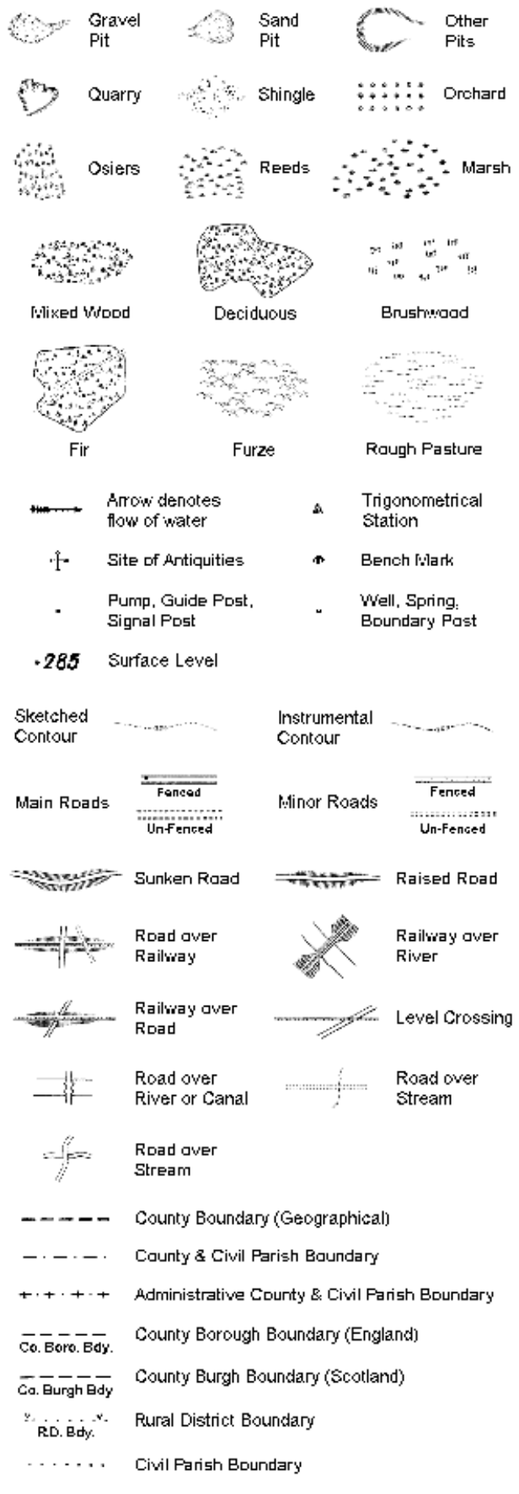
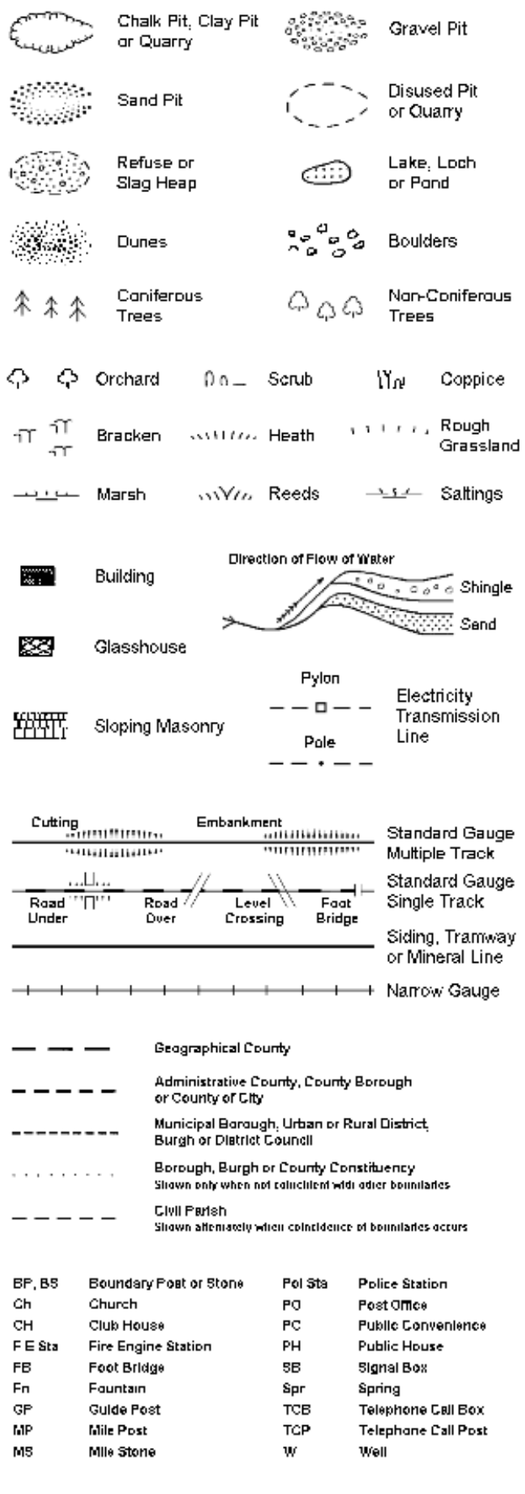
Historical Mapping Legends

Ordnance Survey County Series 1:10,560

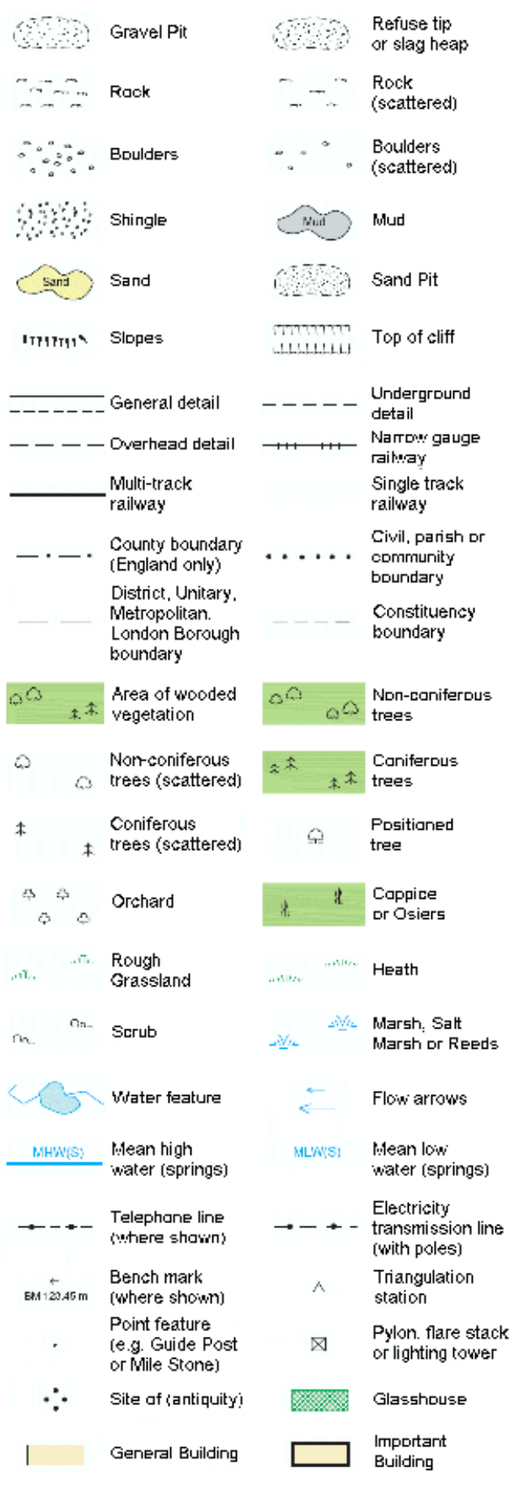


Ordnance Survey Plan 1:10,000



BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping



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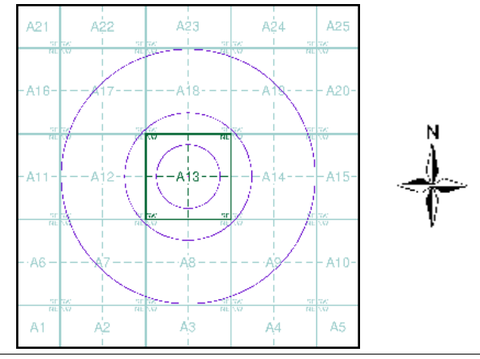
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:10,560	1847 - 1849	2
Lancashire And Furness	1:10,560	1894	3
Lancashire And Furness	1:10,560	1909	4
Lancashire And Furness	1:10,560	1928	5
Lancashire And Furness	1:10,560	1928	6
Lancashire And Furness	1:10,560	1938	7
Ordnance Survey Plan	1:10,000	1955	8
Ordnance Survey Plan	1:10,000	1974	9
Ordnance Survey Plan	1:10,000	1993	10
10K Raster Mapping	1:10,000	1999	11
10K Raster Mapping	1:10,000	2006	12
VectorMap Local	1:10,000	2018	13

Historical Map - Slice A



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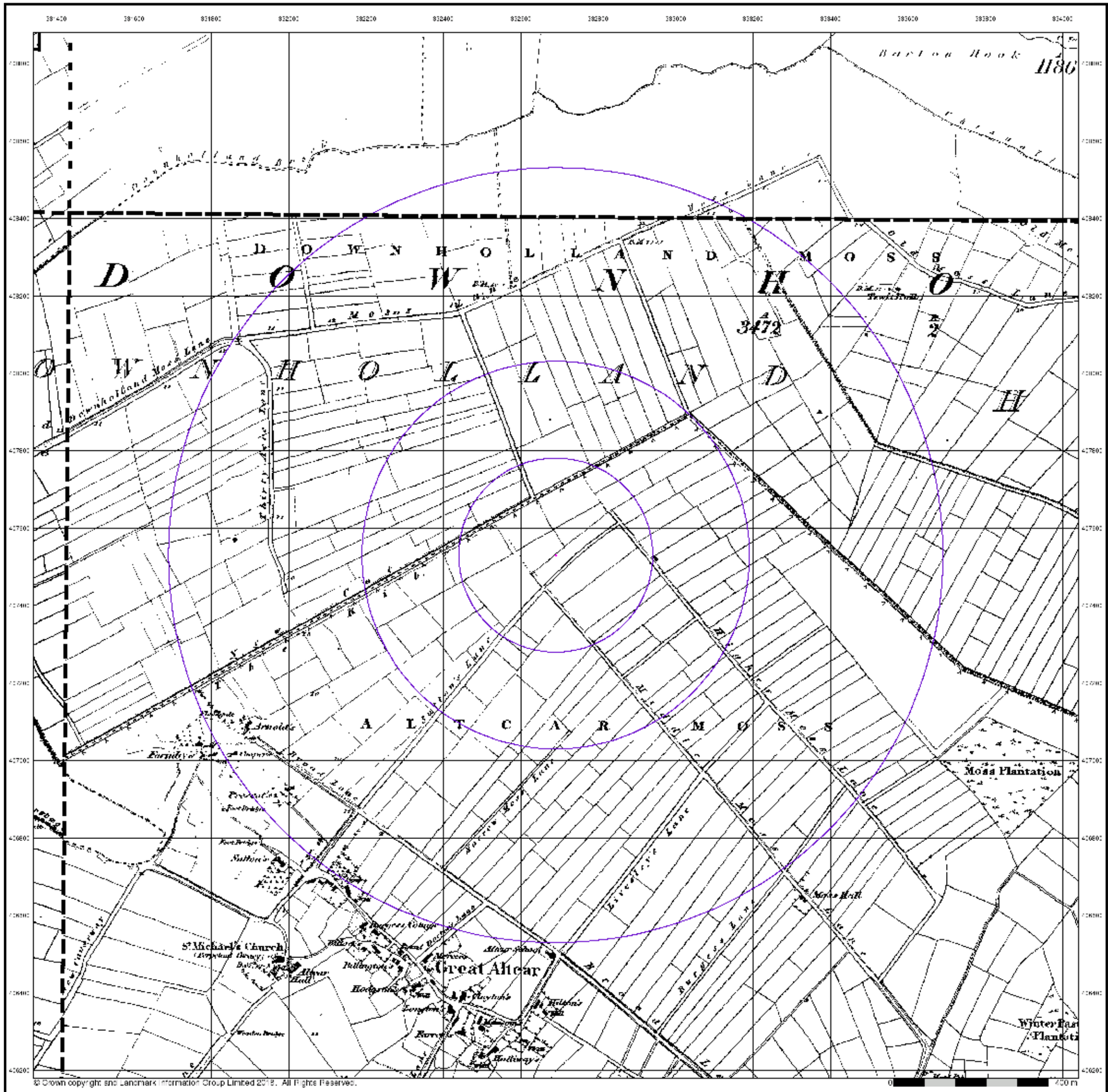

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Lancashire And Furness

Published 1847 - 1849

Source map scale - 1:10,560

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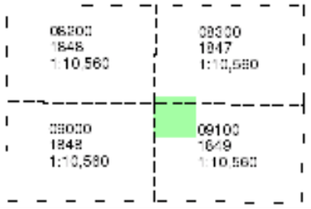
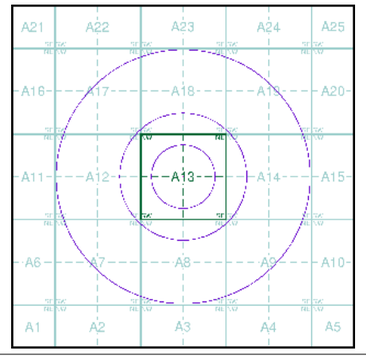
Map Name(s) and Date(s)



Historical Map - Slice A



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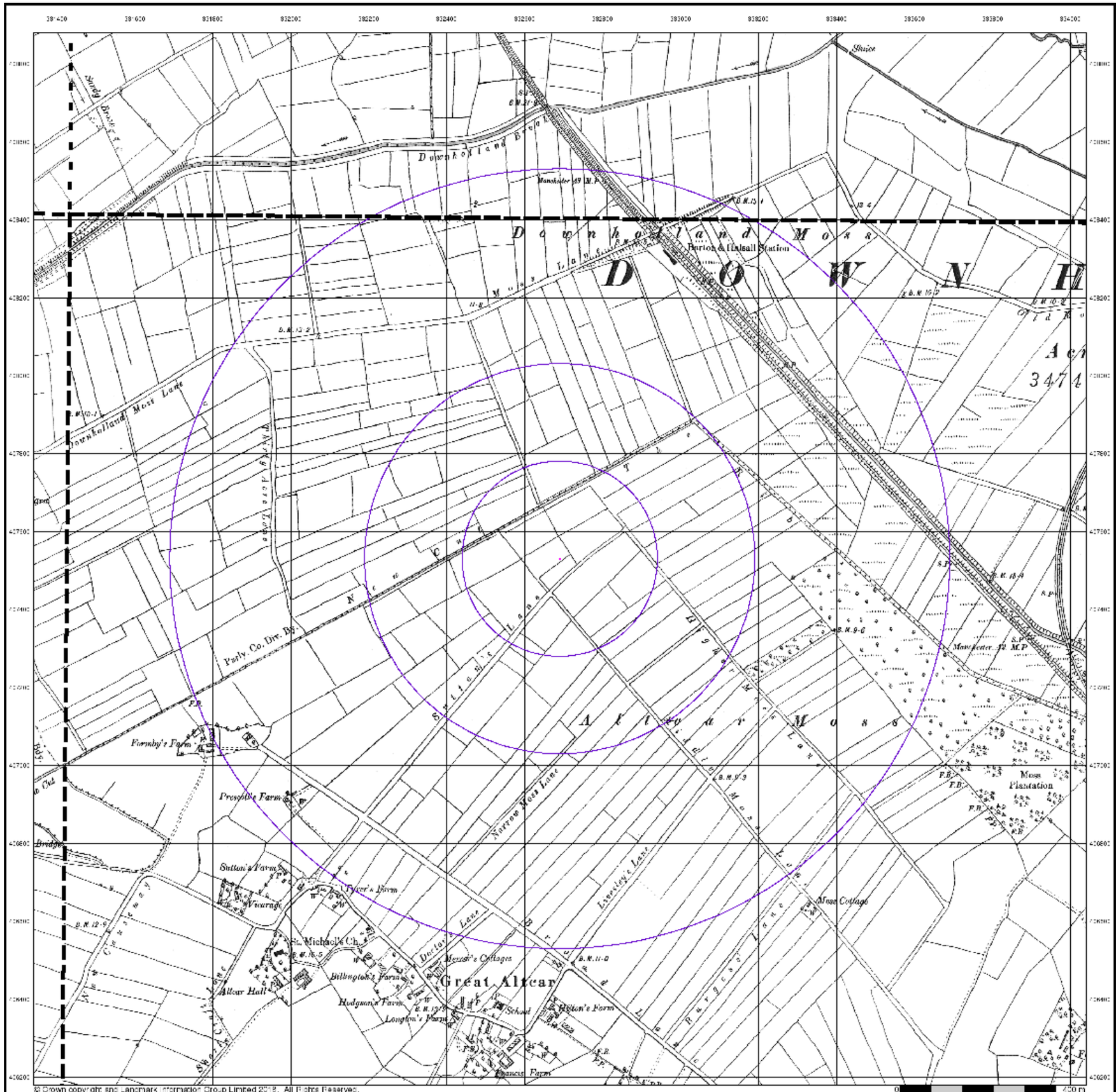

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Lancashire And Furness

Published 1894

Source map scale - 1:10,560

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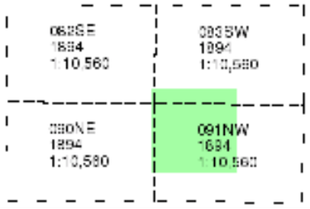
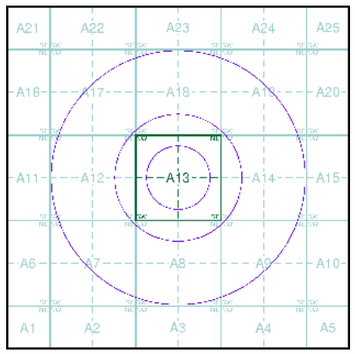


Historical Map - Slice A



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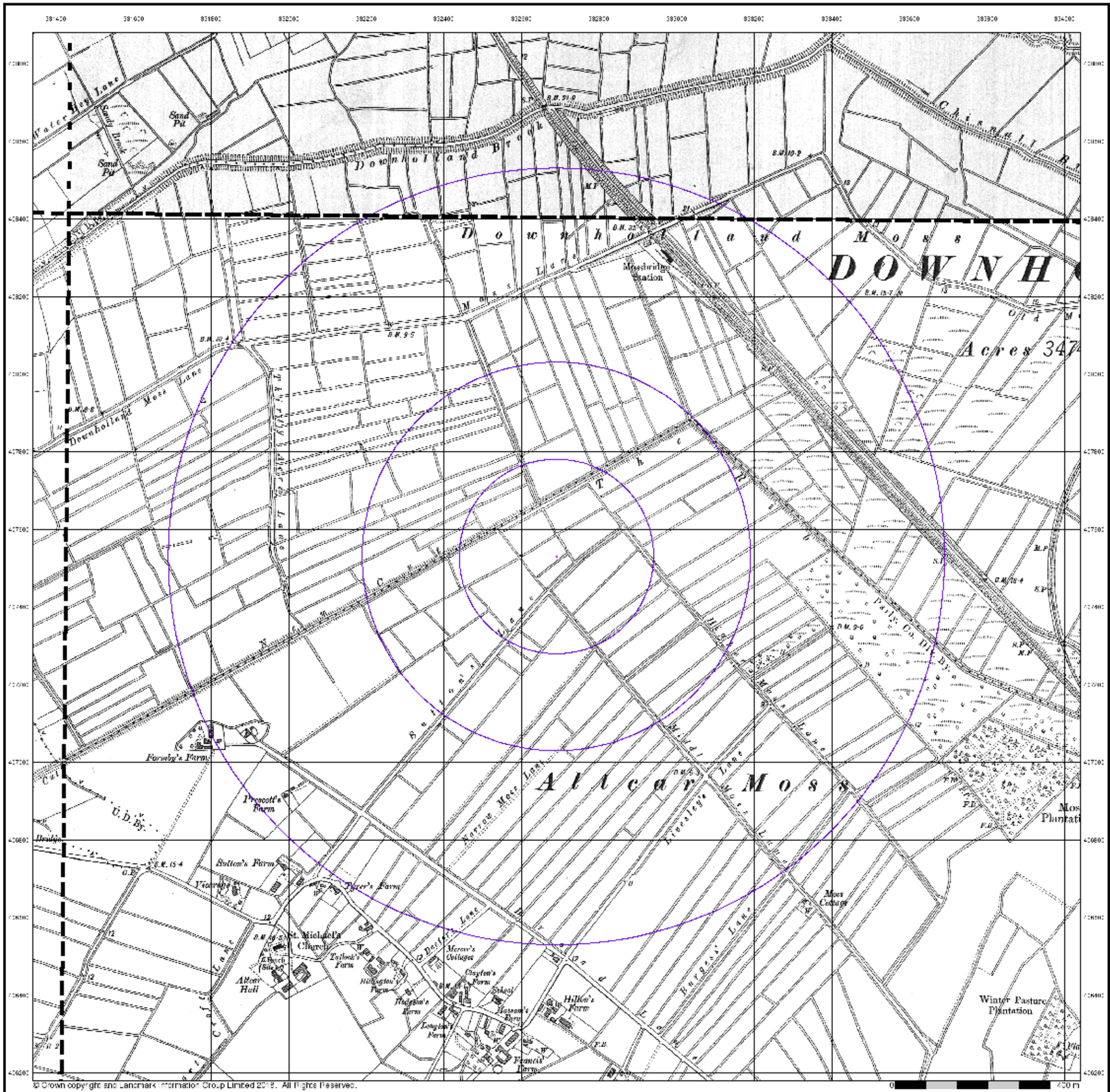

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Lancashire And Furness

Published 1909

Source map scale - 1:10,560

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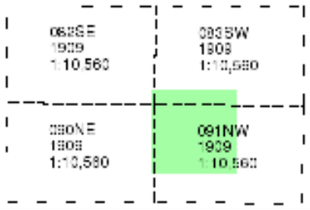

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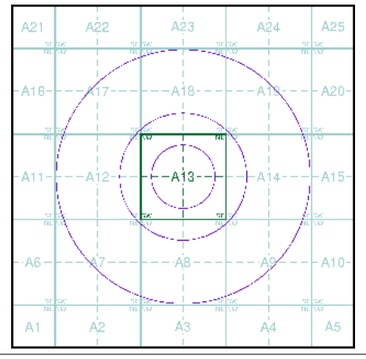

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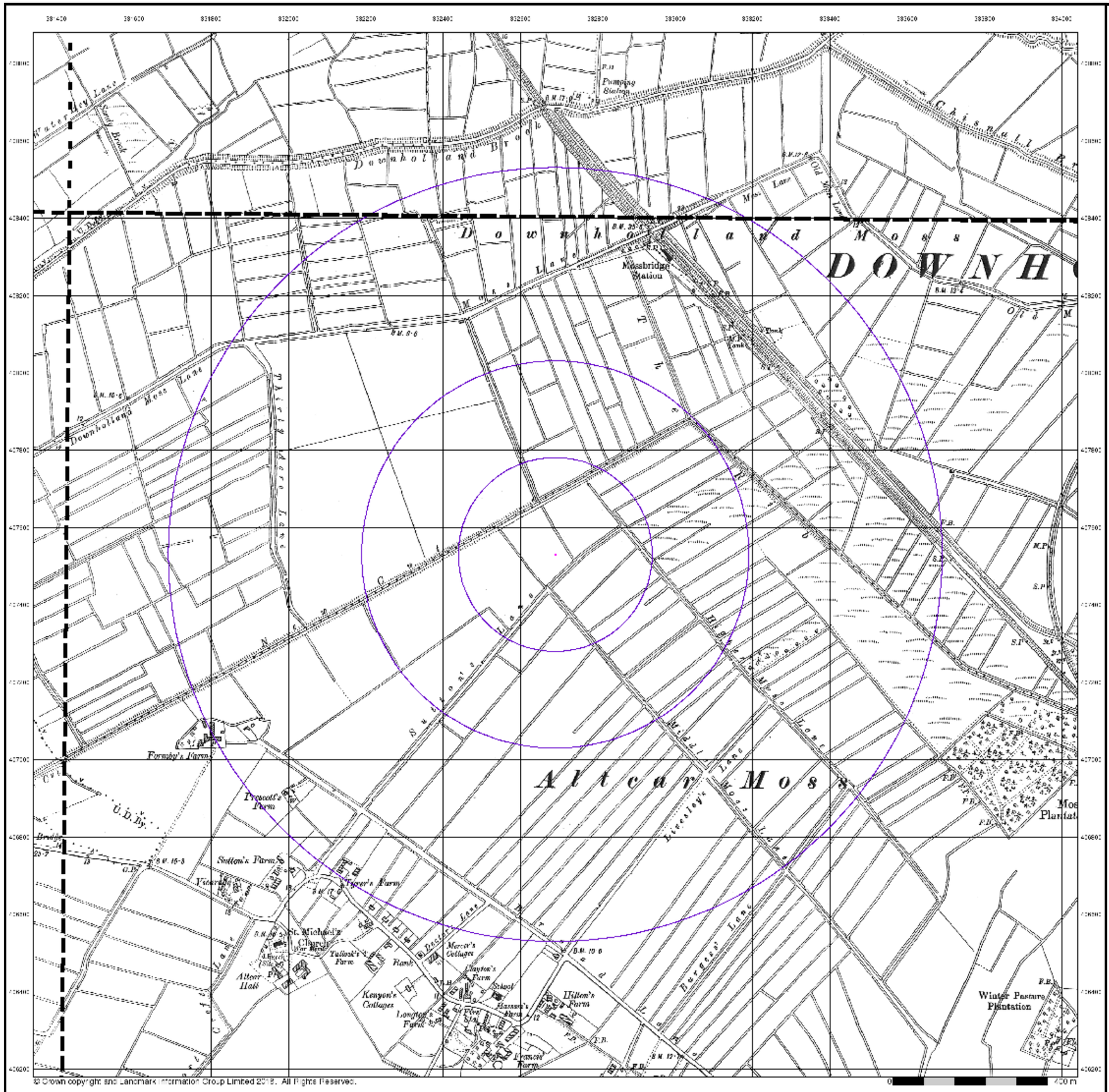

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Lancashire And Furness

Published 1928

Source map scale - 1:10,560

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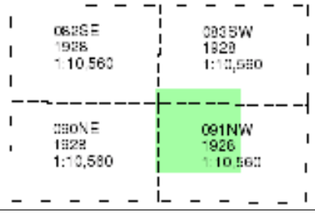
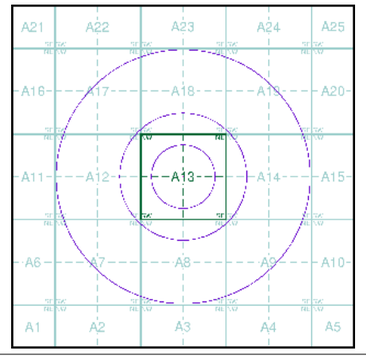


Historical Map - Slice A



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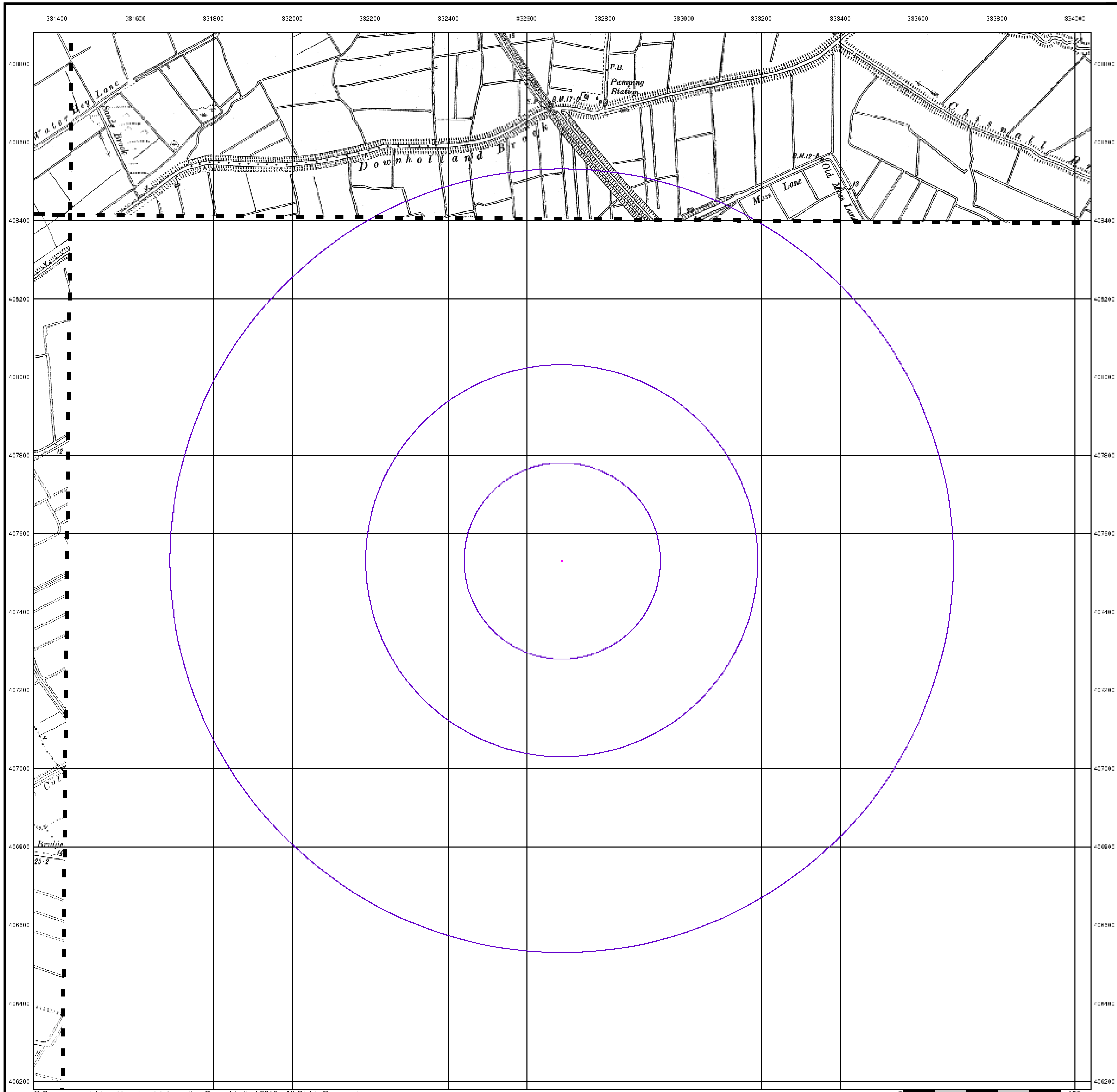

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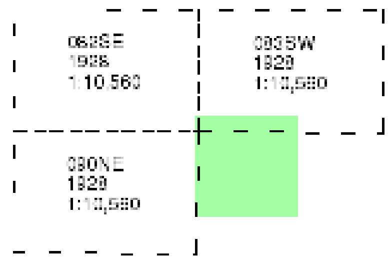
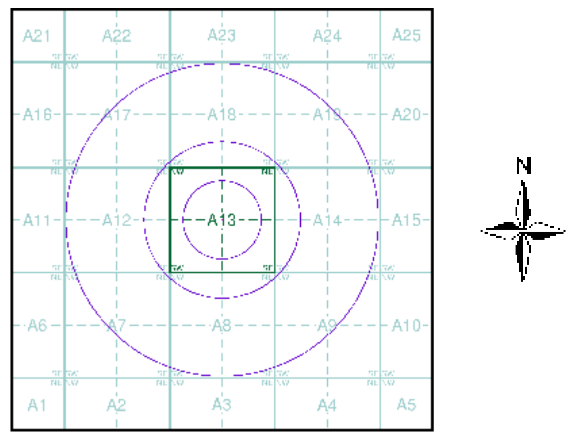


Historical Map - Slice A



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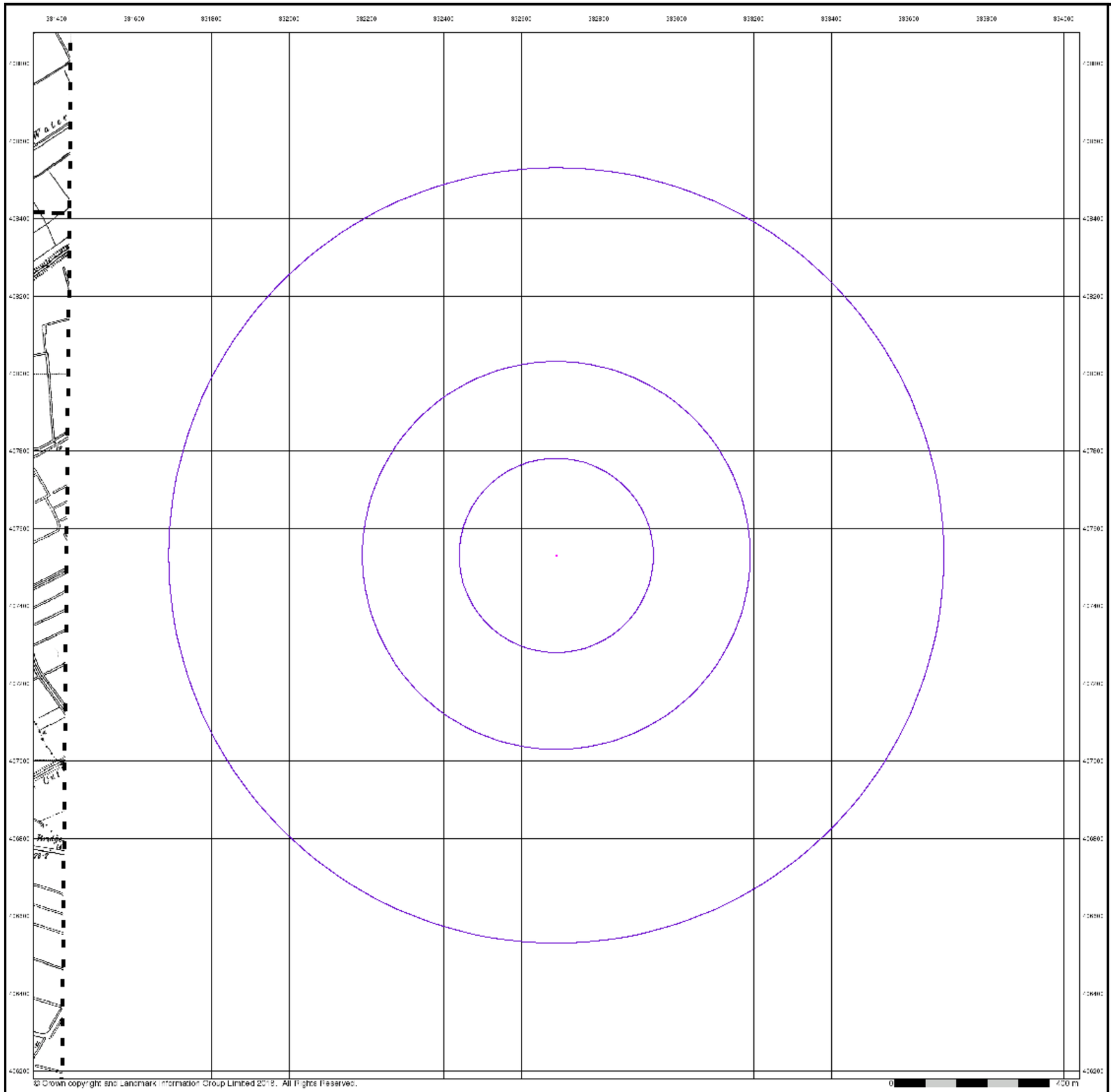

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Lancashire And Furness

Published 1938

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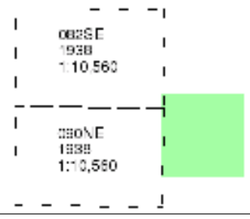
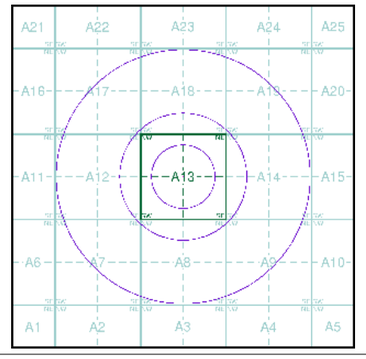
Map Name(s) and Date(s)



Historical Map - Slice A



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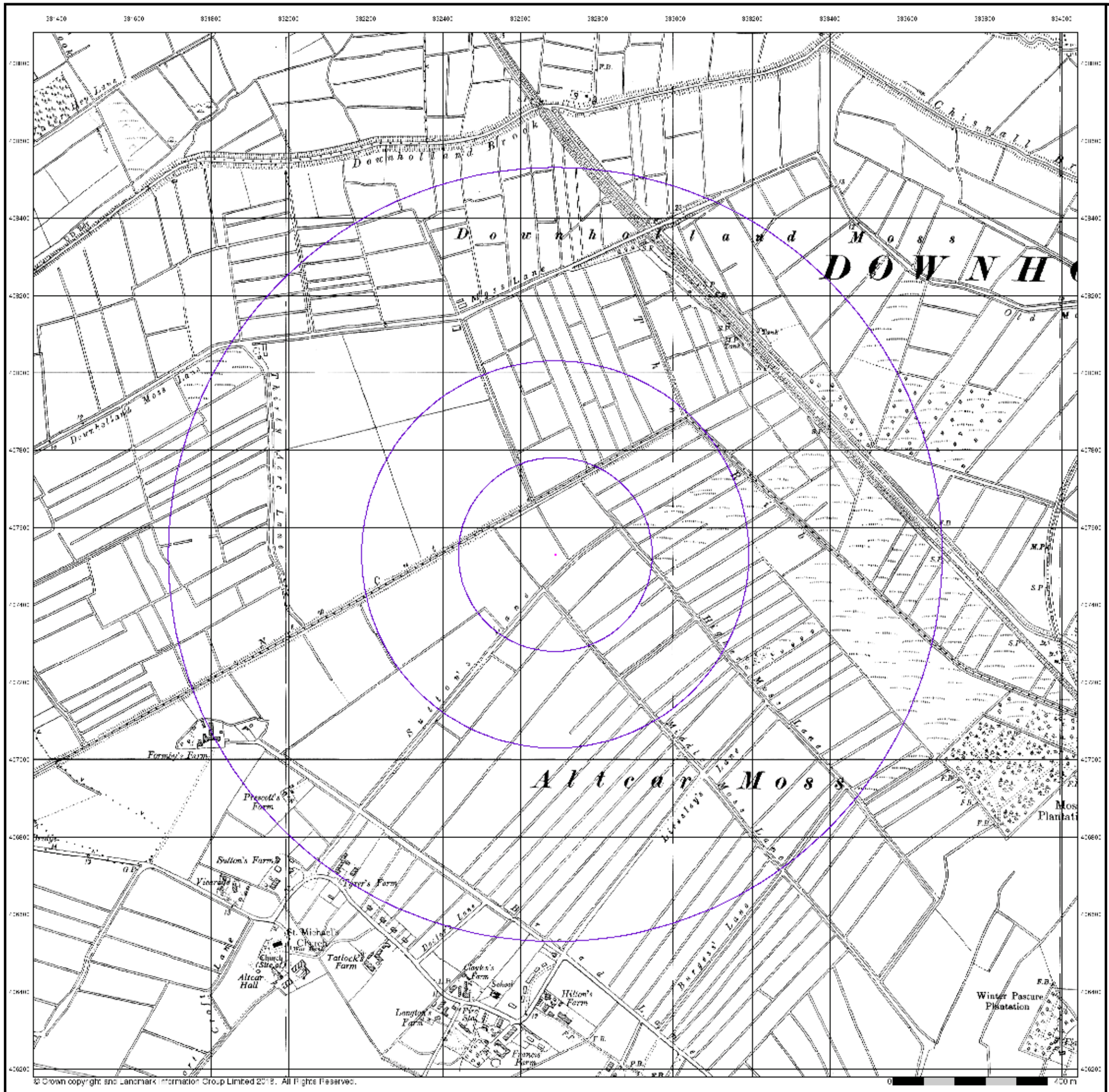

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Ordnance Survey Plan

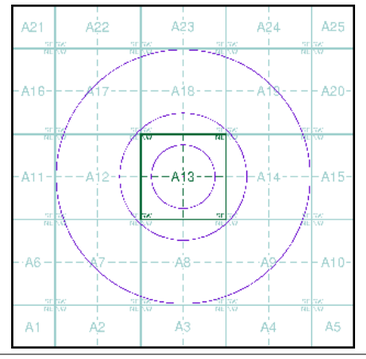
Published 1955

Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

Historical Map - Slice A



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Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

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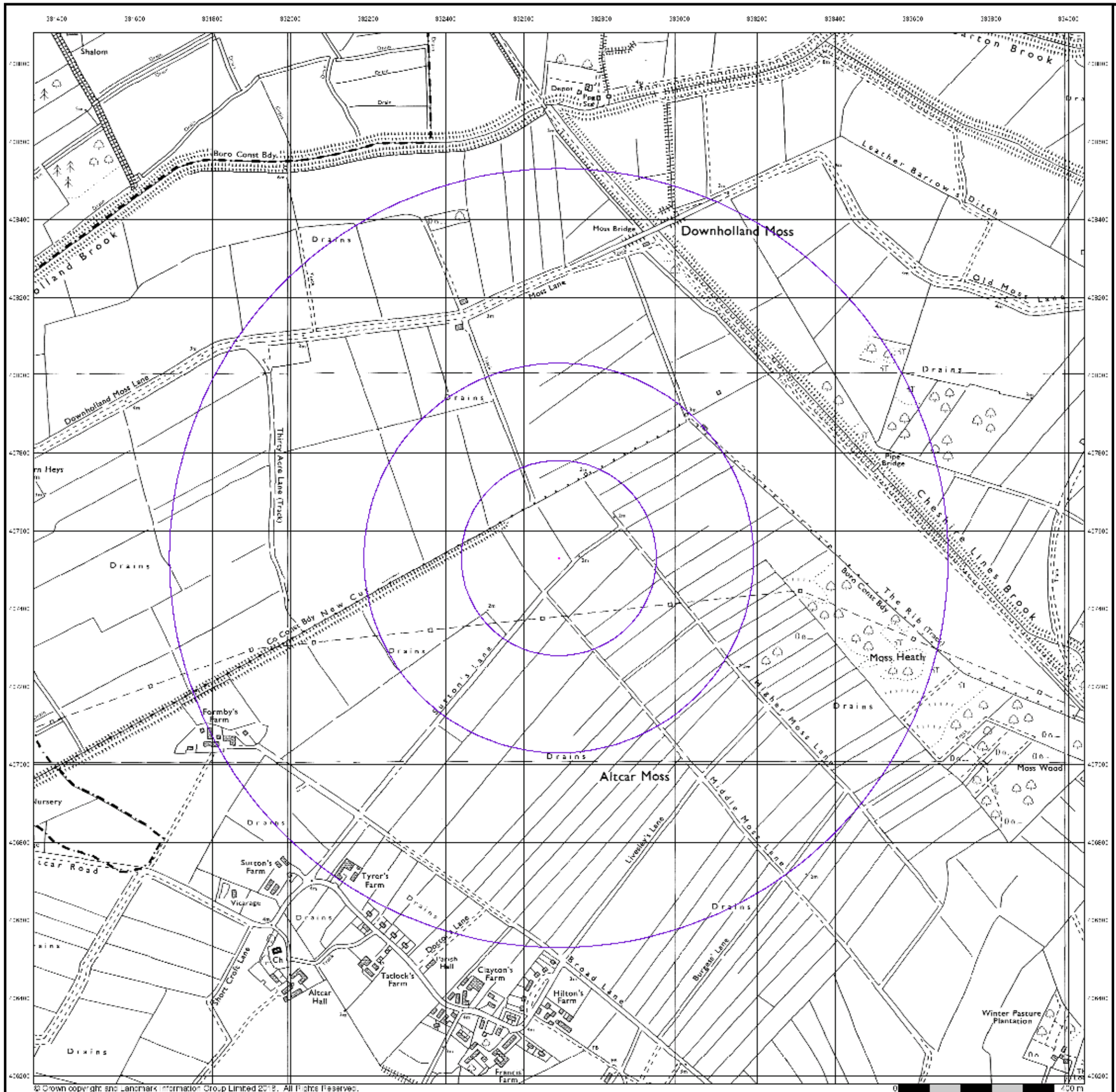

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Ordnance Survey Plan

Published 1974

Source map scale - 1:10,000

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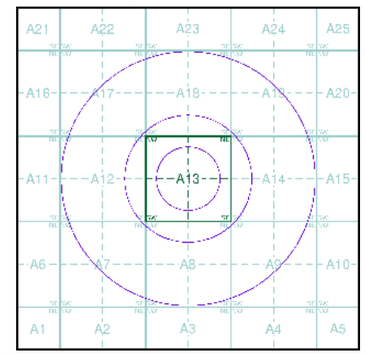
Map Name(s) and Date(s)

SD30NW
1974
1:10,000

Historical Map - Slice A



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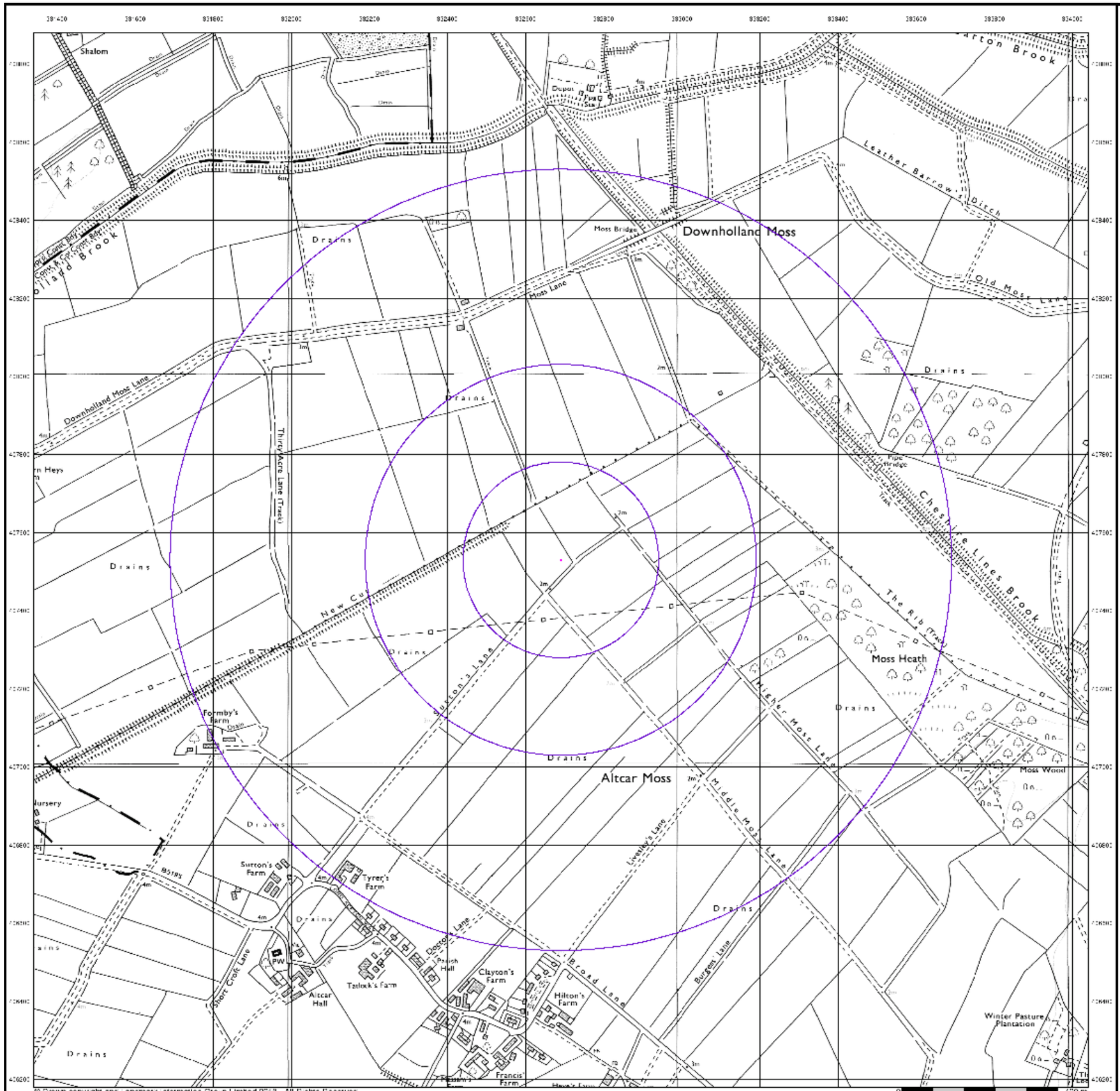

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Ordnance Survey Plan

Published 1993

Source map scale - 1:10,000

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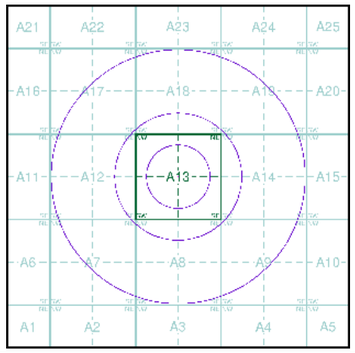
Map Name(s) and Date(s)

SD30NW
1993
1:10,000

Historical Map - Slice A



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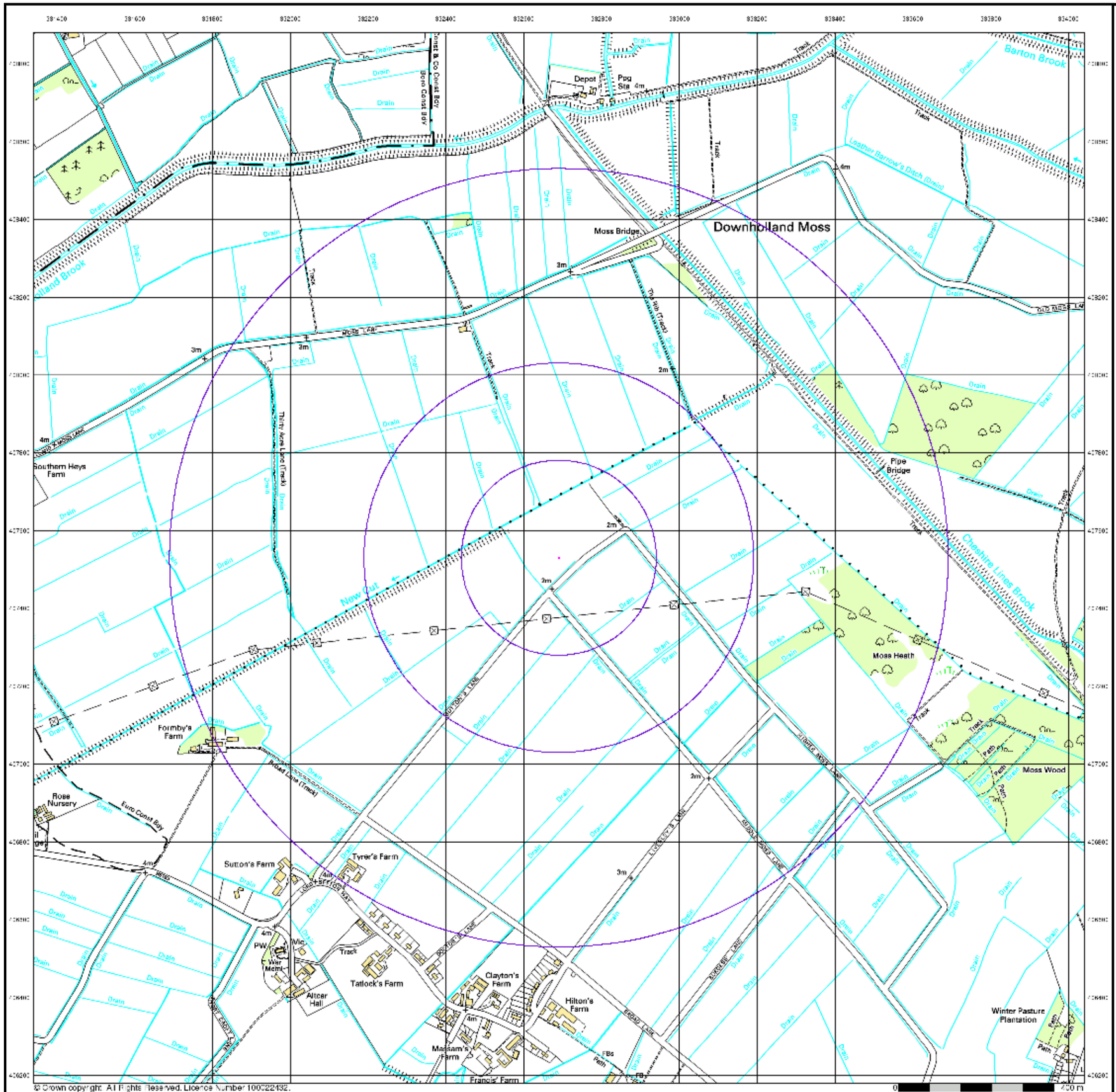

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10k Raster Mapping

Published 1999

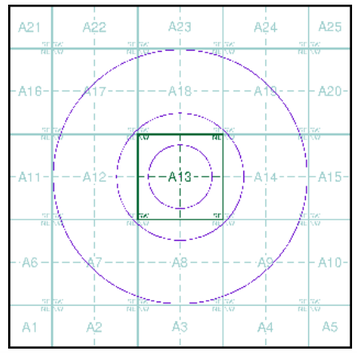
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

SD30NW
1999
1:10,000

Historical Map - Slice A



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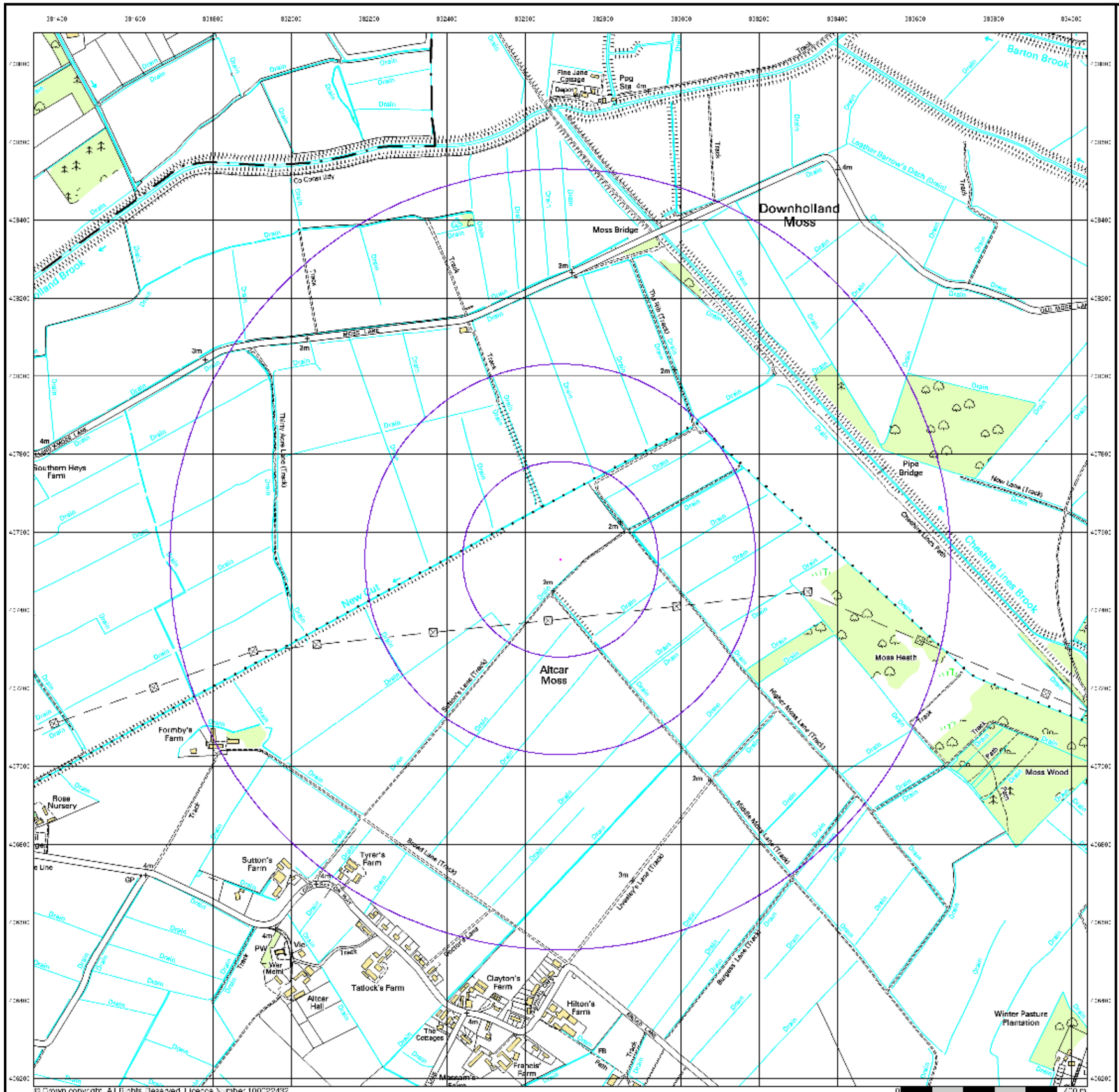

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10k Raster Mapping

Published 2006

Source map scale - 1:10,000

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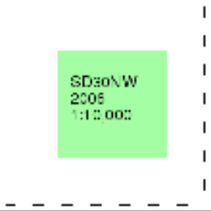

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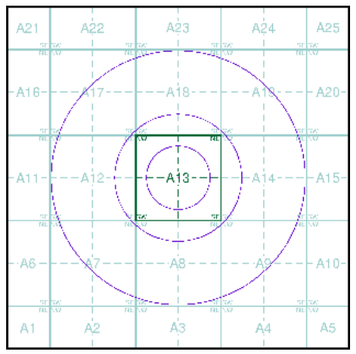

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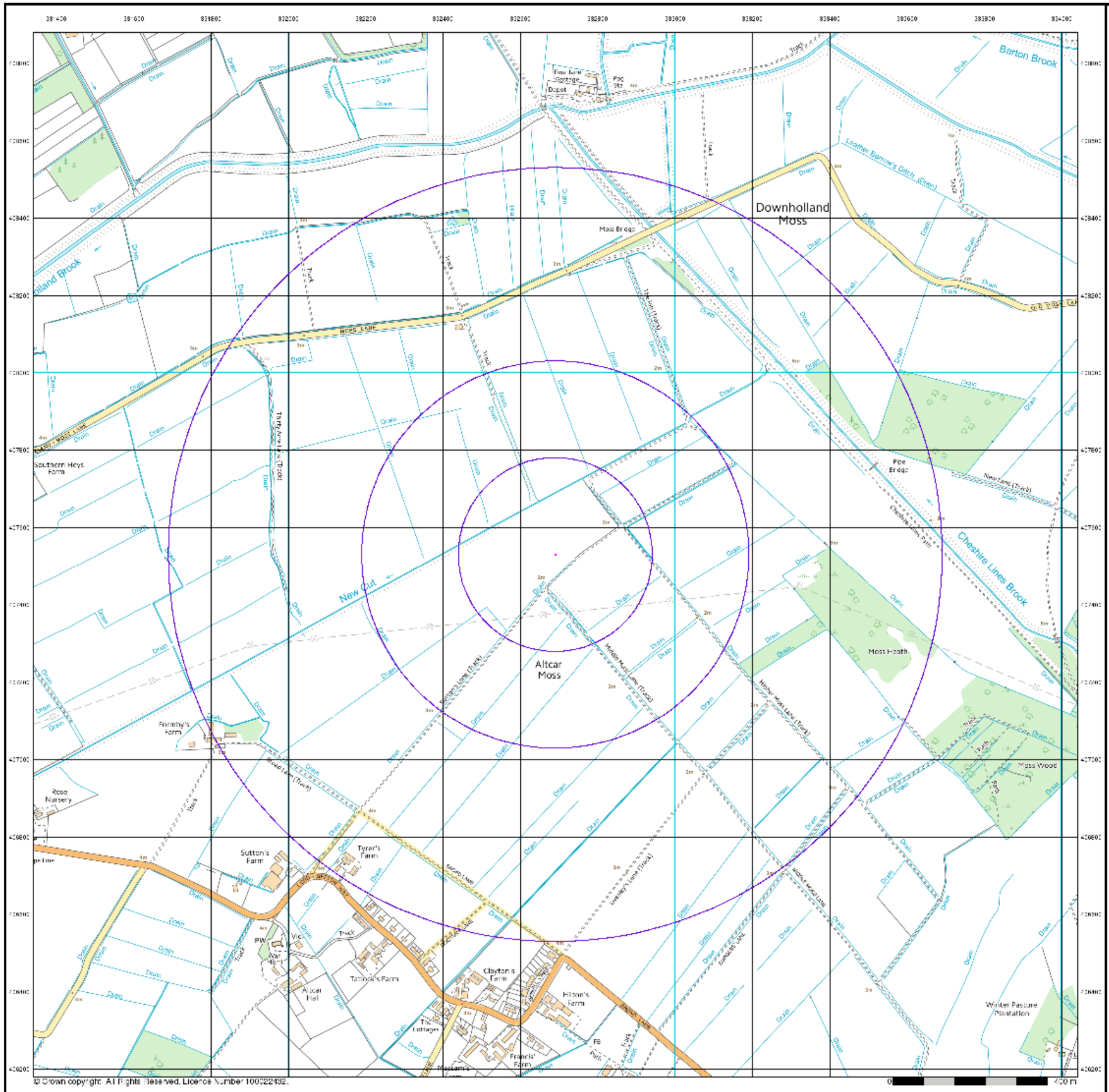

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VectorMap Local

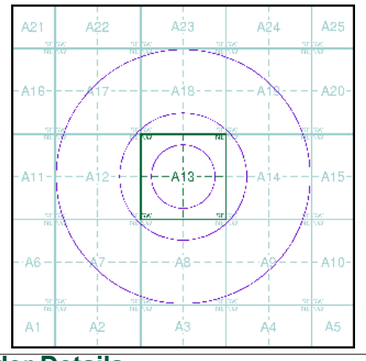
Published 2018

Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

Historical Map - Slice A



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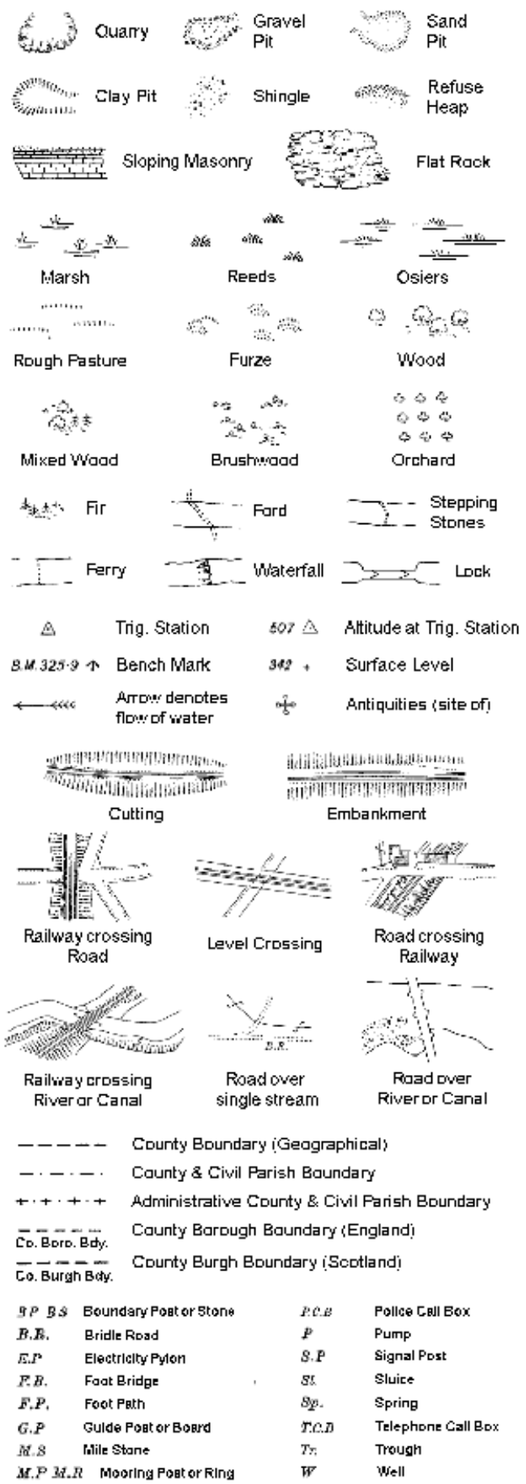
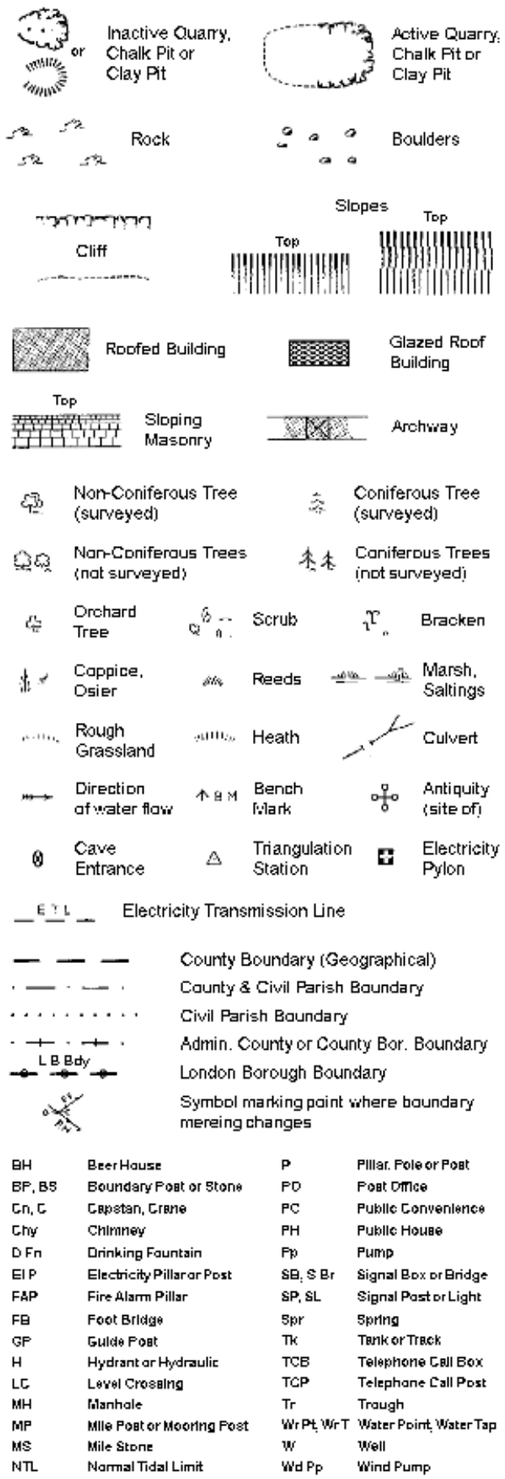
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



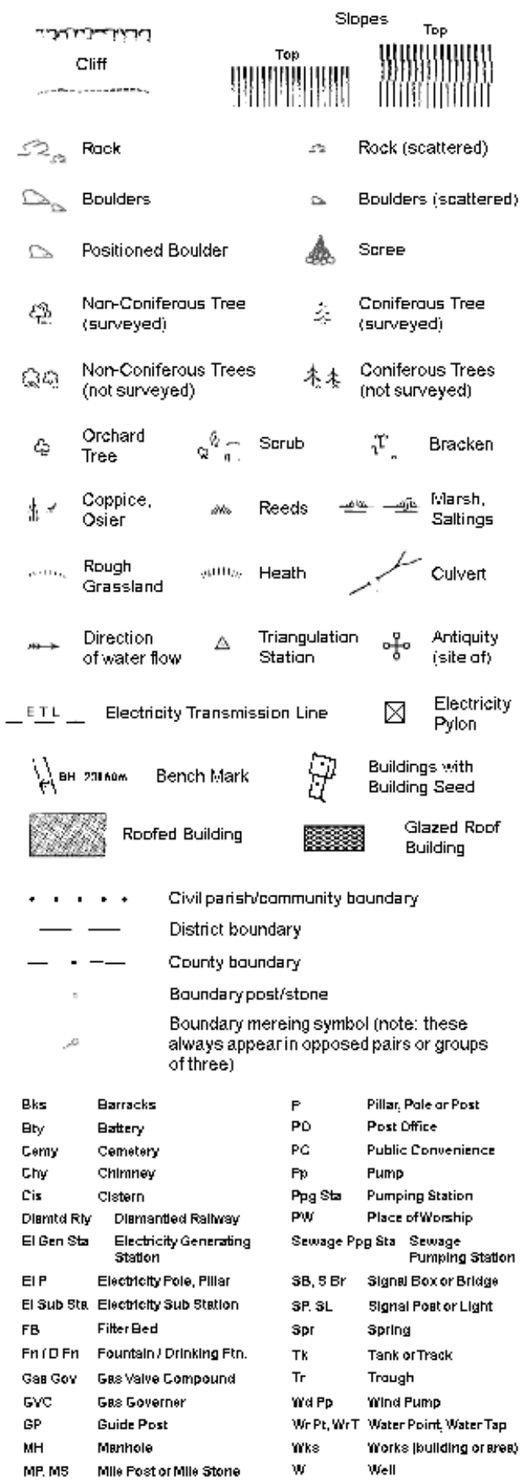
B.S B.S	Boundary Post or Stone	*P.C.B*	Police Call Box
B.R.	Bridle Road	*P*	Pump
E.P	Electricity Pylon	*S.P*	Signal Post
F.B.	Foot Bridge	*Sl.*	Sluice
F.P.	Foot Path	*Sp.*	Spring
G.P	Guide Post or Board	*T.C.B*	Telephone Call Box
M.S	Mile Stone	*Tr.*	Trough
M.P M.R	Mooring Post or Ring	*W*	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governor	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

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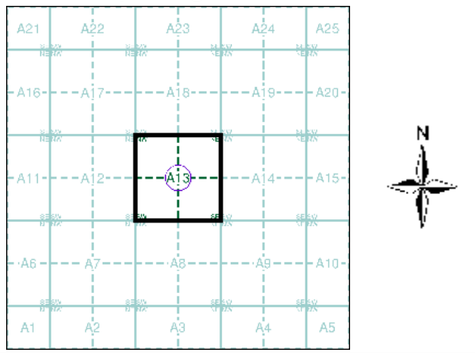
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:2,500	1893	2
Lancashire And Furness	1:2,500	1908	3
Lancashire And Furness	1:2,500	1927	4
Ordnance Survey Plan	1:2,500	1972	5
Large-Scale National Grid Data	1:2,500	1993	6
Historical Aerial Photography	1:2,500	2000	7

Historical Map - Segment A13



Order Details

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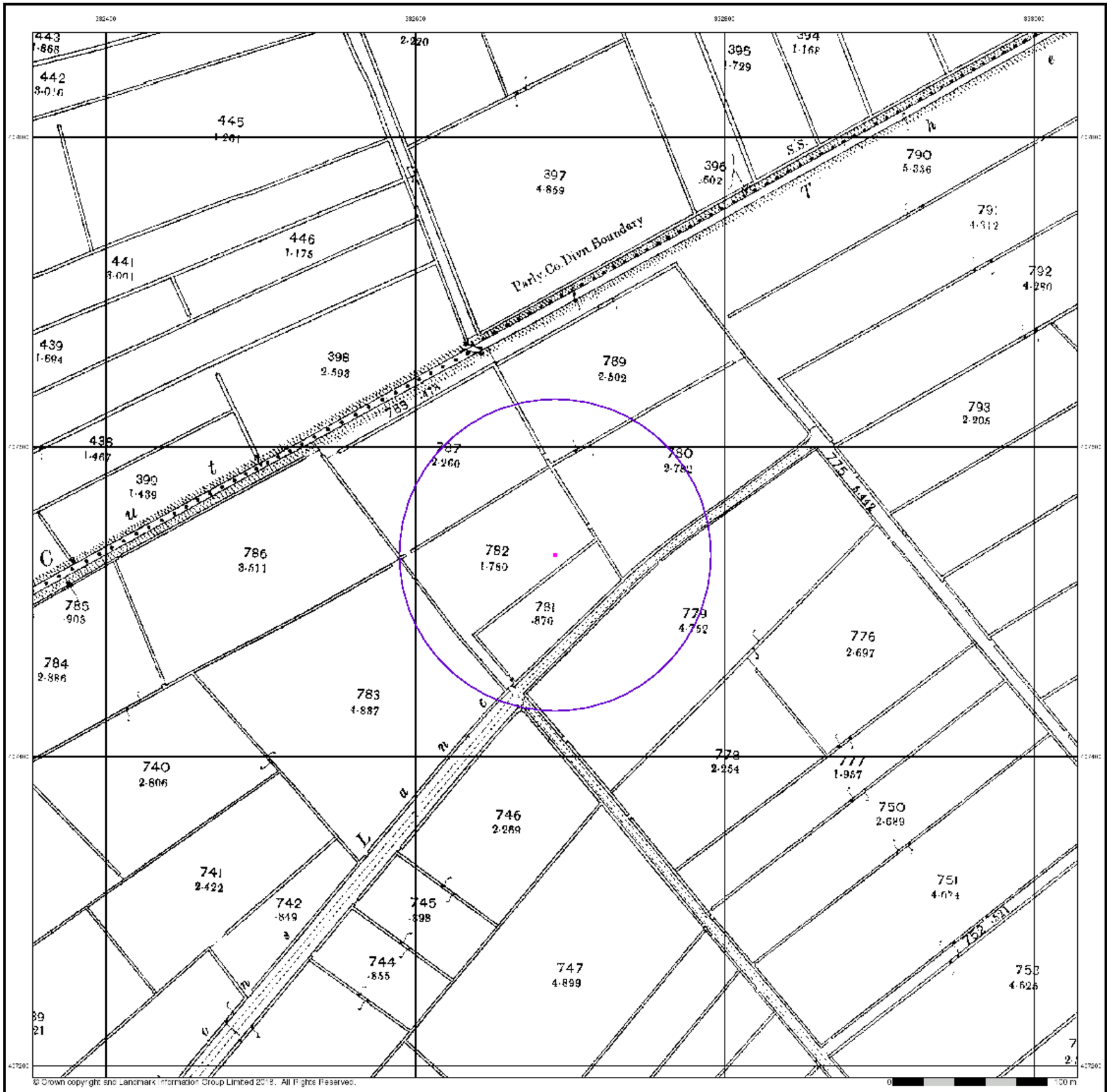

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Lancashire And Furness

Published 1893

Source map scale - 1:2,500

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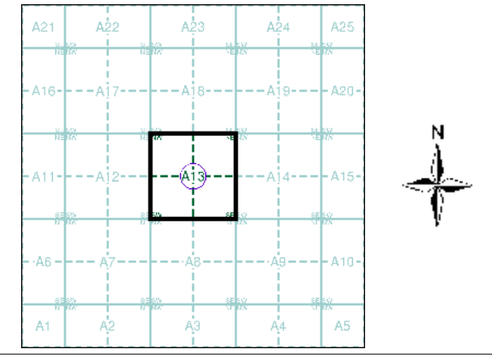
Map Name(s) and Date(s)

Historical Map - Segment A13



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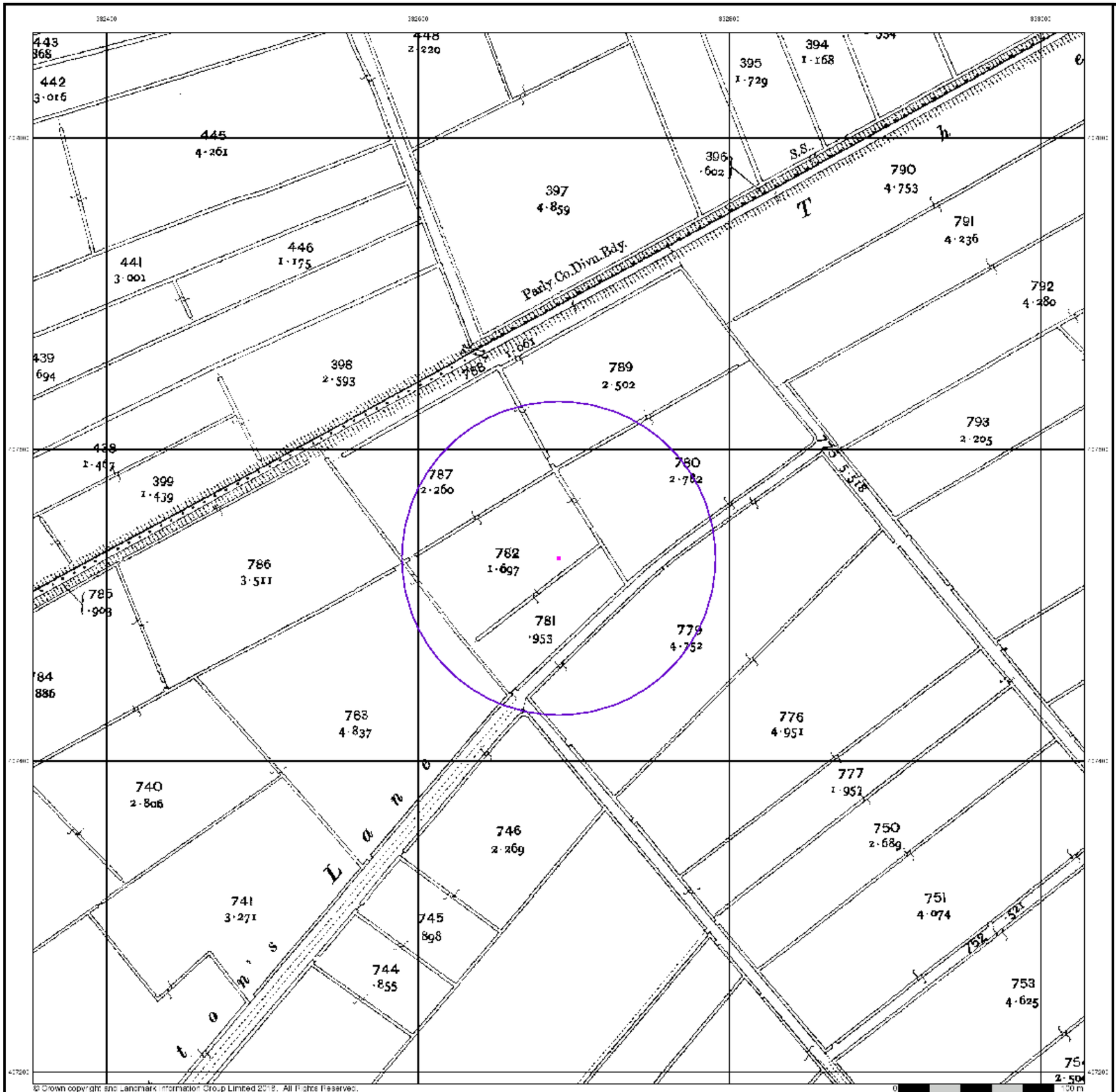

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Lancashire And Furness

Published 1908

Source map scale - 1:2,500

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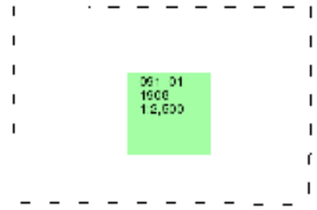

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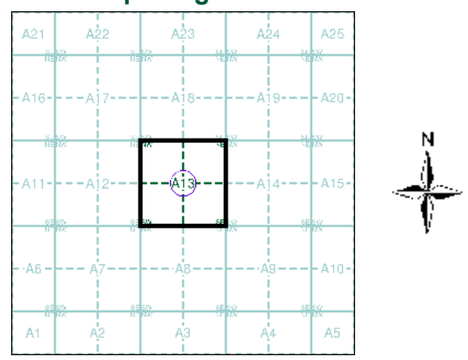

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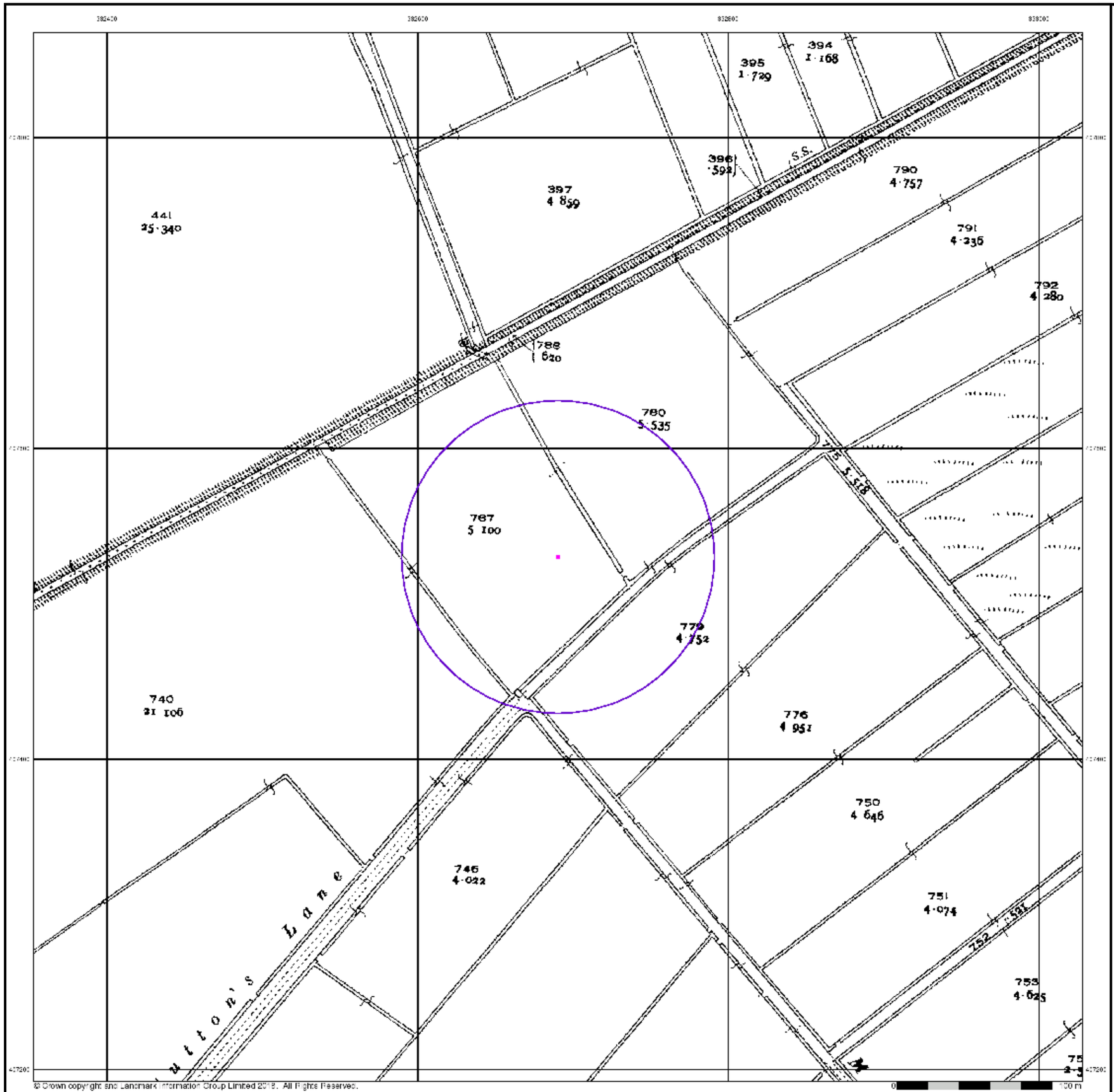

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Lancashire And Furness

Published 1927

Source map scale - 1:2,500

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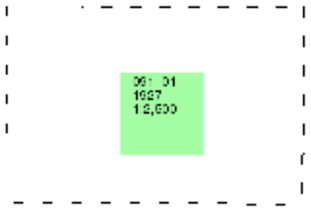

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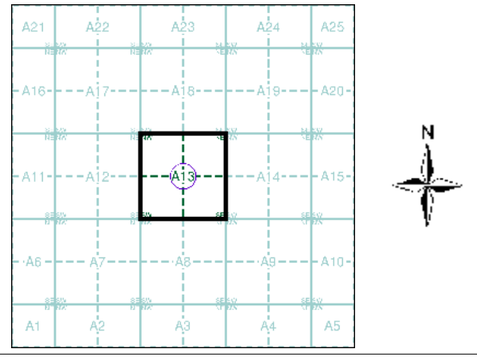

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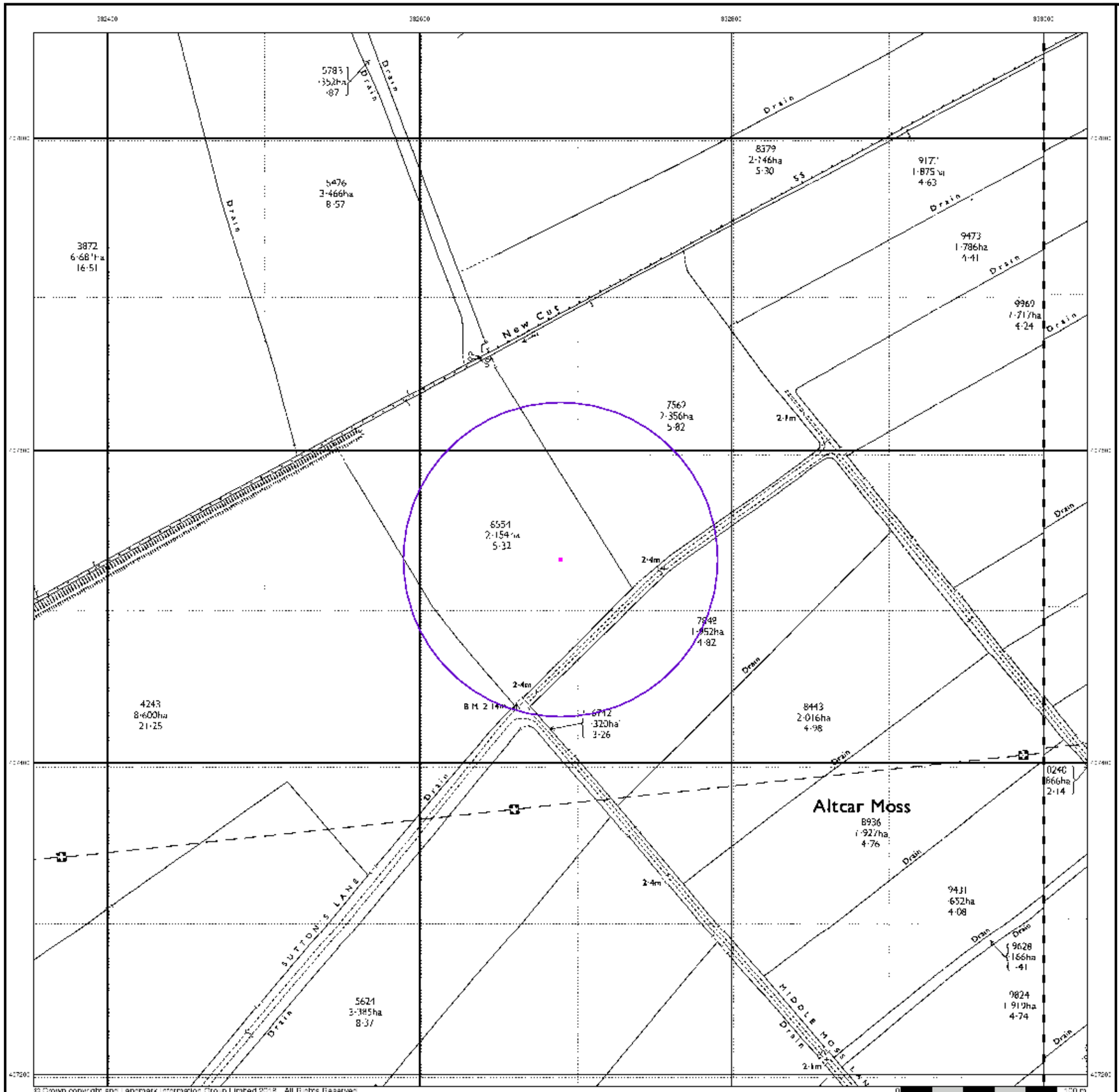

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Ordnance Survey Plan

Published 1972

Source map scale - 1:2,500

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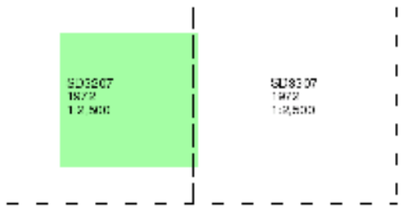

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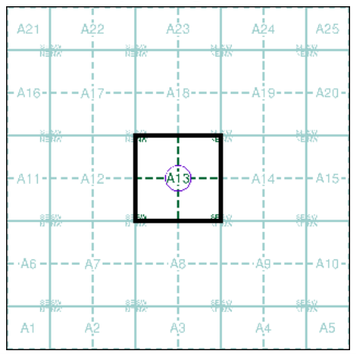

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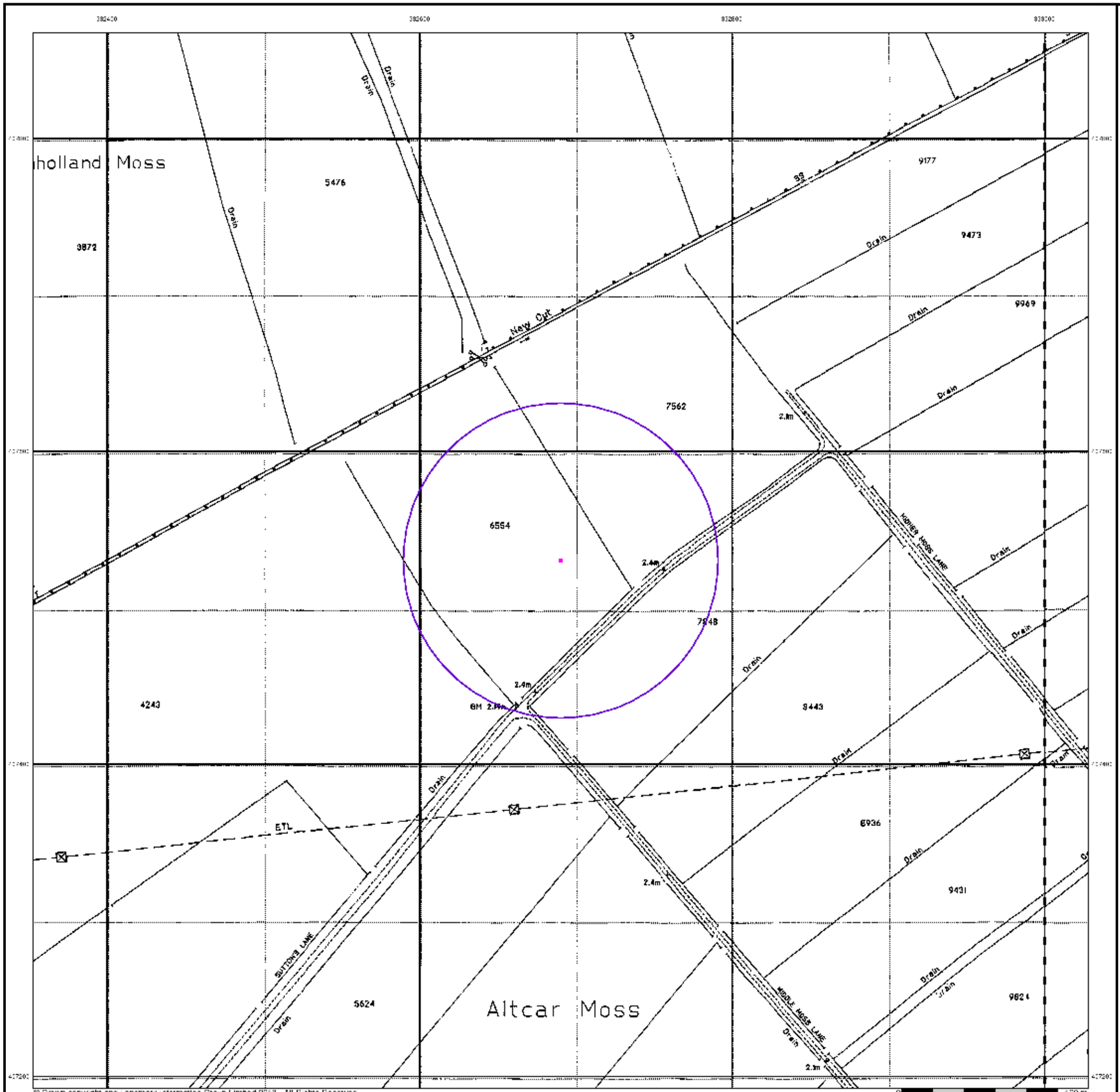

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0 100 m

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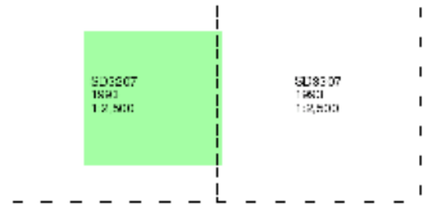
Large-Scale National Grid Data

Published 1993

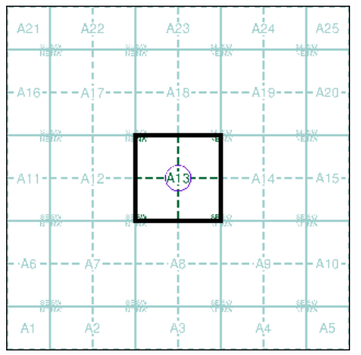
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

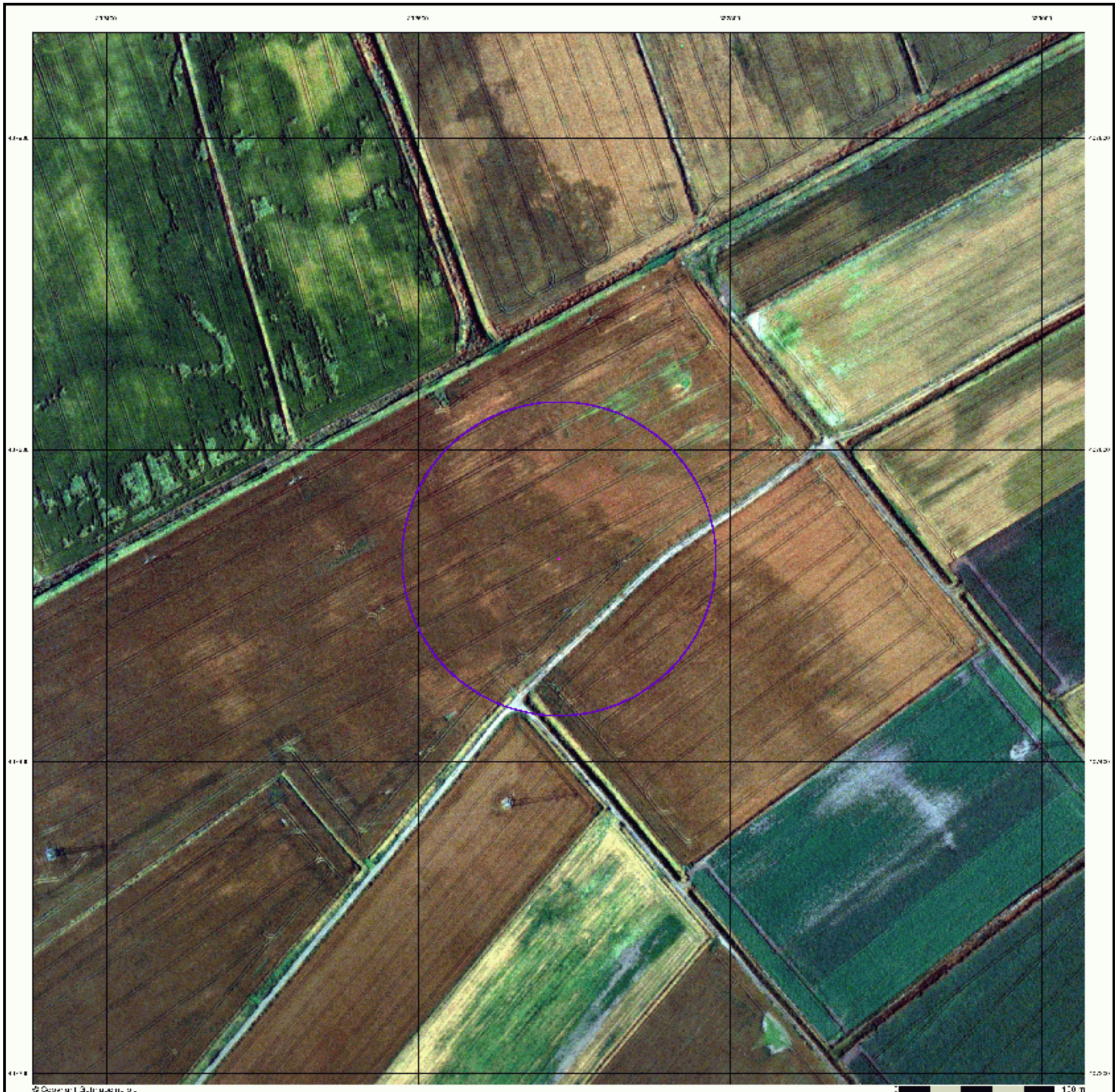
Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	100

Site Details

Site at 332690, 407530

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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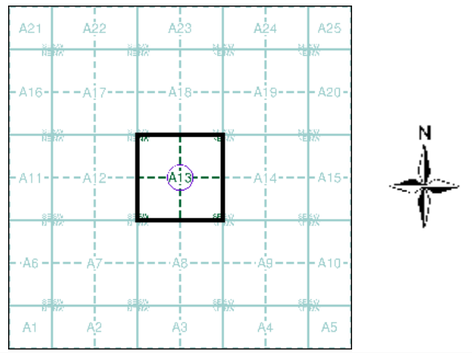
Historical Aerial Photography

Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	100

Site Details

Site at 332690, 407530

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Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck® Report:

Historical Data Report Datasheet

Order Details:

Order Number:
166375554_1_1

Customer Reference:
2018/0129

National Grid Reference:
332690, 407530

Slice:
A

Site Area (Ha):
0.01

Search Buffer (m):
1000

Site Details:

Site at 332690, 407530

Client Details:

Mr A Rose
Envireau Ltd
Cedars Farm Barn
Market Street
Draycott
Derbyshire
DE72 3NB

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LANDMA

Contents

Report Section	Page Number
Summary	-
Historical Building Plans Information	-
Historical Land Use Information	1
Historical Tanks and Energy Facilities	-
Historical Map List	2
Useful Contacts and Further Information	3

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Building Plans Information					
Areas Cleared Due To Enemy Action					
Above Ground Fuel Tanks (100m)				n/a	n/a
Asbestos (100m)				n/a	n/a
Benzene/Benzole/Naphtha, Naphthalene/Kerosene (100m)				n/a	n/a
Electricity Generation (100m)				n/a	n/a
Electricity Sub-Stations (100m)				n/a	n/a
Gas Industry (100m)				n/a	n/a
Gas Storage (100m)				n/a	n/a
Gas Use (100m)				n/a	n/a
Oil Industry (100m)				n/a	n/a
Oil Storage (100m)				n/a	n/a
Oil Use (100m)				n/a	n/a
Paint based Oils (100m)				n/a	n/a
Paraffin (100m)				n/a	n/a
Petrol and Diesel Industry (100m)				n/a	n/a
Petrol and Diesel Storage (100m)				n/a	n/a
Petrol and Diesel Use (100m)				n/a	n/a
Potential Fuel Gas (100m)				n/a	n/a
Potential Fuel Oil (100m)				n/a	n/a
Potential Fuel Use (100m)				n/a	n/a
Potential Petrol and Diesel (100m)				n/a	n/a
Potential Tanks (100m)				n/a	n/a
Potentially Fuel-related Tanks (100m)				n/a	n/a
Underground Fuel Tanks (100m)				n/a	n/a
Historical Land Use Information					
Former Marshes					
Historical Flood Liabilities					
Potentially Contaminative Industrial Uses (Past Land Use)	pg 1				2
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)					

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Tanks and Energy Facilities					
Electrical Sub Station Facilities (100m)				n/a	n/a
Electricity Industry Facilities (100m)				n/a	n/a
Gas Industry Facilities (100m)				n/a	n/a
Gas Monitoring Facilities (100m)				n/a	n/a
Miscellaneous Power Facilities (100m)				n/a	n/a
Oil Industry Facilities (100m)				n/a	n/a
Petroleum Storage Facilities (100m)				n/a	n/a
Potential Tanks (100m)				n/a	n/a
Tanks (100m)				n/a	n/a

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Historical Land Use Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1894 - 1955	A19SW (NE)	743	1	333239 408031
2	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Railways Date of Mapping: 1894 - 1955	A18NE (N)	899	1	332891 408406

No Historical Building Plans information available.

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The following mapping has been analysed for Historical Land Use Information:

1:10,560	Mapsheet	Published Date
Lancashire And Furness	083_00	1847
Lancashire And Furness	082_00	1848
Lancashire And Furness	090_00	1848
Lancashire And Furness	091_00	1849
Lancashire And Furness	082_SE	1894
Lancashire And Furness	083_SW	1894
Lancashire And Furness	090_NE	1894
Lancashire And Furness	091_NW	1894
Lancashire And Furness	082_SE	1909
Lancashire And Furness	083_SW	1909
Lancashire And Furness	090_NE	1909
Lancashire And Furness	091_NW	1909
Lancashire And Furness	082_SE	1928
Lancashire And Furness	083_SW	1928
Lancashire And Furness	090_NE	1928
Lancashire And Furness	091_NW	1928
Ordnance Survey Plan	SD30NW	1955
1:10,000	**Mapsheet**	**Published Date**
Ordnance Survey Plan	SD30NW	1993

The following mapping has been analysed for Historical Tanks and Energy Facilities:

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	SD3207	1972
Ordnance Survey Plan	SD3307	1972

Useful Contacts and Further Information

Contact	Name and Address	Contact Details
1	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9966 Fax: 0844 844 9951 Email: helpdesk@landmark.co.uk Website: www.landmark.co.uk

Historical Building Plans Information

This data set contains potentially contaminative features such as asbestos, petrol, oil and tanks captured from Historical Building Plans. The Historical Building Plans were produced by the London-based firm Charles E. Goad Ltd. as fire insurance plans, dating back to 1885. The firm ceased production of fire insurance plans in 1970. Most of the important towns and cities of the British Isles are covered. Historical Building Plans are usually at the scales of 1:480 (1 inch to 40 feet) for the British Isles. They were updated every 5-6 years by means of revision sheets designed to be pasted on to the original plans.

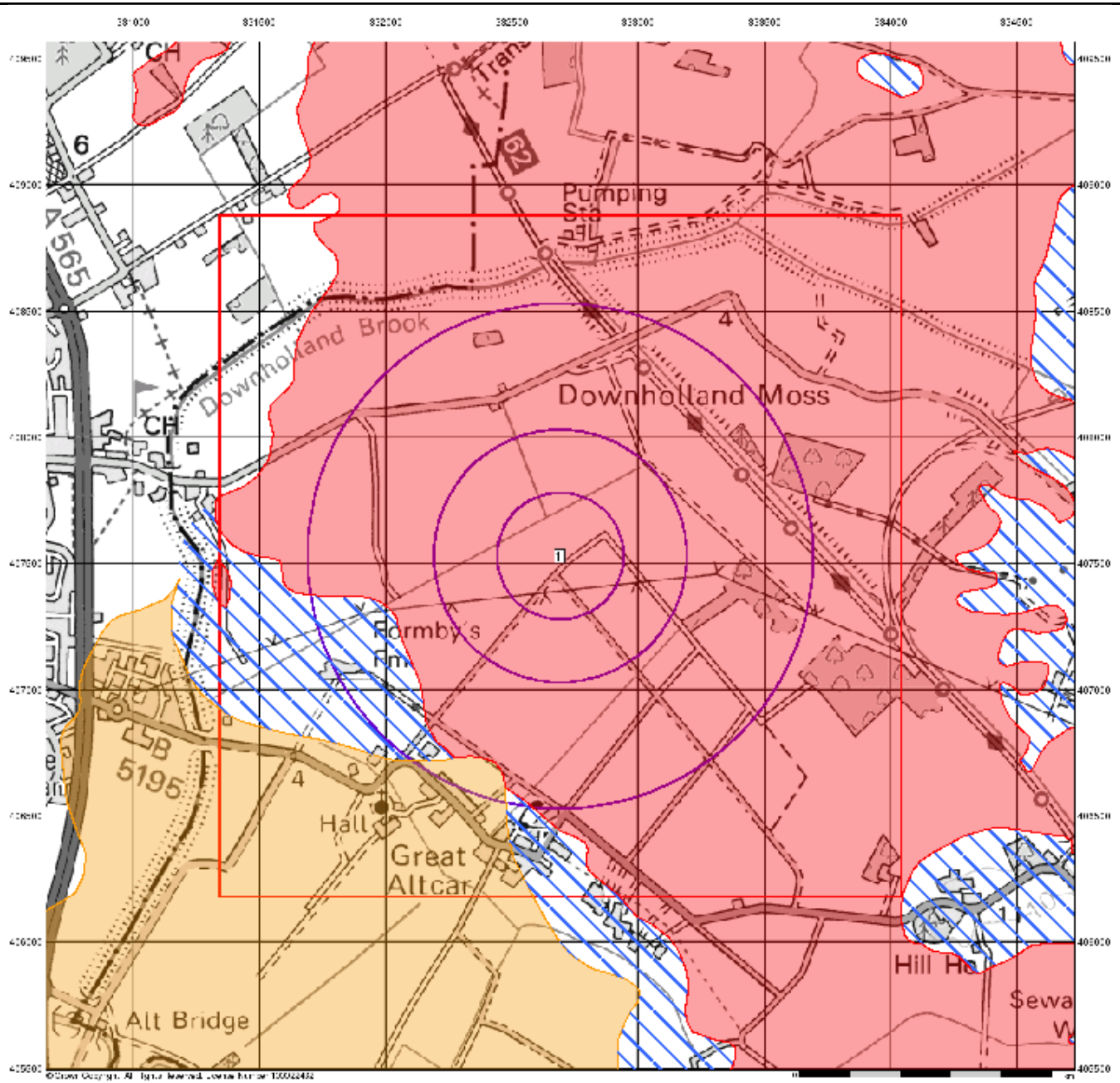
It should be noted that Historical Building Plans are only available for certain major towns and cities and in some cases there may only be partial coverage of the search area. It cannot therefore be assumed that the absence of responses under the Historical Building Plans section of this report indicates that no hazards exist. Please check the Historical Building Plans Map List table in the Historical Map List section of this report to establish if Historical Building Plans are available for this search area.

Historical Land Use Information

Landmark's Historical Land Use Data is the result of combined analysis of historical map data captured at 1:10,560 and 1:10,000. A unique comprehensive database of Historic Land Use from the 1840's to 1996 it includes 67 different types of potentially contaminated past industrial land use. This entailed analysing over 60,000 maps and is drawn from at least four, and up to six historical map editions. In addition a seventh layer was also created, known as the land use layer, containing areas of infilled land which are plotted via comparison between two or more map editions.

Historical Tanks and Energy Facilities

In addition to HLUD, additional analysis uncovered some of the most dangerous sources of contamination (past and present tanks, petrol storage, oil, gas, electricity, miscellaneous facilities). This data set covers over 390,000 Historical Tanks and Energy facilities in Great Britain and was captured from post war 1:2500 and 1:1250 Ordnance Survey historical mapping covering a period from 1943 to 1996.



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Ground Stability Data (1:50,000)

General

Specified Site

Potential for Compressible Ground Stability Hazards

High | Low

Moderate | Very Low

Potential for Collapsible Ground Stability Hazards

High | Low

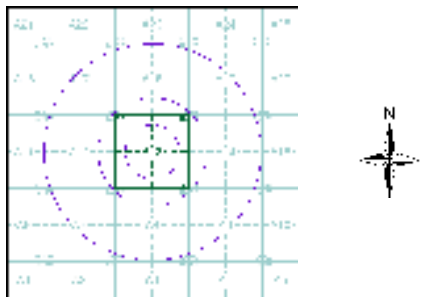
Moderate | Very Low

Brine Pumping and Salt Mining — Point | Polygon

Brine Pumping Related Feature

Salt Mining Related Feature

Mining and Ground Stability - Slice A



Order Details

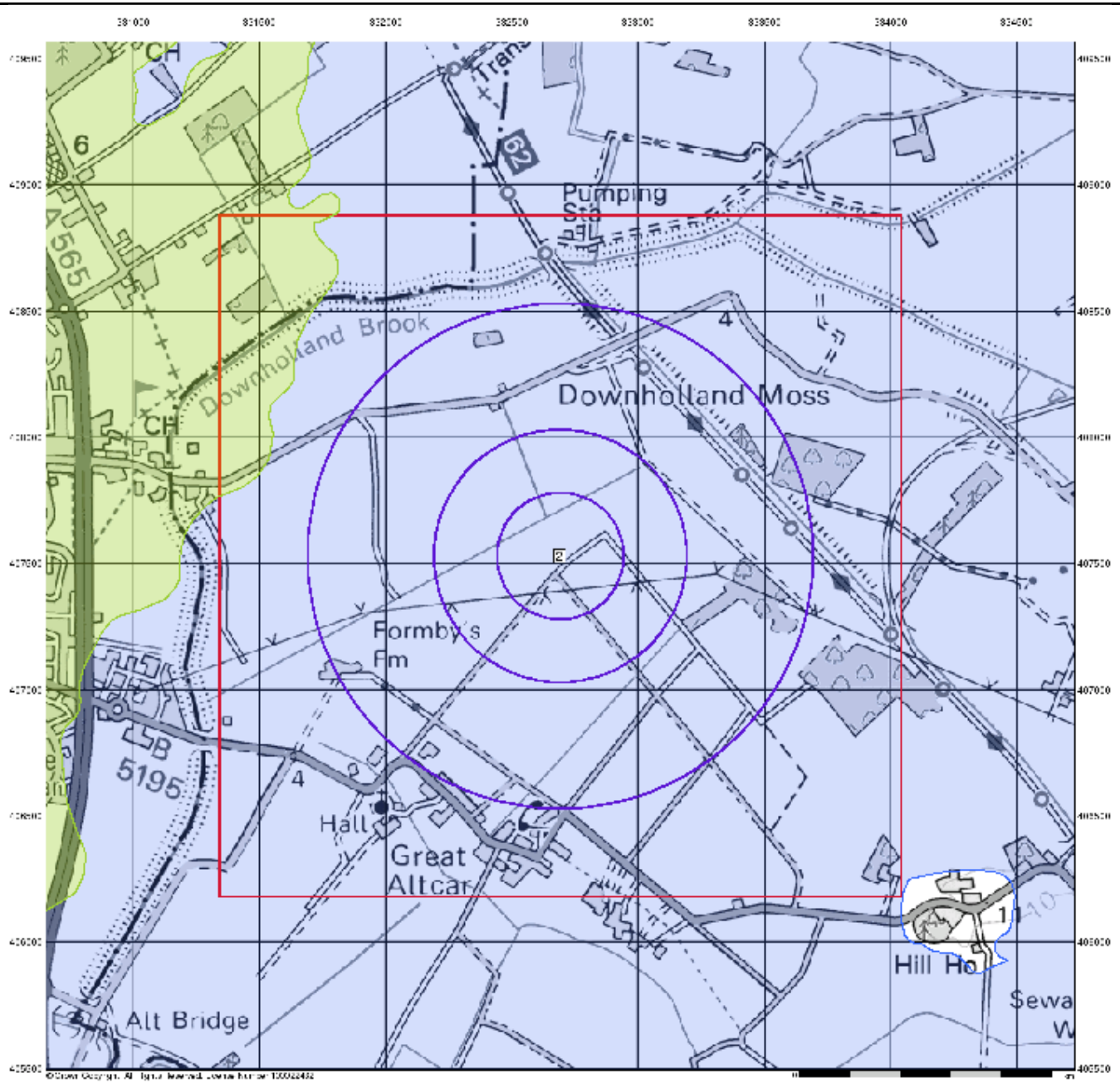
Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

Landmark

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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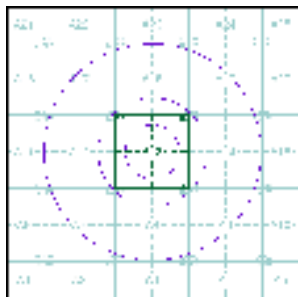
Ground Stability Data (1:50,000)

General

Potential for Landslide Ground Stability Hazards

Potential for Ground Dissolution Stability Hazards

Mining and Ground Stability - Slice A



Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
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Site Details

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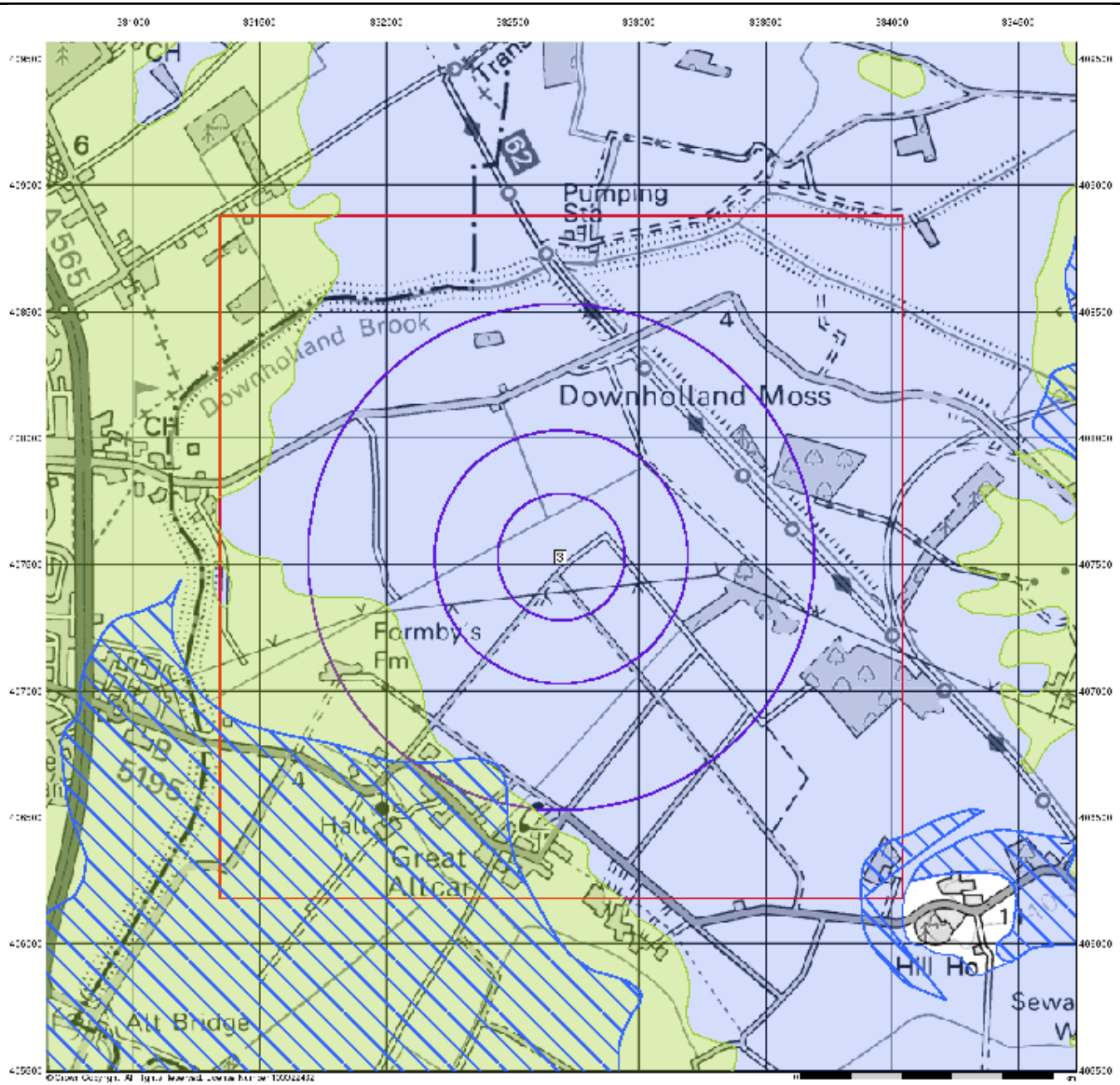

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Ground Stability Data (1:50,000)

General

Site

Potential for Running Sand Ground Stability Hazards

High

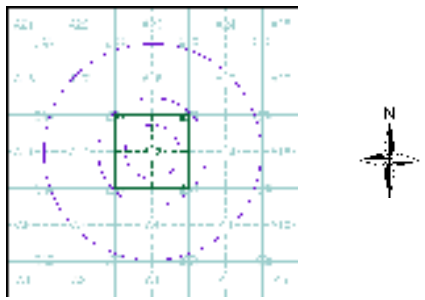
Moderate

Potential for Shrinking or Swelling Clay Ground Stability Hazards

High

Moderate

Mining and Ground Stability - Slice A



Order Details

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Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

Landmark

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck® Report:

Mining and Ground Stability Datasheet

Order Details:

Order Number:
166375554_1_1

Customer Reference:
2018/0129

National Grid Reference:
332690, 407530

Slice:
A

Site Area (Ha):
0.01

Search Buffer (m):
1000

Site Details:

Site at 332690, 407530

Client Details:

Mr A Rose
Envireau Ltd
Cedars Farm Barn
Market Street
Draycott
Derbyshire
DE72 3NB

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LAND

Contents

Report Section and Details	Page Number
Summary	-
The Summary section provides an overview of the data contained within the report, detailing the number of data set features or the existence of a data set in relation to the buffer selected. For ease of reference, the report is broken down into 4 sections of data; Mining and Natural Cavities Data, Historical Land Use Information (1:2,500), Historical Land Use Information (1:10,000) and Ground Stability Data (1:50,000).	
Mining and Natural Cavities Data	-
The Mining and Natural Cavities Data section features data sets related to the existence of mining areas and their potential hazards; and details of naturally formed cavities. Data sets within this section are not plotted, with the exception of BGS Recorded Mineral Sites and Potential Mining Areas which feature on the Historical Land Use Information (1:10,000) map.	
Historical Land Use Information (1:2,500)	-
The Historical Land Use Information (1:2,500) section contains data captured from analysis carried out by Landmark of 1:1,250 and 1:2,500 scale historical Ordnance Survey mapping, identifying areas where, historically, the land uses were potentially contaminative. For the purpose of this Envirocheck module, only historical data relating to mining and ground stability has been included and plotted on the corresponding Historical Land Use Information (1:2,500) map. This section also includes the Subterranean Features data set, which details various man-made and man-used underground spaces obtained from the Subterranea Britannica society.	
Historical Land Use Information (1:10,000)	-
The Historical Land Use (1:10,000) section covers data captured from the systematic analysis carried out by Landmark of 1:10, 560 and 1:10,000 scale historical Ordnance Survey mapping dating back to the mid-19th century, identifying potentially contaminative past industrial land uses. For the purpose of this Envirocheck module, only data relating to mining and ground stability has been included and plotted on the accompanying Historical Land Use Information (1:10,000) map.	
Ground Stability Data (1:50,000)	1
The Ground Stability (1:50,000) section includes the BGS Geosure data suite, reporting features to 250m and plotted onto 3 separate maps. Also reported is brine subsidence, brine mining and salt mining data sets, of which Brine Pumping and Salt Mining Related Features are plotted, and subsidence insurance claims and insurance investigations data, which is not plotted.	
Motion Map Data (1:2,500)	-
The Motion Map Data (1:2,500) section contains data which is plotted to indicate long-term stability trends from analysis of satellite radar data.	
Historical Map List	2
The Historical Map List section details the historical mapping that has been analysed for your site, in relation to the Historical Land Use Information sections.	
Data Currency	3
Data Suppliers	5
Useful Contacts	6

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The brine subsidence data relating to the Driotwich area as provided in this report is derived from JPB studies and physical monitoring undertaken annually over more than 35 years. For more detailed interpretation contact enquiries@jpb.co.uk. JPB retain the copyright and intellectual rights to this data and accept no liability for any loss or damage, including in direct or consequential loss, arising from the use of this data.

The Mining Instability data was obtained on licence from Ove Arup & Partners Limited (for further information, contact mining.review@arup.com). No reproduction or further use of such Data is to be made without the prior written consent of Ove Arup & Partners Limited. The supplied Mining Instability data is derived from publicly available records and other third party sources and neither Ove Arup & Partners nor Landmark warrant the accuracy or completeness of such information or data.

Report Version v53.0

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Mining and Natural Cavities Data					
BGS Recorded Mineral Sites					
Coal Mining Affected Areas			n/a	n/a	n/a
Man Made Mining Cavities					
Mining Instability			n/a	n/a	n/a
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential Mining Areas					
Historical Land Use Information (1:2,500)					
Extractive Industries or Potential Excavations from 1855-1909 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1893-1915 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1906-1937 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1924-1949 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1950-1980 (100m)				n/a	n/a
Subterranean Features (100m)				n/a	n/a
Historical Land Use Information (1:10,000)					
Air Shafts					
Disturbed Ground					
General Quarrying					
Heap, unknown constituents					
Mineral Railway					
Mining & quarrying general					
Mining of coal & lignite					
Quarrying of sand & clay, operation of sand & gravel pits					
Former Marshes					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)					

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Ground Stability Data (1:50,000)					
CBSCB Compensation District			n/a	n/a	n/a
Brine Pumping Related Features					
Brine Subsidence Solution Area					
Potential for Collapsible Ground Stability Hazards	pg 1	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 1	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 1	Yes		n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 1	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 1	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 1	Yes		n/a	n/a
Salt Mining Related Features					
Subsidence Insurance Claims				n/a	n/a
Subsidence Investigations				n/a	n/a
Motion Map Data (1:2,500)					
Motion Map (100m)				n/a	n/a

Report Version v53.0

Ground Stability Data (1:50,000)

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	CBSCB Compensation District The site does not fall within the brine compensation area.				
	Brine Subsidence Solution Area The site does not fall within the brine subsidence solution area.				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
1	**Potential for Compressible Ground Stability Hazards** Hazard Potential: High Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
2	**Potential for Landslide Ground Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
3	**Potential for Running Sand Ground Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530

The following mapping has been analysed for Historical Land Use Information (1:2,500):

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	SD3207	1972
Ordnance Survey Plan	SD3307	1972

The following mapping has been analysed for Historical Land Use Information (1:10,000):

1:10,560	Mapsheet	Published Date
Lancashire And Furness	083_00	1847
Lancashire And Furness	082_00	1848
Lancashire And Furness	090_00	1848
Lancashire And Furness	091_00	1849
Lancashire And Furness	082_SE	1894
Lancashire And Furness	083_SW	1894
Lancashire And Furness	090_NE	1894
Lancashire And Furness	091_NW	1894
Lancashire And Furness	082_SE	1909
Lancashire And Furness	083_SW	1909
Lancashire And Furness	090_NE	1909
Lancashire And Furness	091_NW	1909
Lancashire And Furness	082_SE	1928
Lancashire And Furness	083_SW	1928
Lancashire And Furness	090_NE	1928
Lancashire And Furness	091_NW	1928
Ordnance Survey Plan	SD30NW	1955
1:10,000	**Mapsheet**	**Published Date**
Ordnance Survey Plan	SD30NW	1993

Mining and Cavities Data	Version	Update Cycle
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	May 2018	Bi-Annually
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	As notified
Man Made Mining Cavities Peter Brett Associates	May 2018	Bi-Annually
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Natural Cavities Peter Brett Associates	May 2018	Bi-Annually
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Historical Land Use Information (1:2,500)	**Version**	**Update Cycle**
Subterranean Features Landmark Information Group Limited	February 2018	Bi-Annually
Ground Stability Data (1:50,000)	**Version**	**Update Cycle**
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	As notified
Subsidence Insurance Claims SP Property Services	February 2018	Quarterly
Subsidence Investigations CET Structures Ltd	February 2018	Quarterly
Brine Subsidence Solution Area Johnson Poole & Bloomer	January 2015	As notified

Motion Map Data (1:2,500)	Version	Update Cycle
Motion Map		
Nigel Press Associates - Hampshire	February 2011	As notified
Nigel Press Associates - Cambridge	January 2011	As notified
Nigel Press Associates - Ipswich	January 2011	As notified
Nigel Press Associates - Norwich	January 2011	As notified
Nigel Press Associates - Peterborough	January 2011	As notified
Nigel Press Associates - Barnstaple	July 2010	As notified
Nigel Press Associates - Derbyshire	July 2010	As notified
Nigel Press Associates - Humberside	July 2010	As notified
Nigel Press Associates - Kent	July 2010	As notified
Nigel Press Associates - Lincolnshire	July 2010	As notified
Nigel Press Associates - Nottinghamshire	July 2010	As notified
Nigel Press Associates - Birmingham	May 2009	As notified
Nigel Press Associates - Bournemouth	May 2009	As notified
Nigel Press Associates - Brighton	May 2009	As notified
Nigel Press Associates - Bristol	May 2009	As notified
Nigel Press Associates - Cardiff	May 2009	As notified
Nigel Press Associates - Central London	May 2009	As notified
Nigel Press Associates - Cheltenham	May 2009	As notified
Nigel Press Associates - Coventry	May 2009	As notified
Nigel Press Associates - Crawley	May 2009	As notified
Nigel Press Associates - Edinburgh	May 2009	As notified
Nigel Press Associates - Exeter	May 2009	As notified
Nigel Press Associates - Glasgow	May 2009	As notified
Nigel Press Associates - Isle of Wight	May 2009	As notified
Nigel Press Associates - Leeds	May 2009	As notified
Nigel Press Associates - Leicester	May 2009	As notified
Nigel Press Associates - Liverpool	May 2009	As notified
Nigel Press Associates - Manchester	May 2009	As notified
Nigel Press Associates - Milton Keynes	May 2009	As notified
Nigel Press Associates - Newcastle	May 2009	As notified
Nigel Press Associates - Northwich	May 2009	As notified
Nigel Press Associates - Nottingham	May 2009	As notified
Nigel Press Associates - Oxford	May 2009	As notified
Nigel Press Associates - Plymouth	May 2009	As notified
Nigel Press Associates - Portsmouth	May 2009	As notified
Nigel Press Associates - Preston	May 2009	As notified
Nigel Press Associates - Reading	May 2009	As notified
Nigel Press Associates - Sheffield	May 2009	As notified
Nigel Press Associates - Stoke	May 2009	As notified
Nigel Press Associates - Swindon	May 2009	As notified
Nigel Press Associates - Tonbridge	May 2009	As notified
Nigel Press Associates - North London	November 2008	As notified
Nigel Press Associates - Head Office	September 2008	As notified

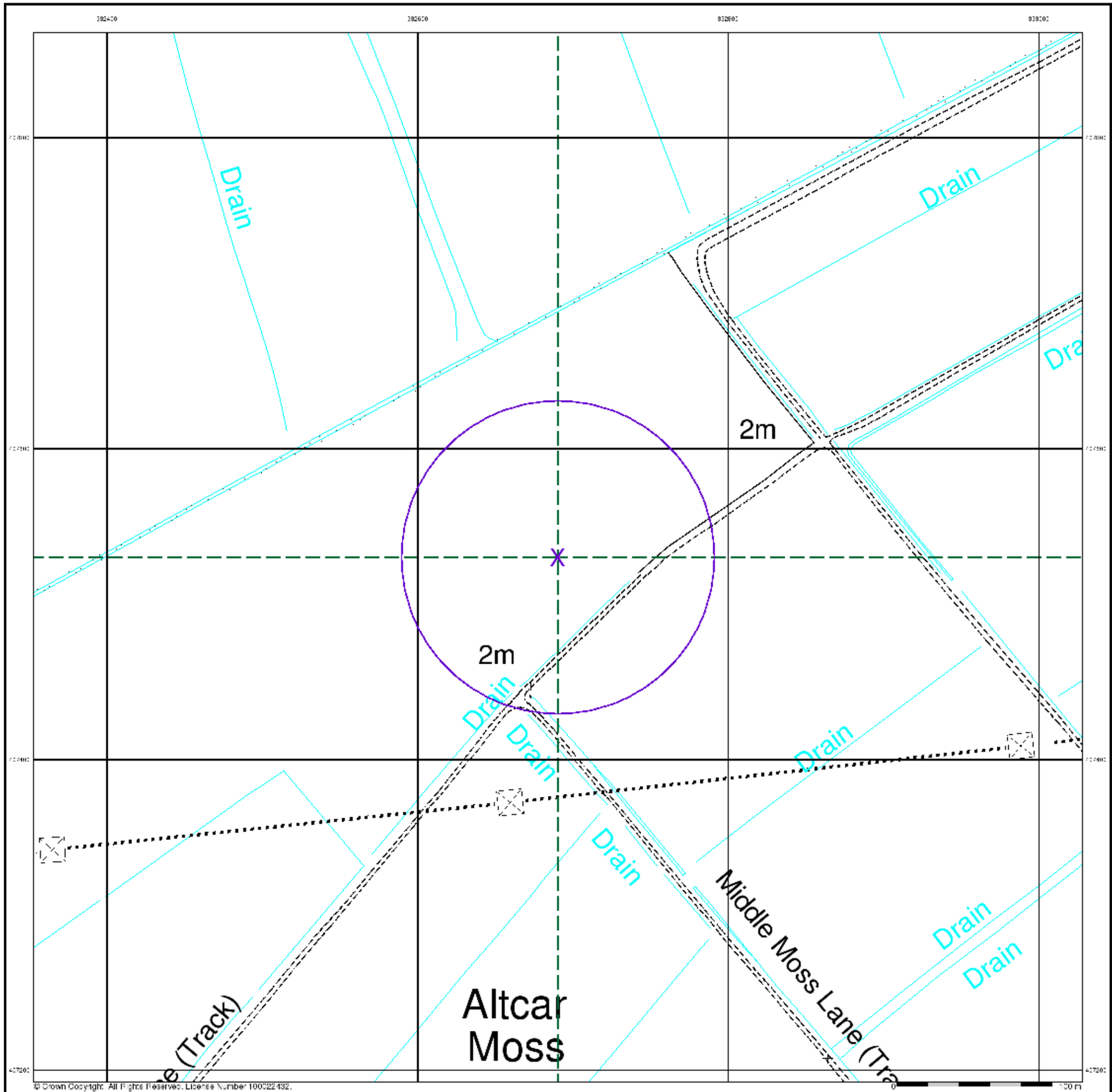
Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
British Geological Survey	
The Coal Authority	
Ove Arup	
Peter Brett Associates	
Wardell Armstrong	
Johnson Poole & Bloomer	

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk



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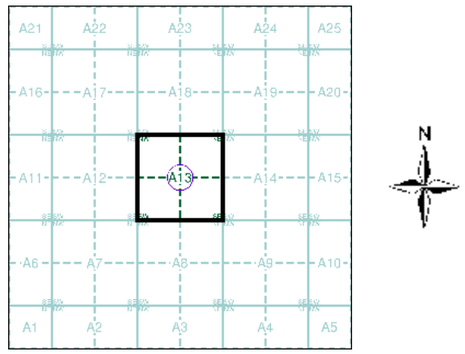
Historical Land Use Information (1:2,500)

General

Potentially Contaminative Industrial Uses (Extractive Industries Activity)

Subterranean Features

Mining and Ground Stability - Segment A13



Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Plot Buffer (m):	100

Site Details

Site at 332690, 407530

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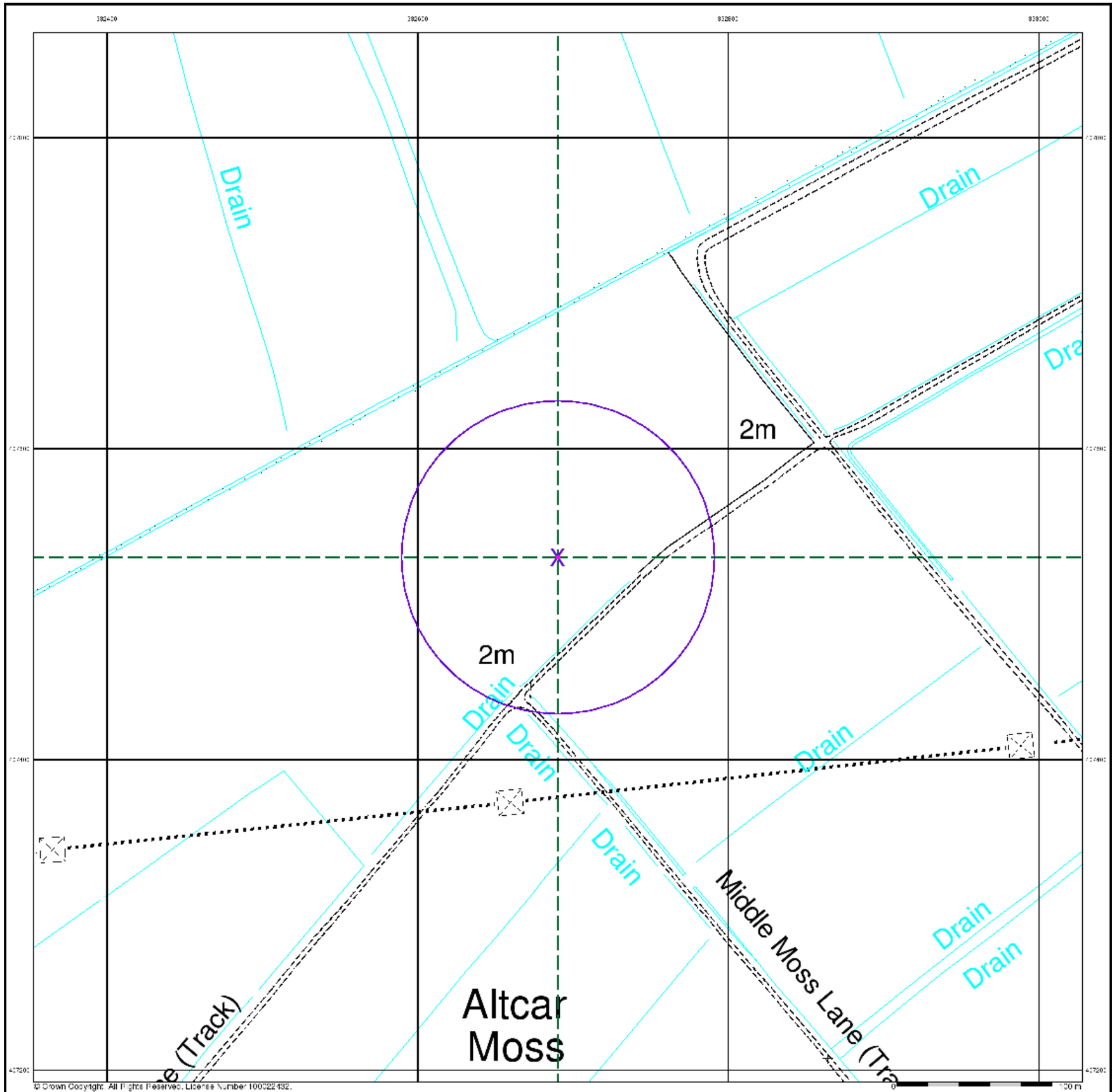
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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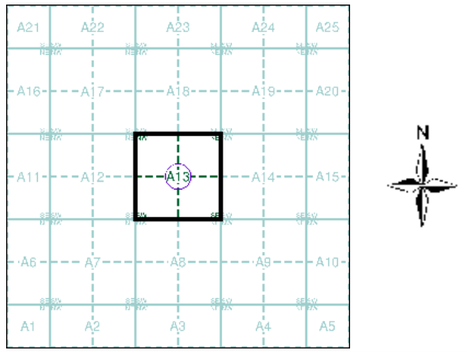
Motion Map Data (1:2,500)

General

Average Velocity Gradient

Mining and Ground Stability - Segment A13



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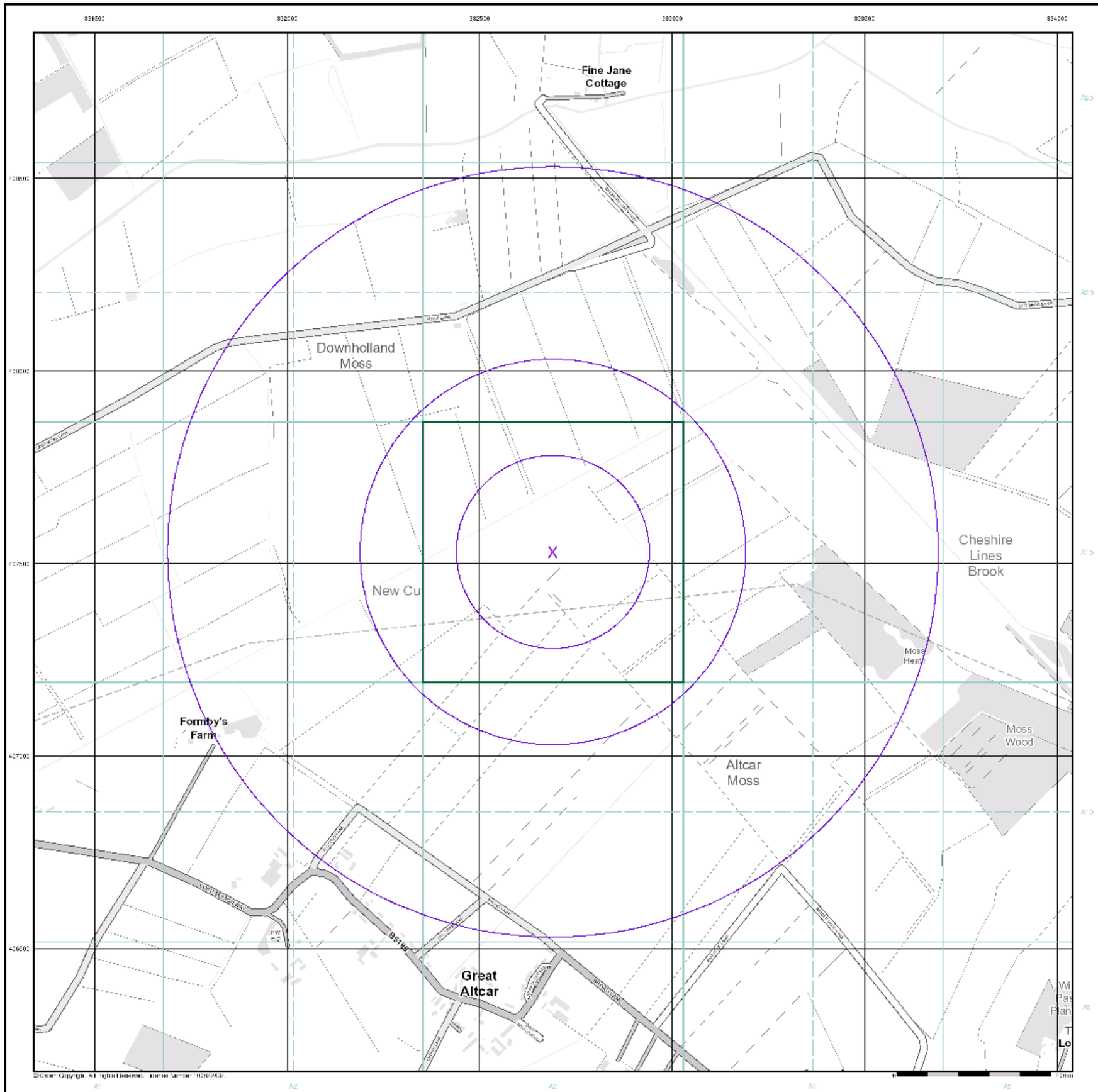

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Historical Land Use Information (1:10,000)

General

Potentially Contaminative Industrial Uses (Past Land Uses - Mining)

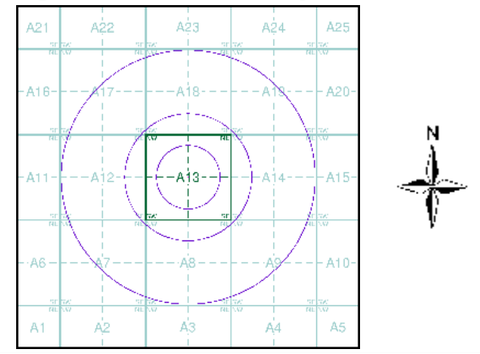
	Point	Line	Polygon

Historical Land Use

	Point	Line	Polygon

Mining Data

Mining and Ground Stability - Slice A



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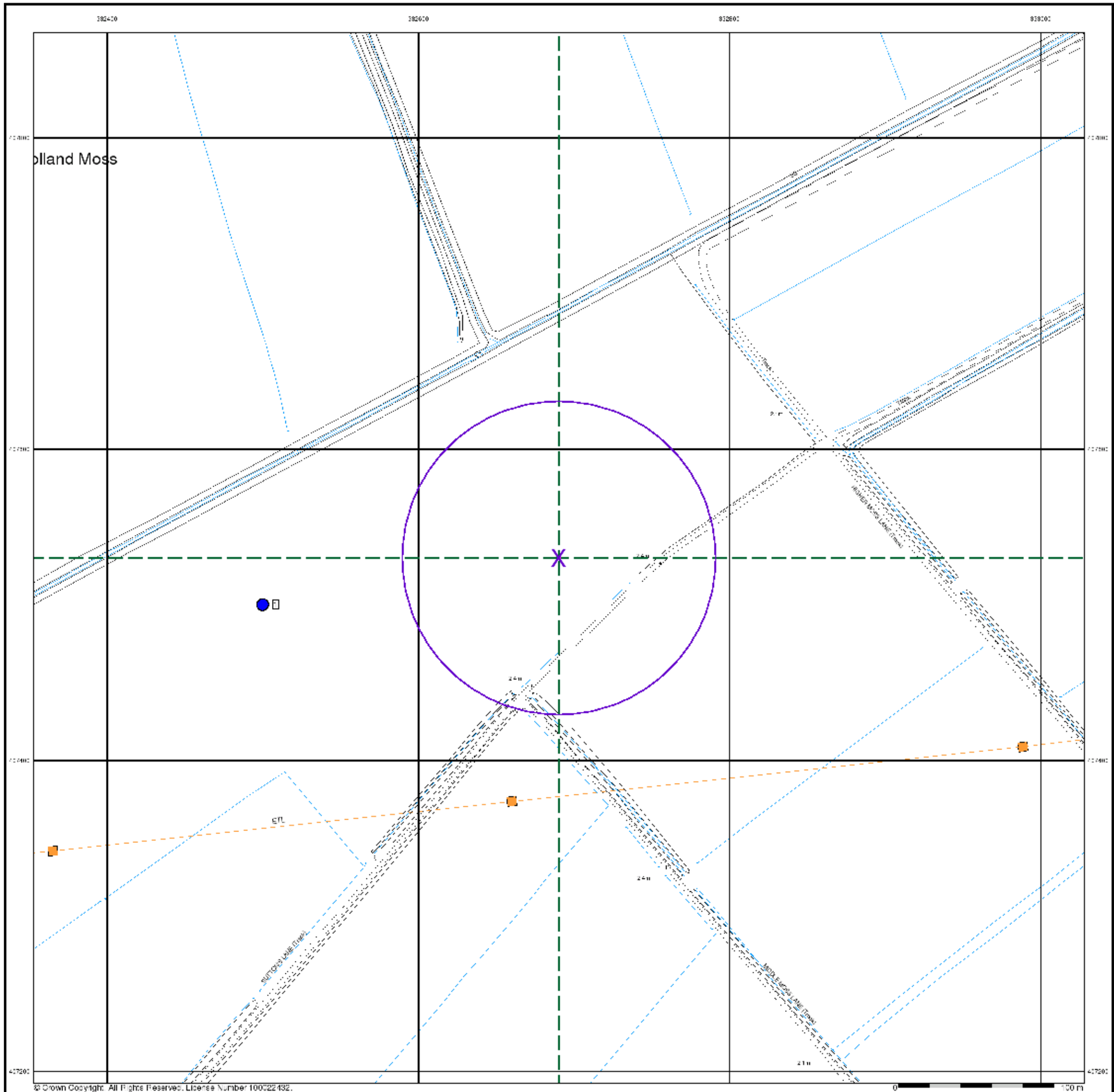

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General

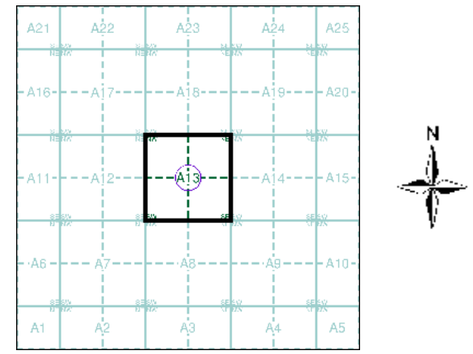
Agency and Hydrological

Waste

Hazardous Substances

Geological

Site Sensitivity Map - Segment A13



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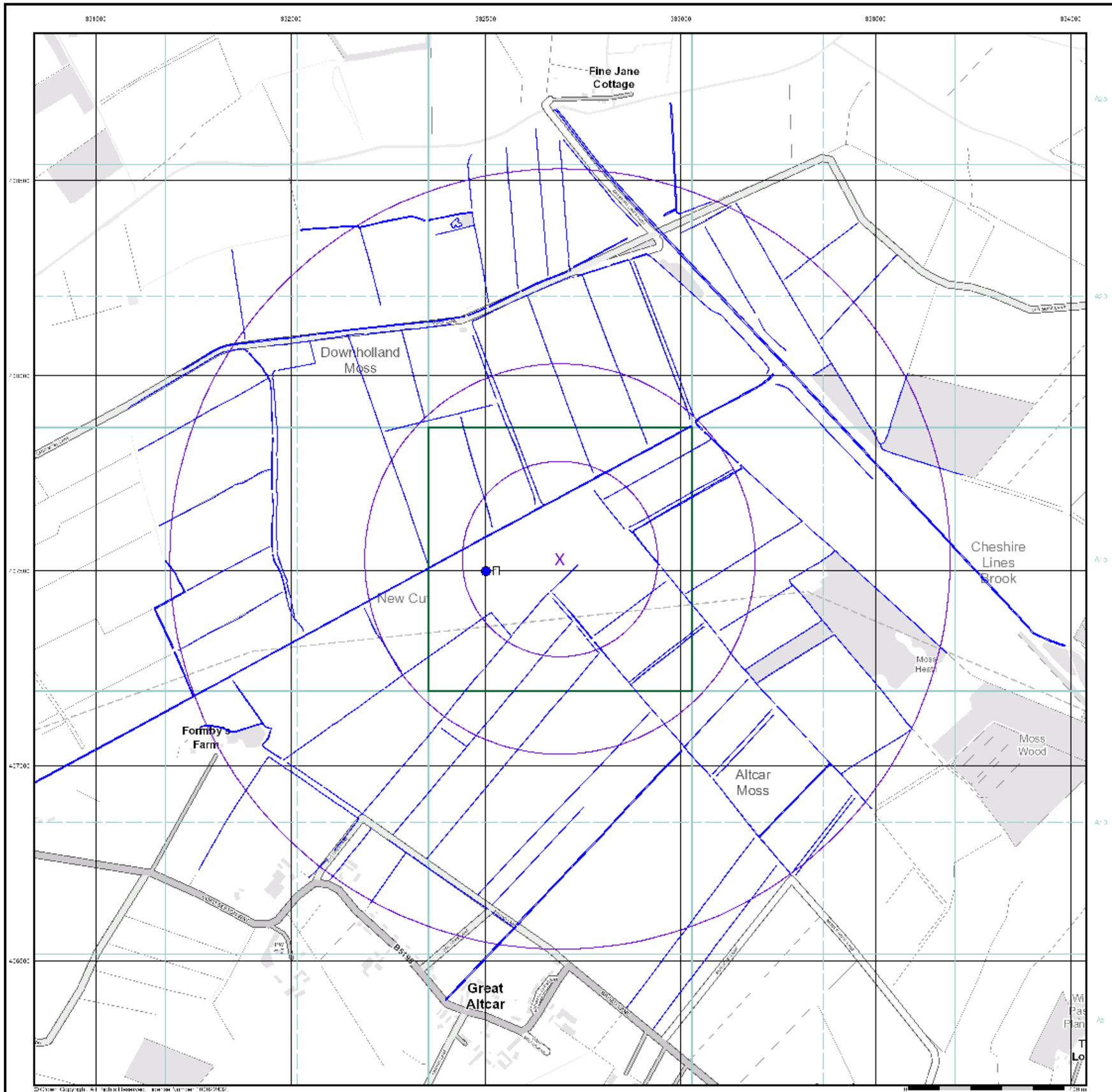

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General

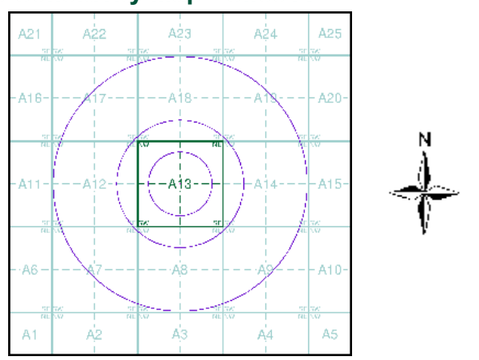
Agency and Hydrological

Waste

Hazardous Substances

Geological

Site Sensitivity Map - Slice A



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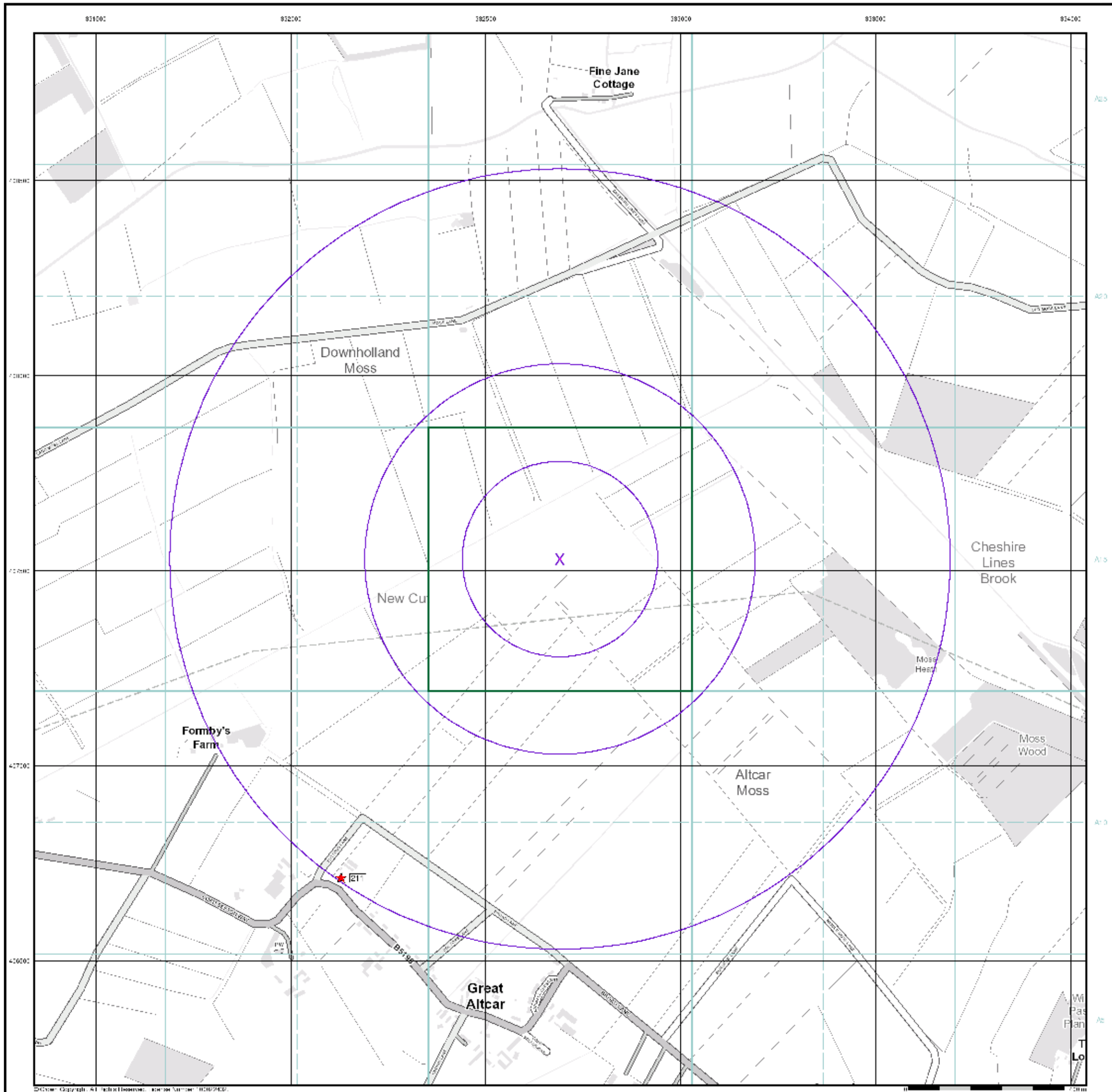

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Industrial Land Use Map

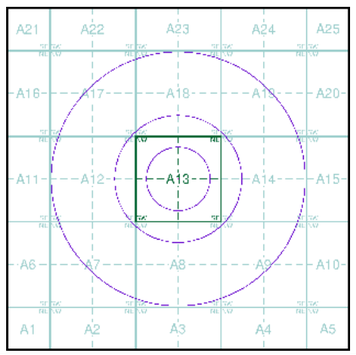
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



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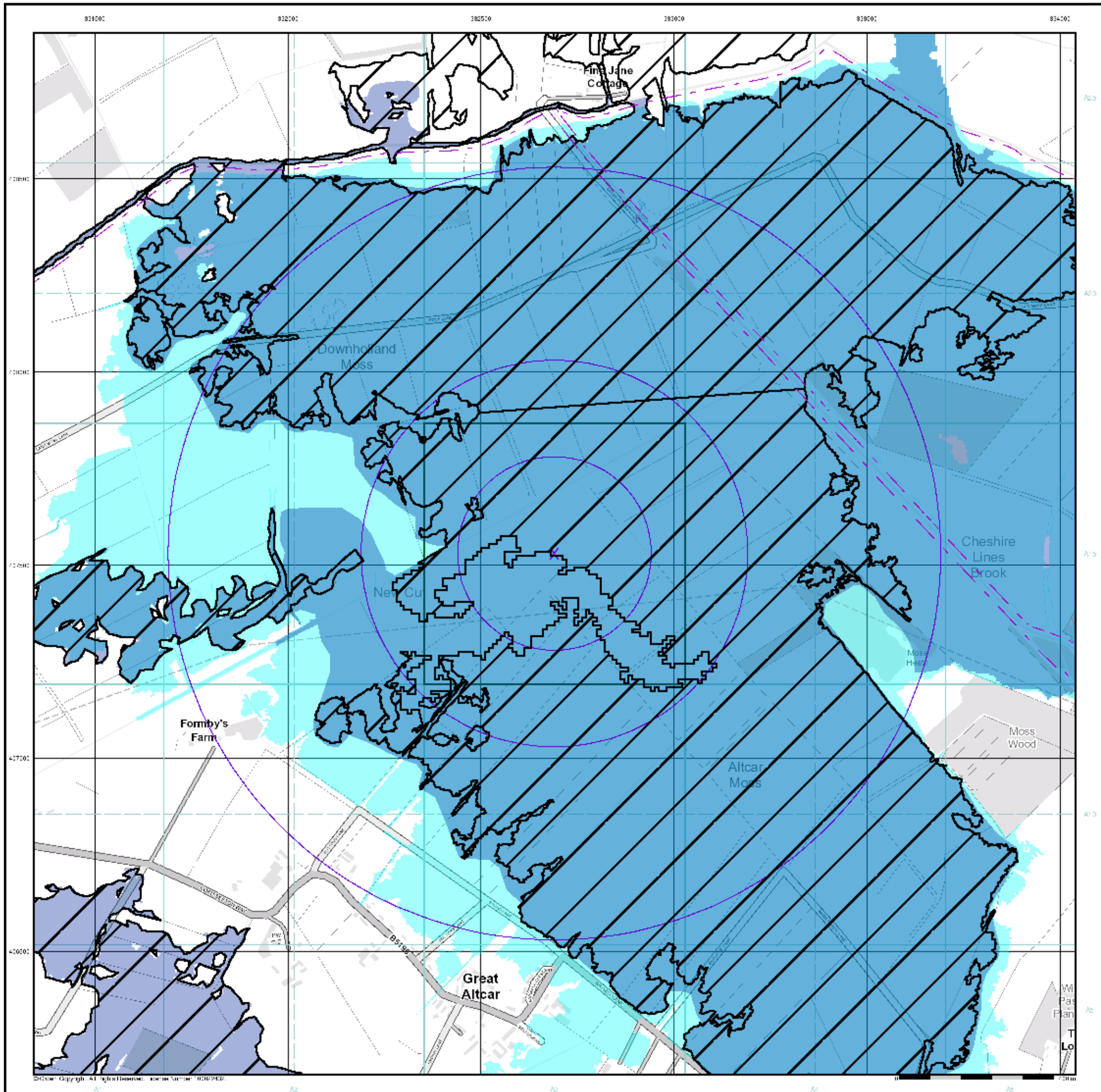

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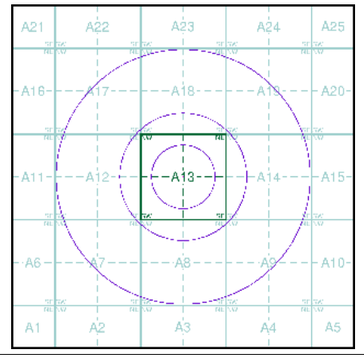
General
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)
- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



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National Grid Reference:	332690, 407530
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Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

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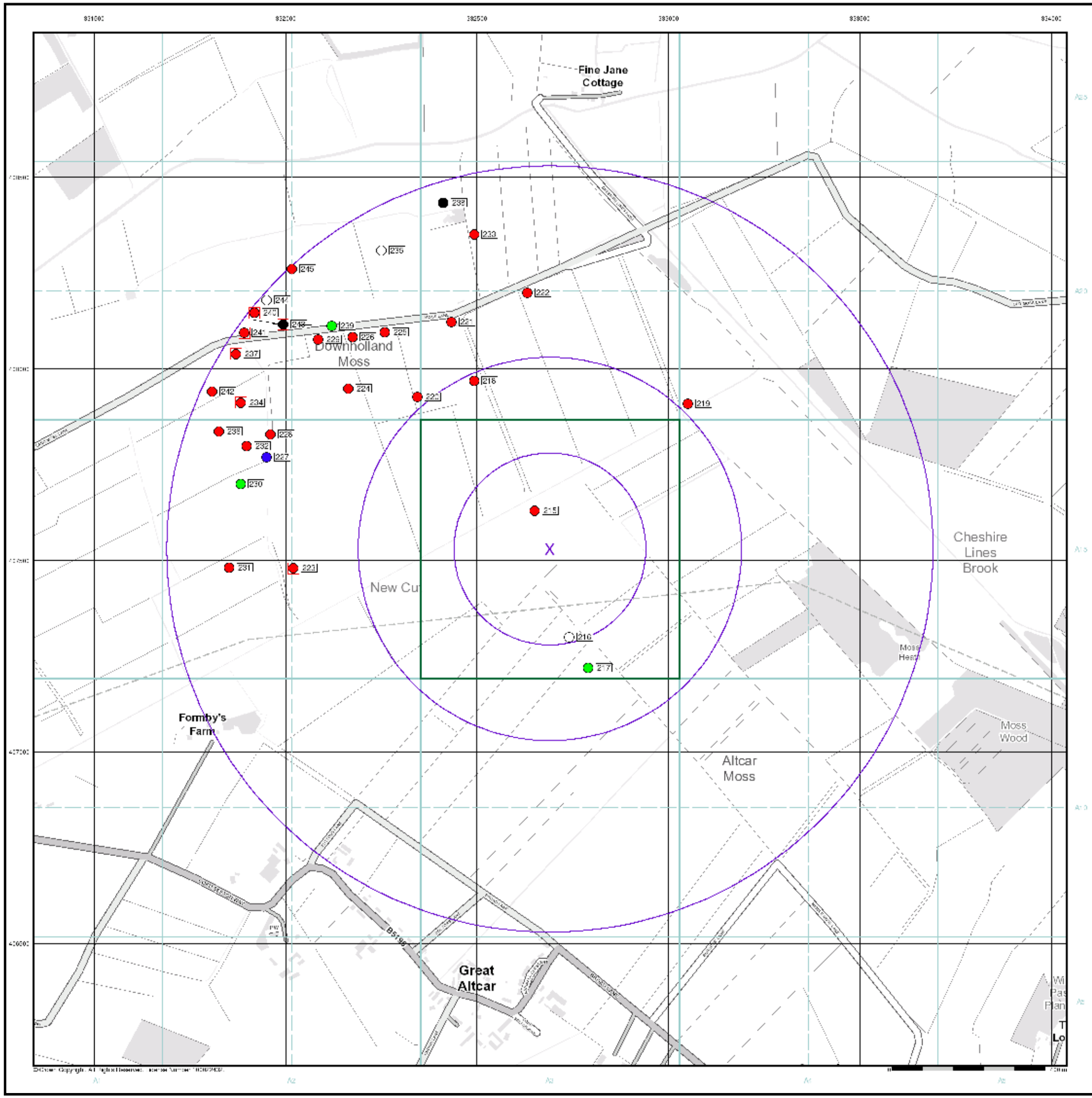

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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

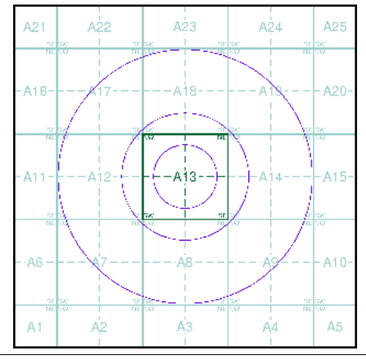
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

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Slice:	A
Site Area (Ha):	0.01
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Site Details

Site at 332690, 407530

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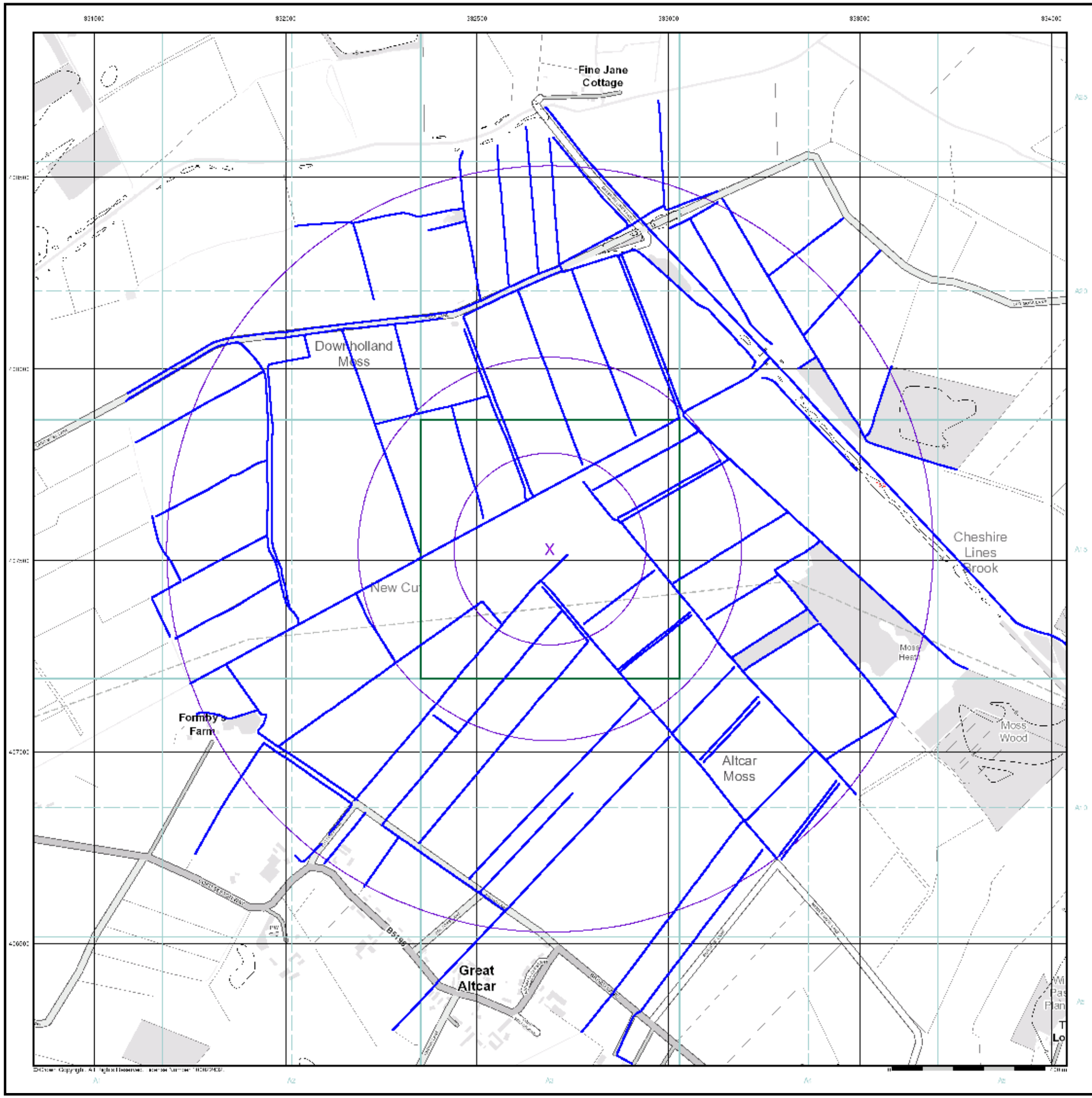

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General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

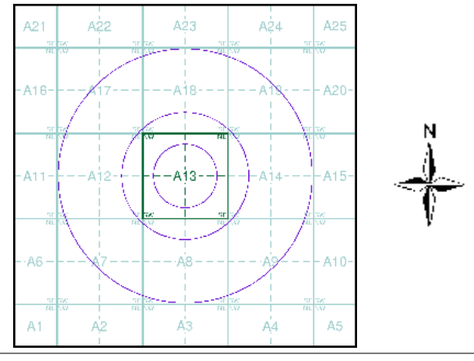
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height
- MLW Mean Low Water
- MHW Mean High Water

OS Water Network Map - Slice A



Order Details

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Site Details

Site at 332690, 407530

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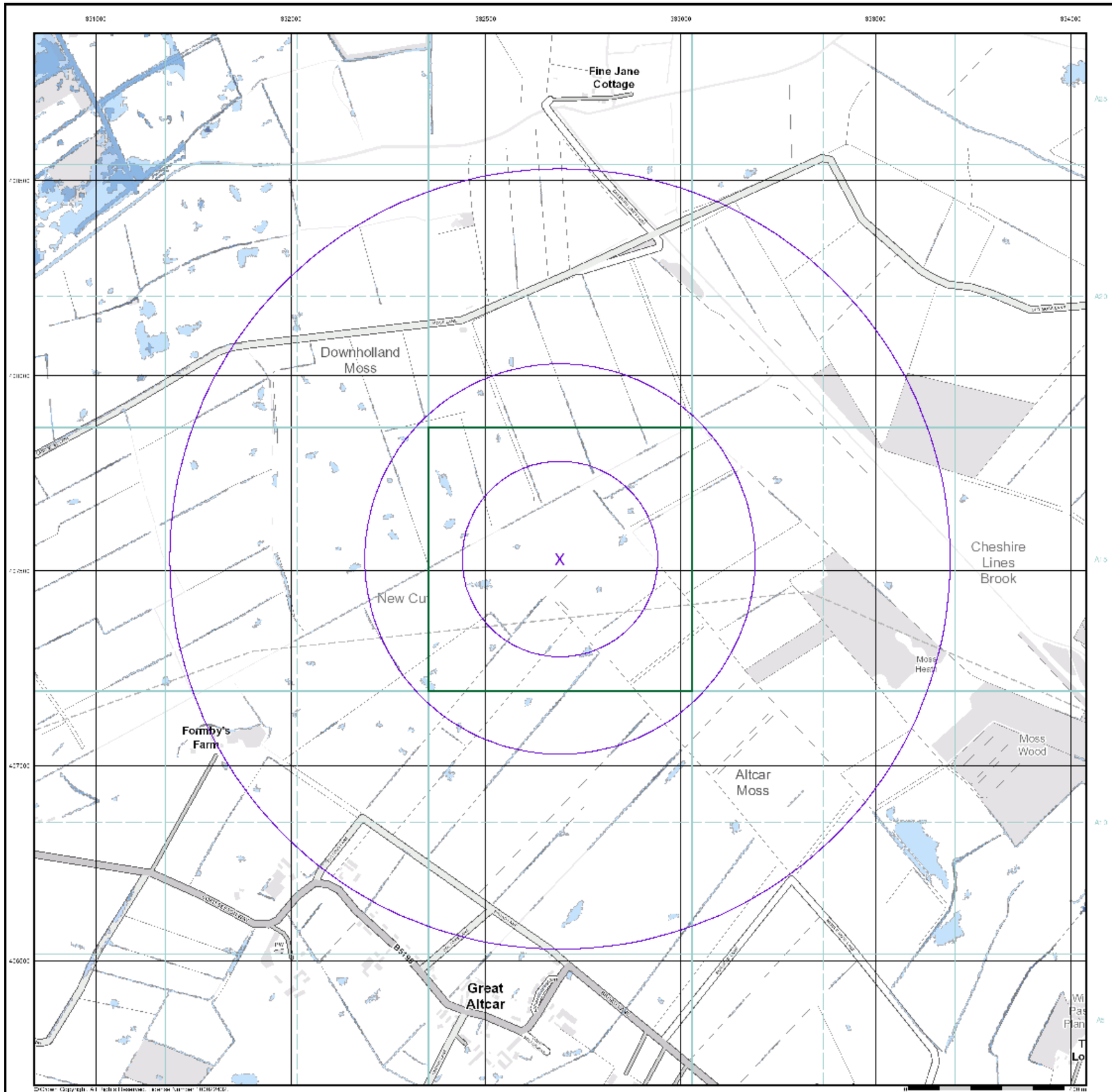

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LANDMARK INFORMATION GROUP

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Risk of Flooding from Surface Water

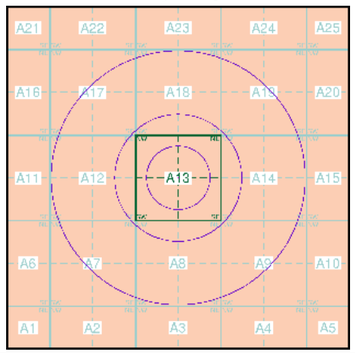
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
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Site Details

Site at 332690, 407530

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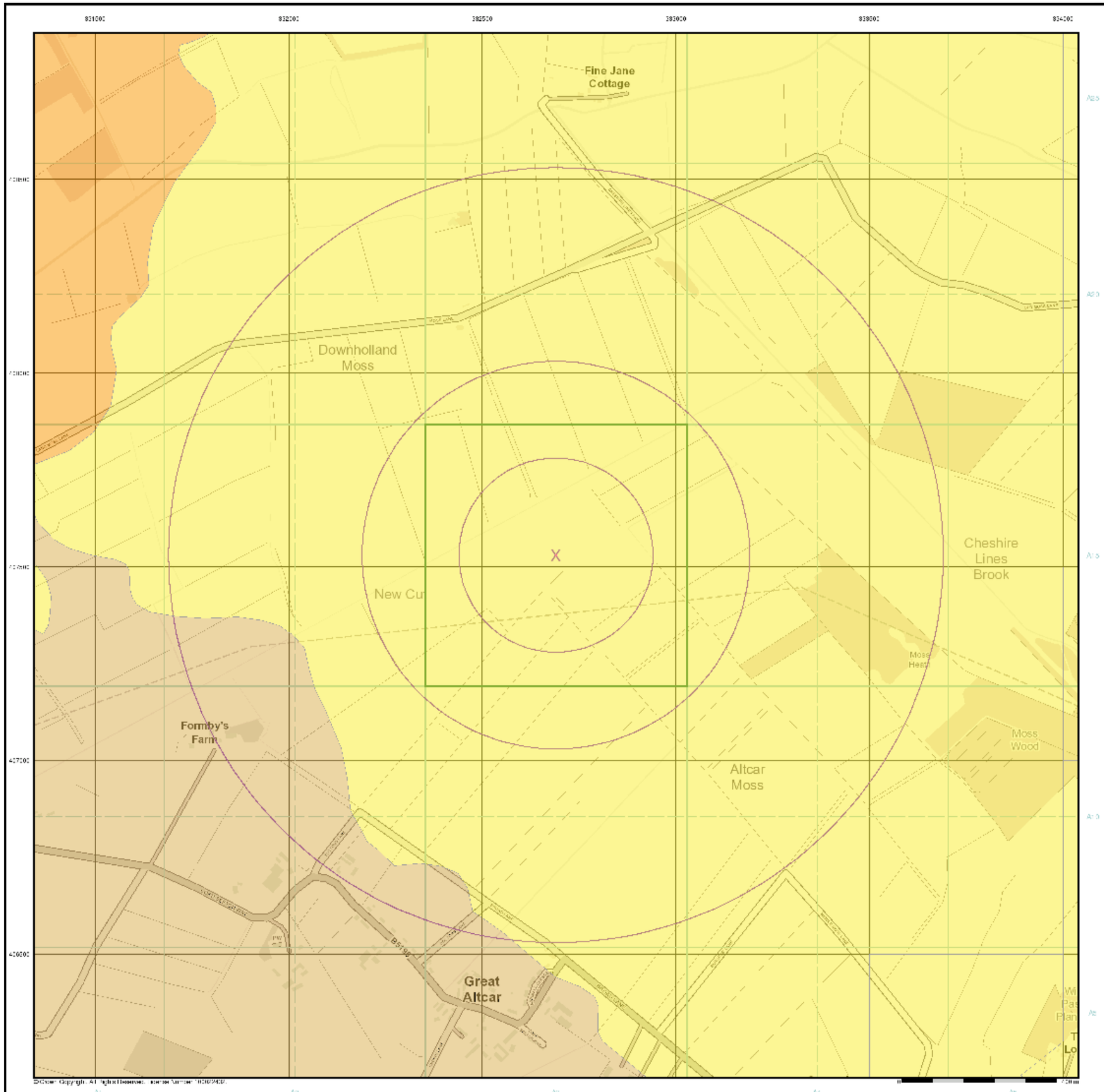

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General

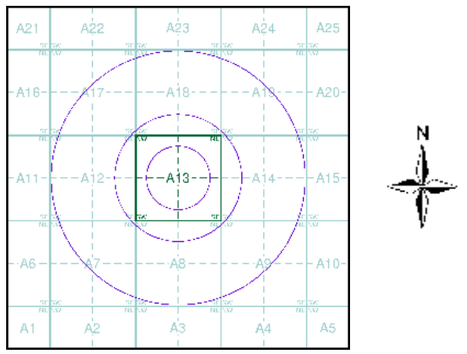
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



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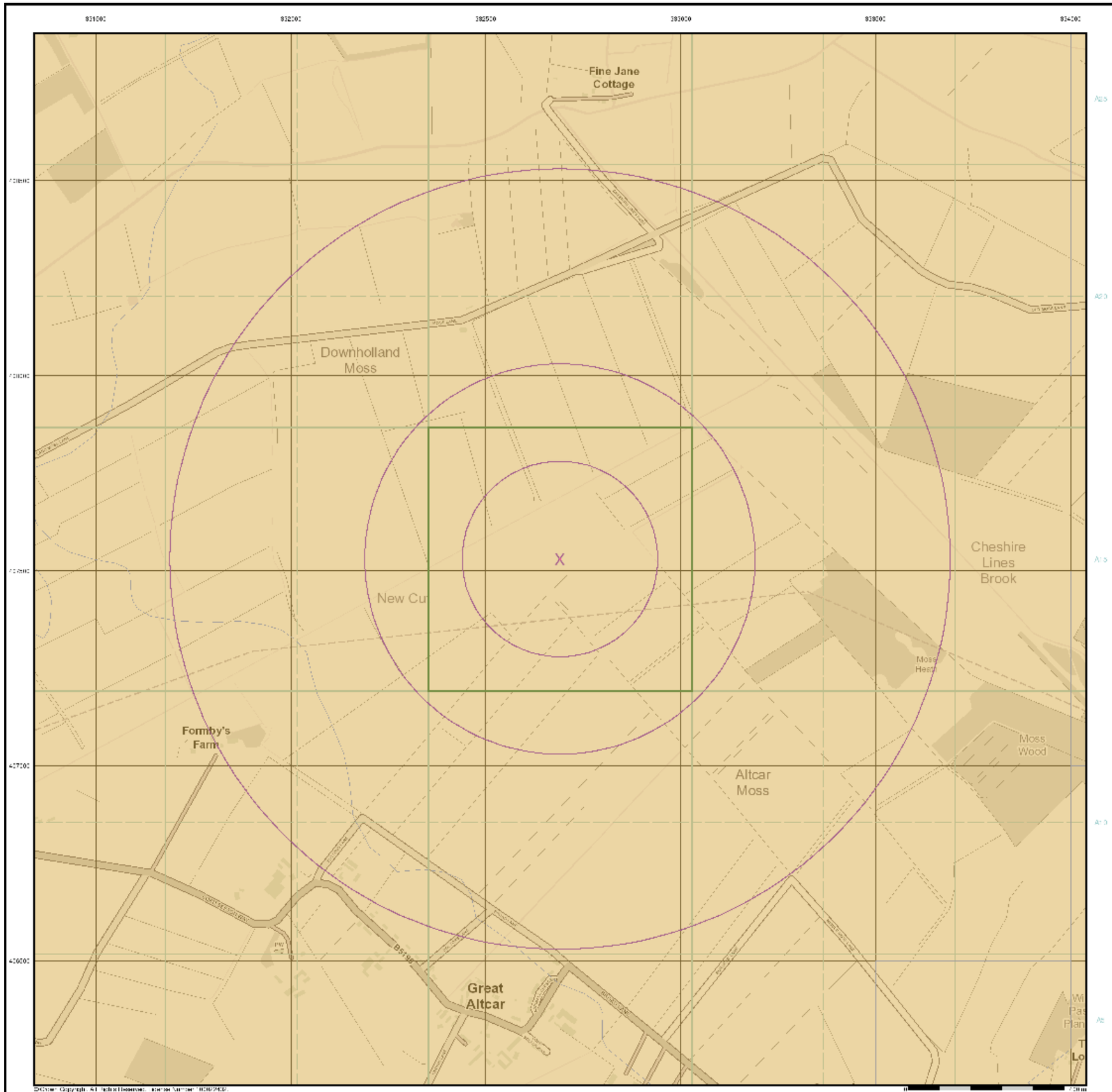

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LANDMARK INFORMATION GROUP

General

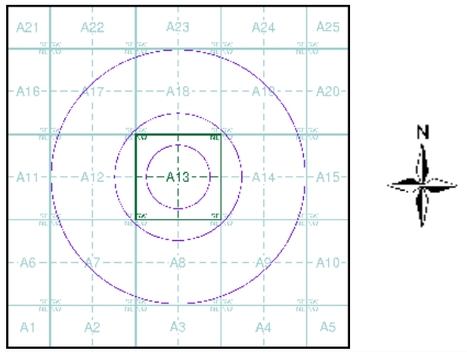
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



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General

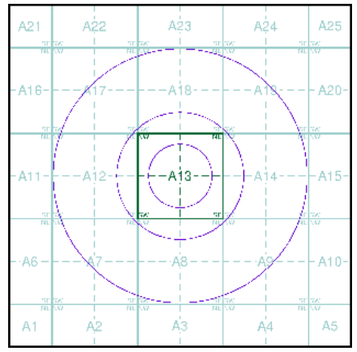
Specified Site Specified Buffer(s) X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



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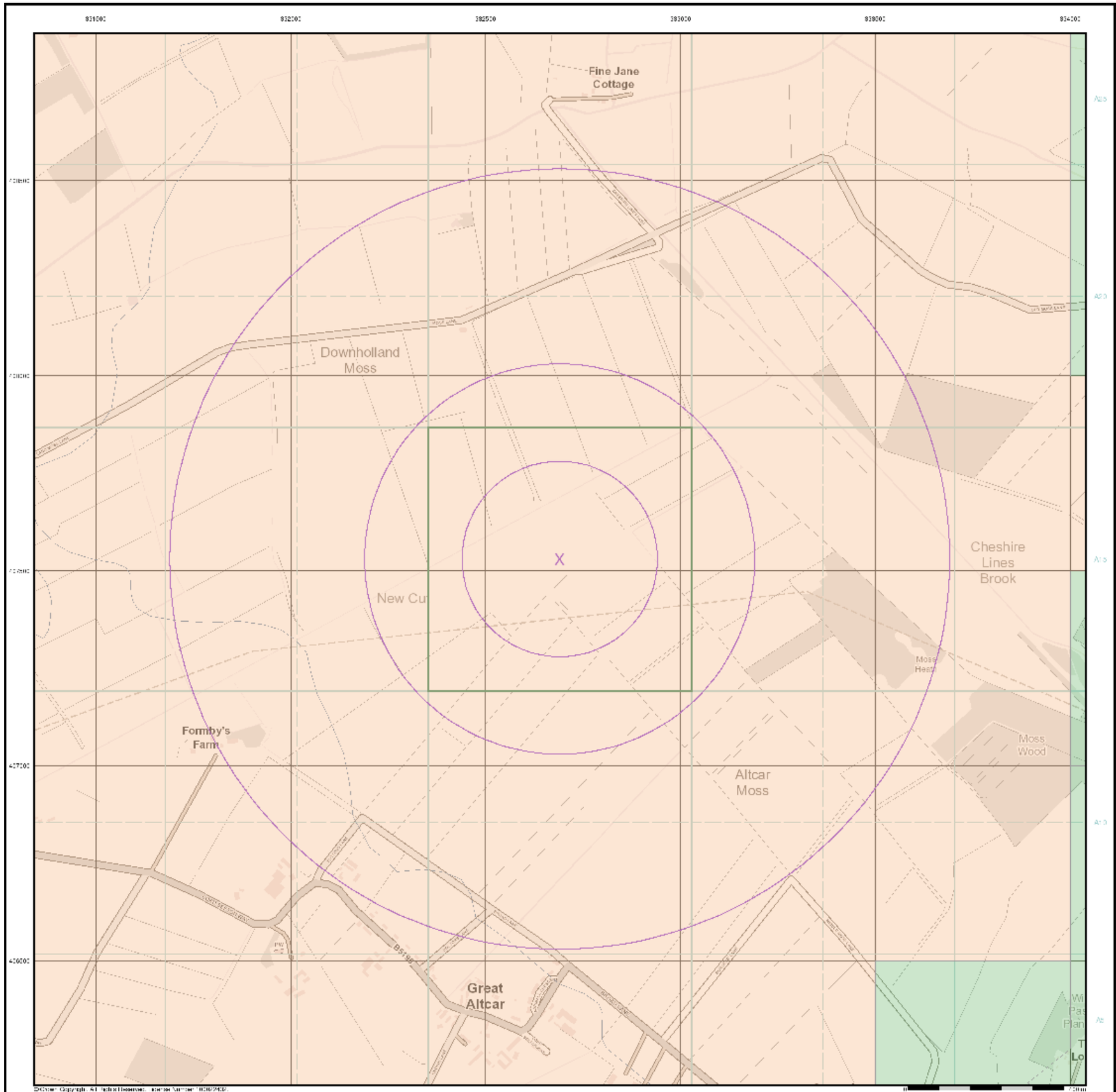

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General

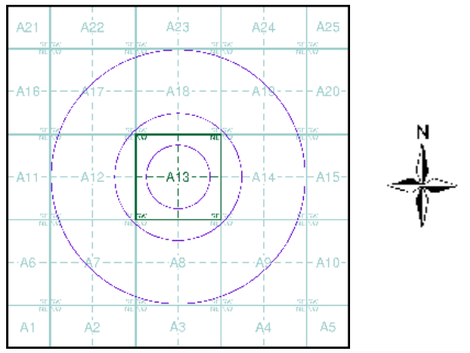
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- <100 mg/kg
- 100 - 200
- 200 - 300
- 300 - 600
- 600 - 1200
- >1200

Estimated Soil Chemistry Lead - Slice A



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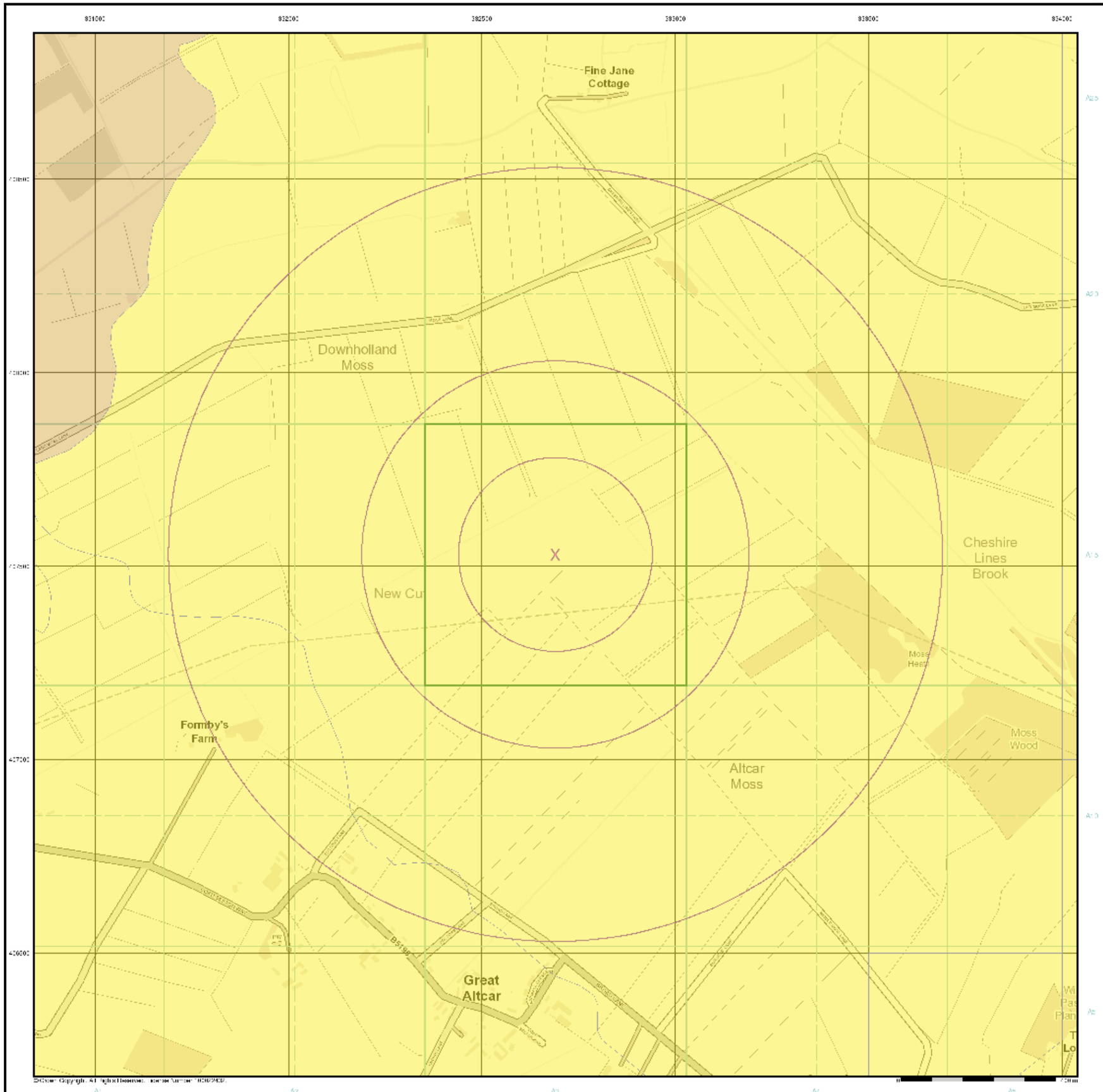

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LANDMARK INFORMATION GROUP®

General

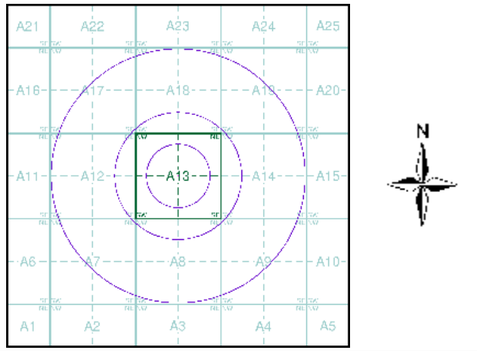
Specified Site Specified Buffer(s) X Bearing Reference Point

Estimated Soil Chemistry Nickel

Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

Estimated Soil Chemistry Nickel - Slice A



Order Details

Order Details:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

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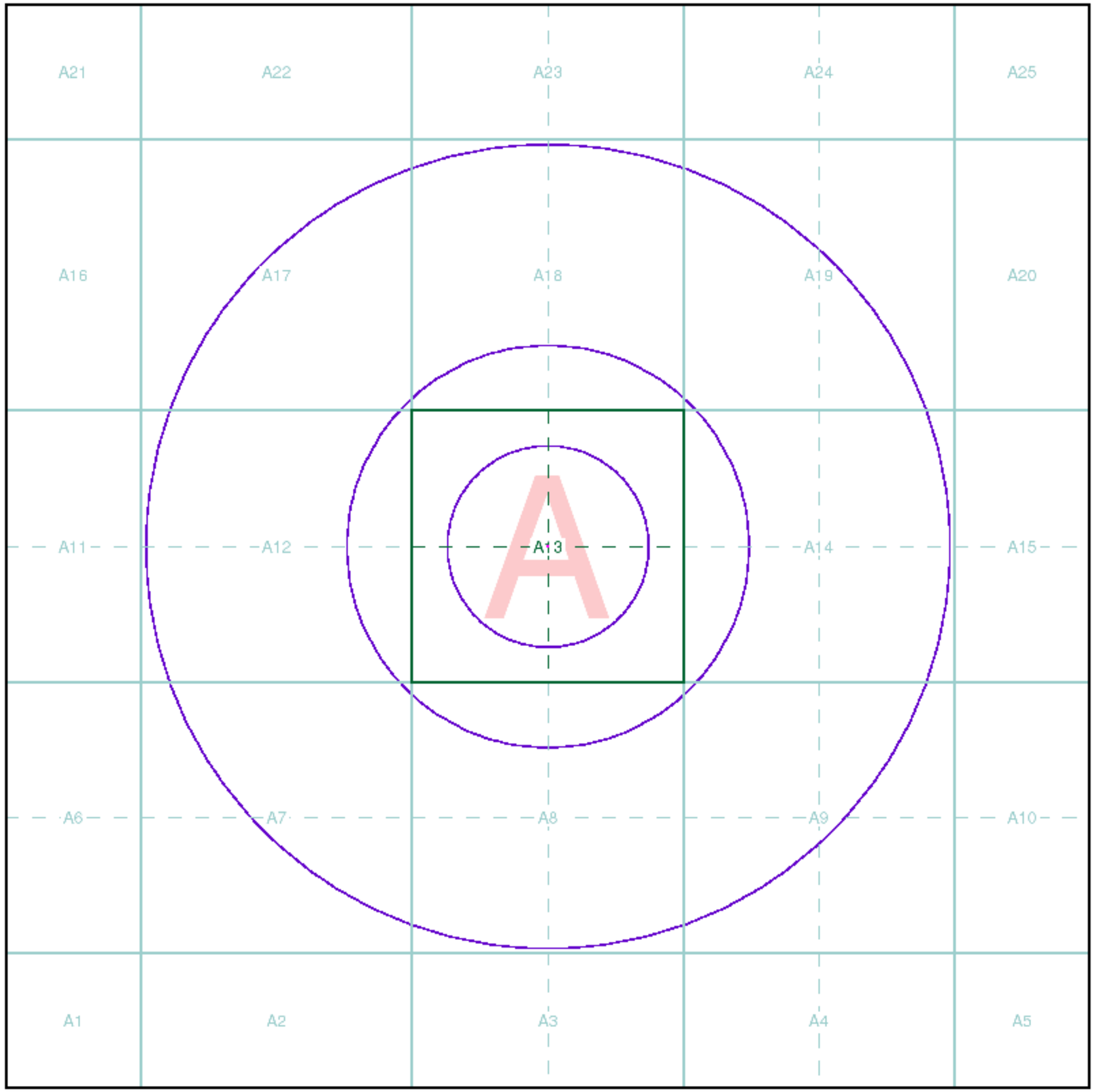
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Map data

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Environment Agency

NATURAL ENGLAND

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr A Rose, Envireau Ltd, Cedars Farm Barn, Market Street, Draycott, Derbyshire, DE72 3NB

Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

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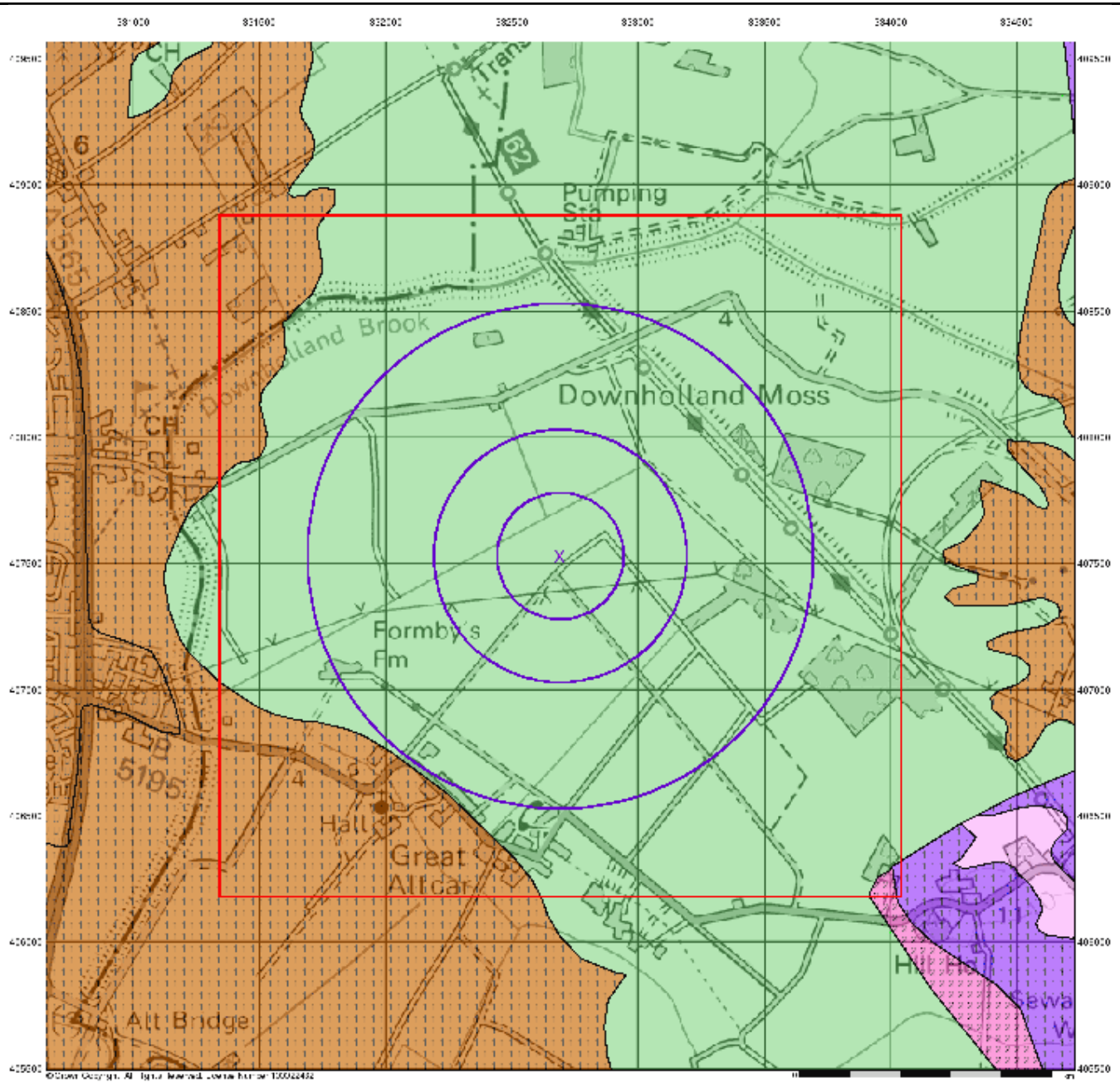

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LANDMARK INFORMATION GROUP

Groundwater Vulnerability

General

Site

Agency and Hydrological

Geological Classes

Soil Classes

Major Aquifer (Highly Permeable)

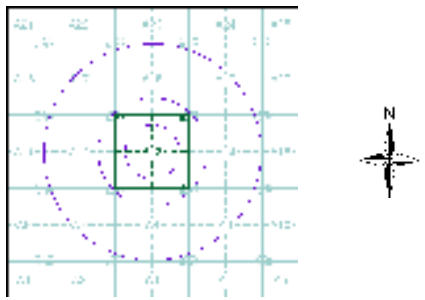
Minor Aquifer (Variably Permeable)

Non Aquifer (Negligibly Permeable)

Water Sea

Drift Deposit

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

Landmark

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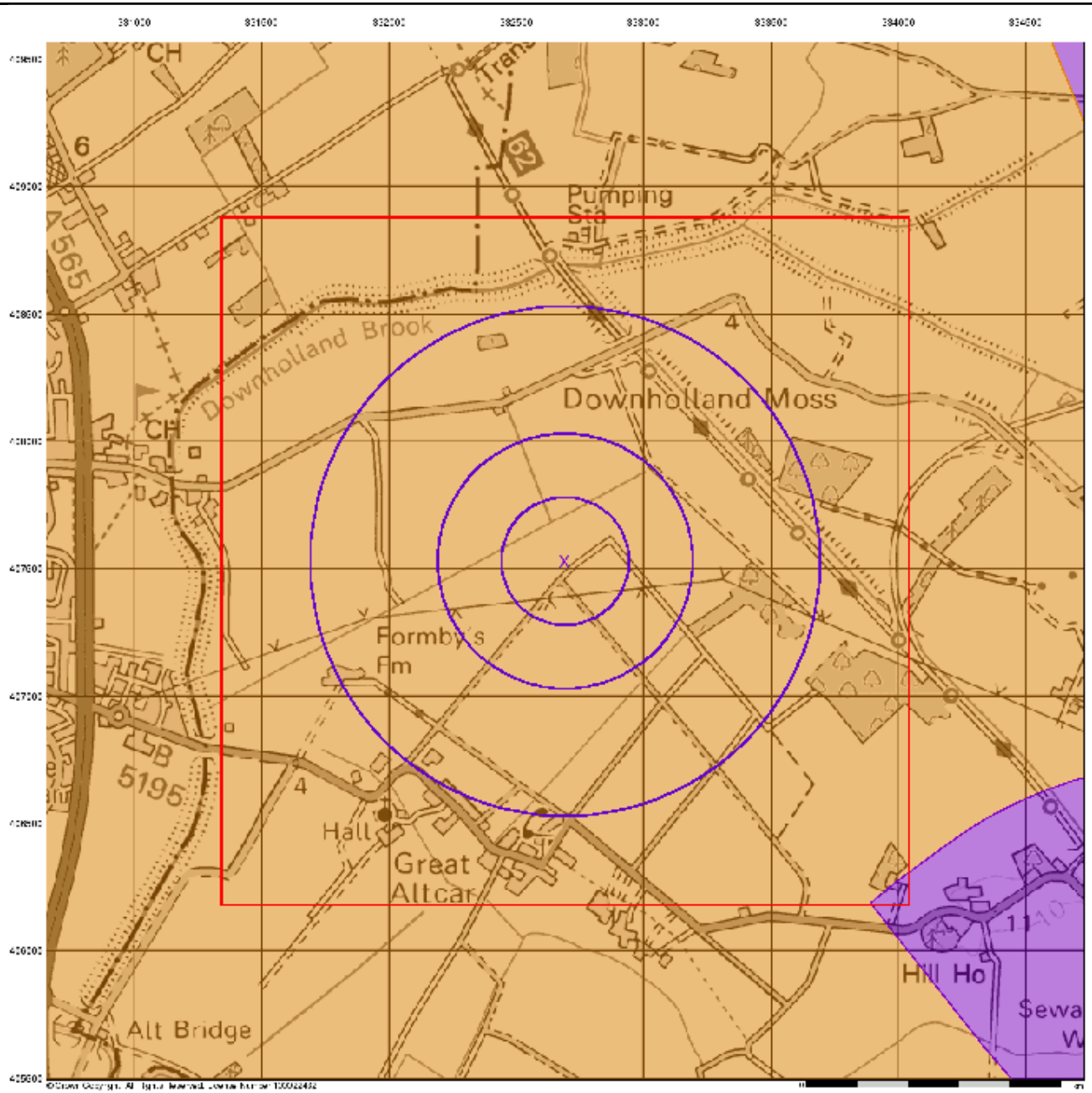
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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LANDMARK INFORMATION GROUP

Bedrock Aquifer Designation

General

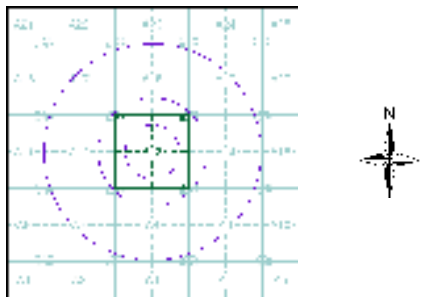
Site

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

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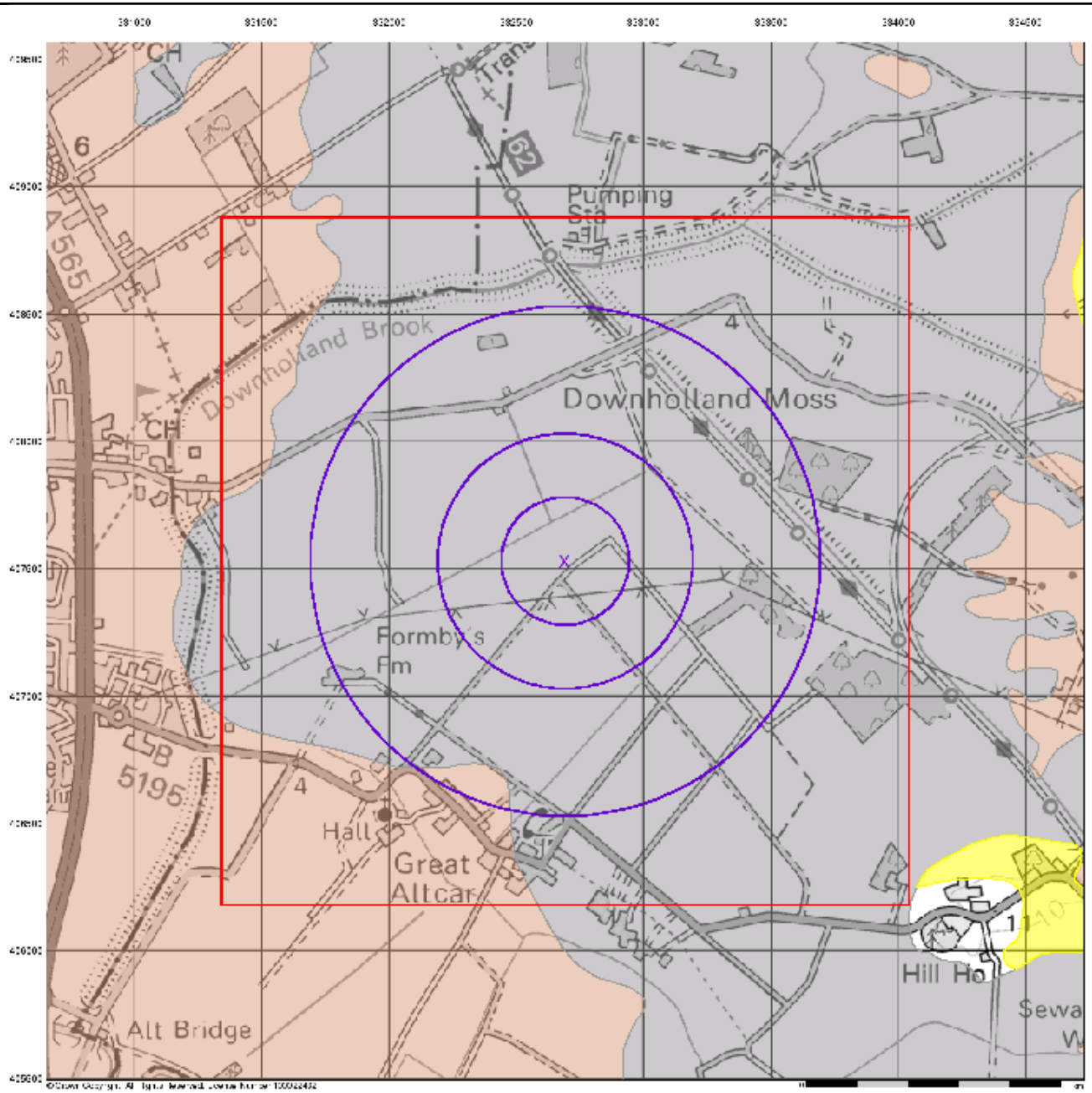
Web: www.envirocheck.co.uk



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LANDMARK INFORMATION GROUP

Superficial Aquifer Designation

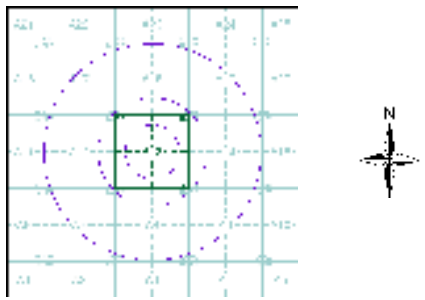
General

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lacustrine and Landslip)

Site Sensitivity Context Map - Slice A



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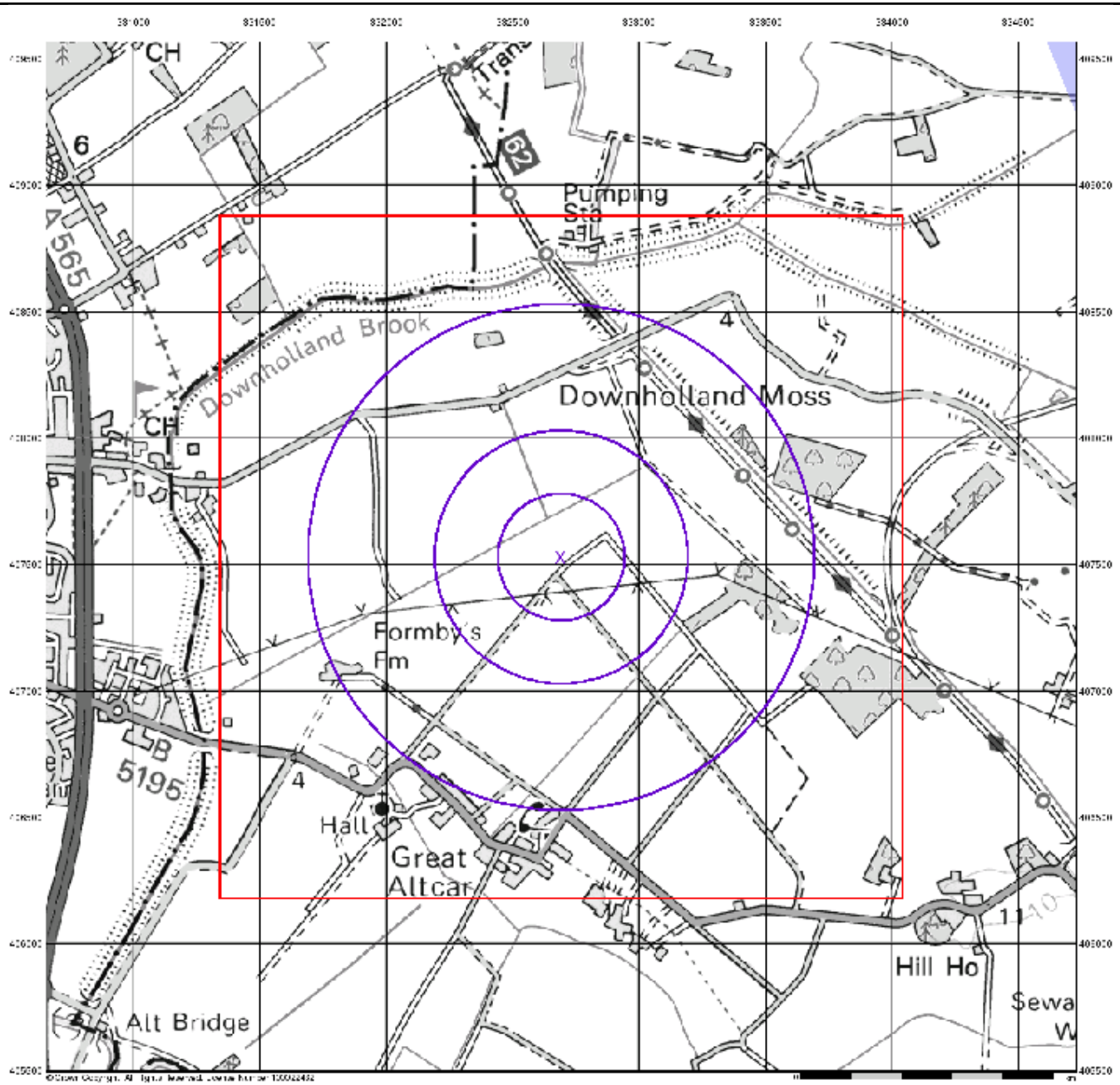
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

Landmark
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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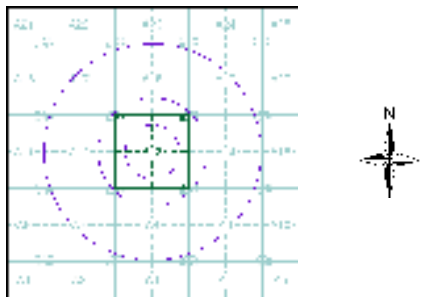
LANDMARK INFORMATION GROUP

Source Protection Zones

General

Agency and Hydrological

Site Sensitivity Context Map - Slice A



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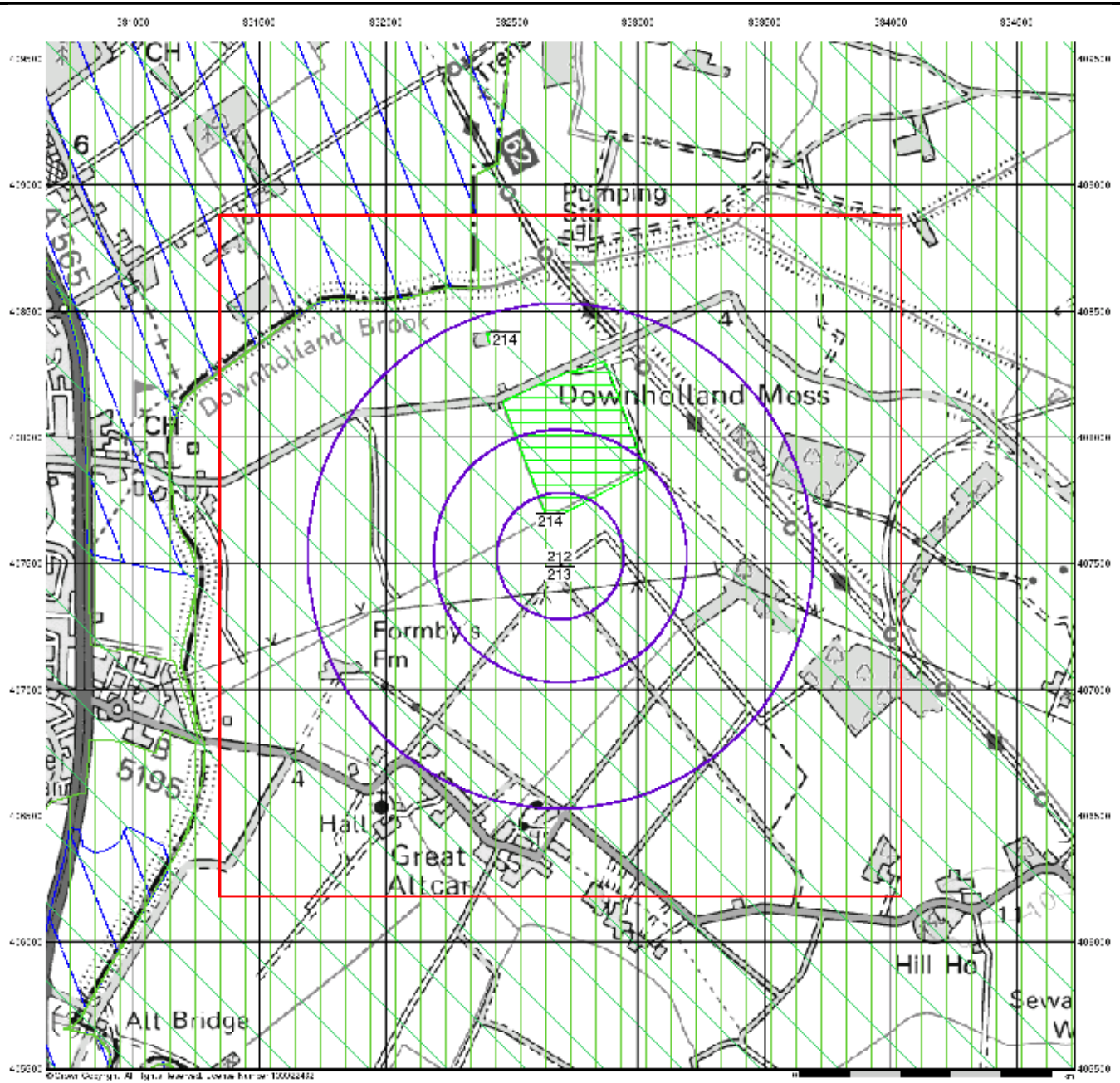
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530



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LANDMARK INFORMATION GROUP

Sensitive Land Uses

General

Site

Sensitive Land Uses

Ancient Woodland

Area of Aspect Green Belt

Area of Outstanding Natural Beauty

Environmentally Sensitive Area

Forest Park

Local Nature Reserve

Marine Nature Reserve

National Nature Reserve

National Park

Nitrate Sensitive Area

Nitrate Vulnerable Zone

Formal Site

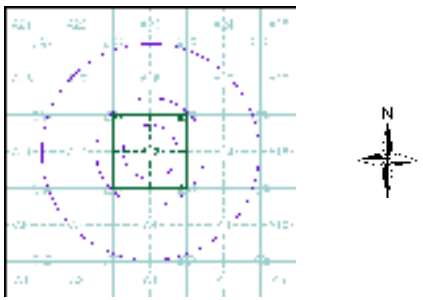
Site of Special Scientific Interest

Special Area of Conservation

Special Protection Area

World Heritage Sites

Site Sensitivity Context Map - Slice A



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Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

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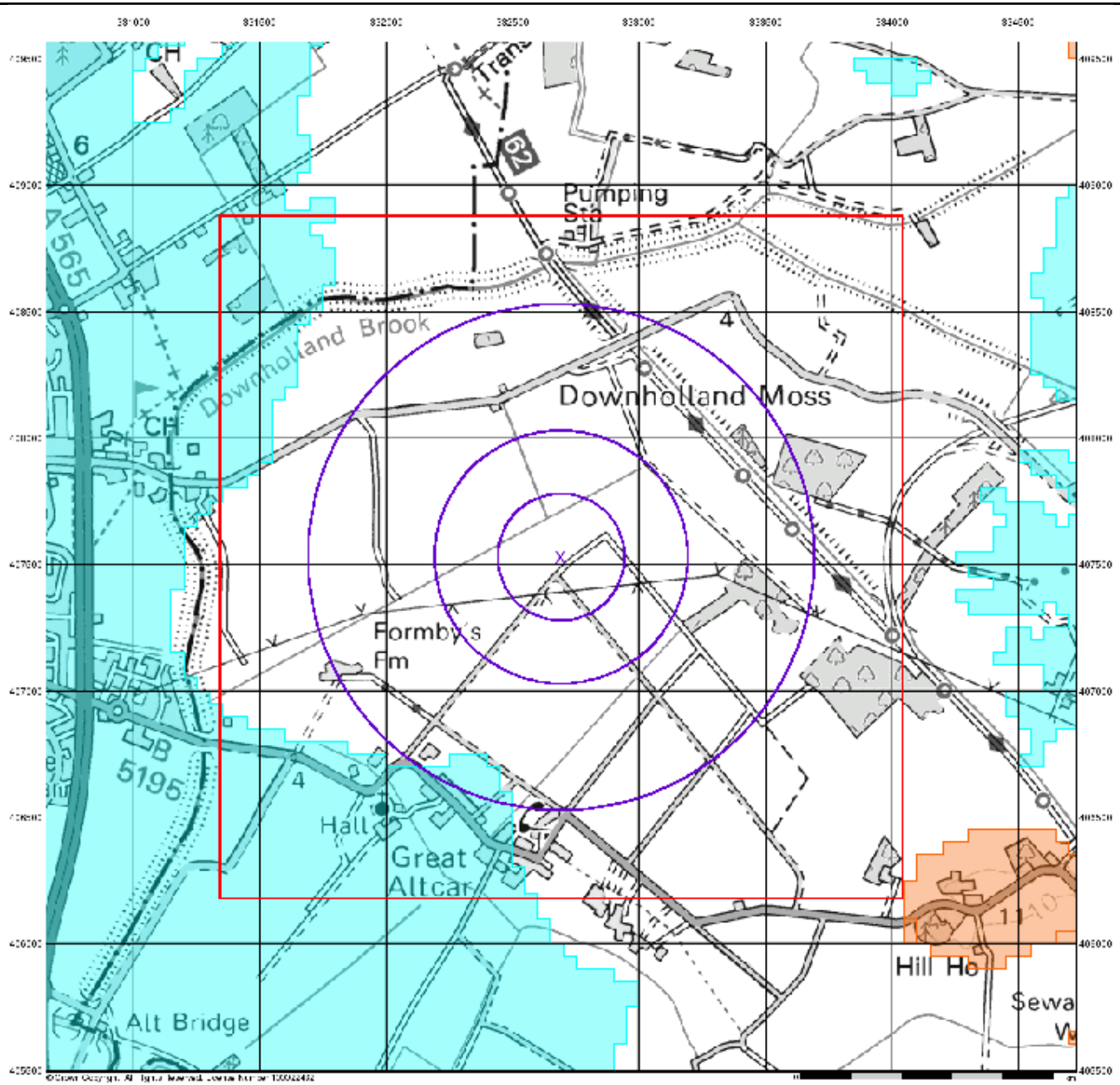

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BGS Flood GFS Data

General

Location Site | Selected Buffer (m) | Bearing Reference Point

Slice

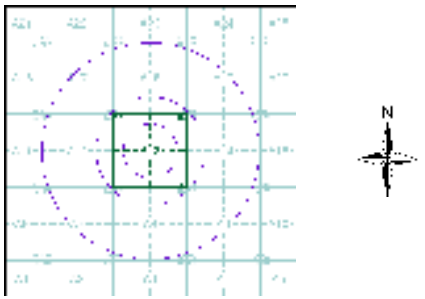
Agency and Hydrological (Flood)

Limited Potential for Groundwater Flooding to Occur

Potential for Groundwater Flooding of Property Situated Below Ground Level

Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	166375554_1_1
Customer Ref:	2018/0129
National Grid Reference:	332690, 407530
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Site at 332690, 407530

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Envirocheck® Report:

Datasheet

Order Details:

Order Number:
166375554_1_1

Customer Reference:
2018/0129

National Grid Reference:
332690, 407530

Slice:
A

Site Area (Ha):
0.01

Search Buffer (m):
1000

Site Details:

Site at 332690, 407530

Client Details:

Mr A Rose
Envireau Ltd
Cedars Farm Barn
Market Street
Draycott
Derbyshire
DE72 3NB

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Contents

Report Section	Page Number
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Hazardous Substances	-
Geological	29
Industrial Land Use	30
Sensitive Land Use	31
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Data Suppliers	38
Useful Contacts	39

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.
In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0

Contents

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility					n/a
Contaminated Land Register Entries and Notices					
Discharge Consents					
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 1		Yes		
Pollution Incidents to Controlled Waters	pg 1		1		
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality	pg 1				1
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions	pg 1				(*12)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 4	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 4	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 4	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences	pg 4	Yes		n/a	n/a
Flooding from Rivers or Sea without Defences	pg 4	Yes		n/a	n/a
Areas Benefiting from Flood Defences	pg 4	Yes		n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 4		29	30	150

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 28	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 29	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 29	Yes			Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards				n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 29	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 29	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 29	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards				n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries					
Fuel Station Entries					
Points of Interest - Commercial Services					
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 30				1
Points of Interest - Public Infrastructure					
Points of Interest - Recreational and Environmental					
Gas Pipelines					
Underground Electrical Cables					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
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Areas of Adopted Green Belt	pg 31	1			
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 31	1			
Ramsar Sites					
Sites of Special Scientific Interest	pg 31		1		
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Nearest Surface Water Feature	A13SE (SE)	43	-	332721 407500
1	**Pollution Incidents to Controlled Waters** Property Type: Water Company Sewage: Sewage Treatment Works Location: Location Description Not Available Authority: Environment Agency, North West Region Pollutant: Sewage Sludge Note: Tributary River Alt Incident Date: 1st July 1992 Incident Reference: 92440097 Catchment Area: Alt Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A13SW (W)	193	2	332500 407500
	River Quality Name: Downholland Bk GQA Grade: River Quality C Reach: A567 To Alt Estimated Distance (km): 9.2 Flow Rate: Flow less than 0.31 cumecs Flow Type: River Year: 2000	A19SW (NE)	703	2	333211 408001
	Water Abstractions Operator: North Moss Farm Partnership Licence Number: 2569031072 Permit Version: Not Supplied Location: Downholland Brook, FORMBY, Lancashire Authority: Environment Agency, North West Region Abstraction: Agricultural Spray Irrigation (Summer) Abstraction Type: Not Supplied Source: Surface Daily Rate (m3): 455 Yearly Rate (m3): 18184 Details: Licence Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A23SW (N)	1104	2	332400 408595
	Water Abstractions Operator: North Moss Farm Partnership Licence Number: 2569031072 Permit Version: Not Supplied Location: Downholland Brook, FORMBY, Lancashire Authority: Environment Agency, North West Region Abstraction: Agricultural Spray Irrigation (Summer) Abstraction Type: Not Supplied Source: Groundwater Daily Rate (m3): 455 Yearly Rate (m3): 18184 Details: Licence Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A23SW (N)	1109	2	332400 408600
	Water Abstractions Operator: Wallace Greenwood & Sons Ltd Licence Number: 2569031061 Permit Version: 100 Location: Downholland Brk At Downholland,Lancs Authority: Environment Agency, North West Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): 546 Yearly Rate (m3): 10456 Details: Land At Downholland, Lancs Authorised Start: 01 May Authorised End: 31 August Permit Start Date: 16th November 1982 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A22SE (NW)	1173	2	332200 408595

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Wallace Greenwood & Sons Ltd Licence Number: 2569031061 Permit Version: Not Supplied Location: Downholland, DOWNHOLLAND, Lancashire Authority: Environment Agency, North West Region Abstraction: Agricultural Spray Irrigation (Summer) Abstraction Type: Not Supplied Source: Surface Daily Rate (m3): 546 Yearly Rate (m3): 10456 Details: Dowholland Brook Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A22SE (NW)	1177	2	332200 408600
	Water Abstractions Operator: Baybutt & Sons Ltd Licence Number: 2569031040 Permit Version: 100 Location: Mere Brook At Downholland Authority: Environment Agency, North West Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): 308 Yearly Rate (m3): 5342 Details: Land At Downholland Authorised Start: 01 March Authorised End: 30 September Permit Start Date: 12th March 1992 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A23SE (N)	1275	2	332800 408800
	Water Abstractions Operator: E Orritt Licence Number: 2569031037 Permit Version: 100 Location: Leather Barrow Ditch At Downholland,Nr Ormskirk Authority: Environment Agency, North West Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): 1130 Yearly Rate (m3): 32877 Details: Land At Downholland,Nr Ormskirk Authorised Start: 01 March Authorised End: 31 August Permit Start Date: 17th July 1998 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A19NE (NE)	1333	2	333700 408400
	Water Abstractions Operator: E Orritt Licence Number: 2569031037 Permit Version: 100 Location: Leather Barrow Ditch At Downholland,Nr Ormskirk Authority: Environment Agency, North West Region Abstraction: General Agriculture: Transfer Between Sources Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): 1130 Yearly Rate (m3): 32877 Details: Land At Downholland,Nr Ormskirk Authorised Start: 01 March Authorised End: 31 August Permit Start Date: 17th July 1998 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A19NE (NE)	1333	2	333700 408400

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Baybutt & Sons Ltd Licence Number: 2569031040 Permit Version: Not Supplied Location: Mere Brook At, DOWNHOLLAND Authority: Environment Agency, North West Region Abstraction: Agricultural Spray Irrigation (Summer) Abstraction Type: Not Supplied Source: Surface Daily Rate (m3): 308 Yearly Rate (m3): 5342 Details: Licence Status : Current Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A24NW (N)	1430	2	333100 408900
	Water Abstractions Operator: E Orritt Licence Number: 2569031038 Permit Version: 100 Location: Rough Brk At Downholland Nr Ormskirk Authority: Environment Agency, North West Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): 1130 Yearly Rate (m3): 32877 Details: Land At Downholland Nr Ormskirk Authorised Start: 01 March Authorised End: 31 August Permit Start Date: 17th July 1998 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A20SE (E)	1677	2	334300 408000
	Water Abstractions Operator: E Orritt Licence Number: 2569031038 Permit Version: 100 Location: Rough Brk At Downholland Nr Ormskirk Authority: Environment Agency, North West Region Abstraction: General Agriculture: Transfer Between Sources Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): 1130 Yearly Rate (m3): 32877 Details: Land At Downholland Nr Ormskirk Authorised Start: 01 March Authorised End: 31 August Permit Start Date: 17th July 1998 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A20SE (E)	1677	2	334300 408000
	Water Abstractions Operator: Baybutt & Sons Ltd Licence Number: 2569031040 Permit Version: 100 Location: Mere Brook At Downholland Authority: Environment Agency, North West Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a river or stream reach, or a row of wellpoints Source: Surface Daily Rate (m3): 0 Yearly Rate (m3): 0 Details: Land At Downholland Authorised Start: 01 March Authorised End: 30 September Permit Start Date: 12th March 1992 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A24NE (NE)	1679	2	333500 409000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: North Moss Farm Partnership Licence Number: 2569031049 Permit Version: Not Supplied Location: Pond At North Moss Farm, Old Southport Road, FORMBY, Merseyside Authority: Environment Agency, North West Region Abstraction: Agricultural Spray Irrigation (Summer) Abstraction Type: Not Supplied Source: Surface Daily Rate (m3): 327 Yearly Rate (m3): 1637 Details: Licence Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A21NE (NW)	1815	2	331500 408900
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 10 Central Lancashire Scale: 1:100,000	A13NE (NE)	0	2	332690 407530
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - B	A13NE (NE)	0	1	332690 407530
	Superficial Aquifer Designations Aquifer Designation: Unproductive Strata	A13NE (NE)	0	1	332690 407530
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A13NE (NE)	0	2	332690 407530
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A13NE (NE)	0	2	332690 407530
	Areas Benefiting from Flood Defences Type: Area Benefiting from Flood Defences Boundary Accuracy: As Supplied	A13NE (NE)	0	2	332690 407530
	Flood Water Storage Areas None				
	Flood Defences None				
2	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 97.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A13SE (SE)	43	3	332721 407500
3	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 8.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (S)	87	3	332666 407447
4	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 6.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (S)	87	3	332666 407447

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 137.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (S)	92	3	332661 407443
6	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 58.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (S)	92	3	332672 407441
7	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 77.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (S)	103	3	332671 407429
8	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 167.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (S)	134	3	332712 407398
9	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 505.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: New Cut Catchment Name: Alt Primacy: 1	A13NW (NW)	140	3	332624 407653
10	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 293.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NW (NW)	140	3	332627 407655
11	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 27.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: New Cut Catchment Name: Alt Primacy: 1	A13NW (NW)	140	3	332627 407655
12	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 427.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: New Cut Catchment Name: Alt Primacy: 1	A13NW (N)	144	3	332651 407668
13	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 360.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A13NW (N)	144	3	332651 407668

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
14	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 420.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (S)	163	3	332722 407371
15	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 17.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (S)	163	3	332722 407371
16	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 124.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (NE)	177	3	332828 407641
17	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 777.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (S)	179	3	332734 407357
18	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 13.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (NE)	182	3	332855 407607
19	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 316.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (NE)	191	3	332803 407683
20	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 293.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A13NW (NW)	193	3	332516 407612
21	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 311.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (NE)	194	3	332868 407605
22	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 14.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (NE)	194	3	332868 407605

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
23	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 326.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (E)	200	3	332878 407597
24	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 114.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (E)	200	3	332878 407597
25	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 229.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (SE)	210	3	332816 407362
26	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 220.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	224	3	332519 407387
27	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 6.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	226	3	332571 407339
28	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 2.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	232	3	332567 407334
29	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 104.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	235	3	332565 407332
30	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 485.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (N)	237	3	332775 407751
31	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 339.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (E)	262	3	332950 407508

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
32	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 73.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (SE)	291	3	332819 407270
33	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 351.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (E)	335	3	333013 407441
34	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	339	3	332498 407252
35	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 354.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A12SE (W)	341	3	332350 407522
36	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 204.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	344	3	332494 407247
37	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 242.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (SE)	357	3	332912 407251
38	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 8.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (SE)	362	3	332866 407214
39	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 239.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (SE)	364	3	332920 407248
40	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 3.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	365	3	332399 407311

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
41	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 189.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SW (SW)	368	3	332396 407309
42	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 83.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13SE (SE)	371	3	332872 407207
43	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 465.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A13NE (NE)	371	3	332913 407825
44	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 85.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SW (N)	431	3	332530 407930
45	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 11.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18SW (N)	431	3	332530 407930
46	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 172.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18SW (N)	443	3	332526 407941
47	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 11.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SW (NW)	444	3	332437 407893
48	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 219.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14SW (SE)	449	3	333100 407347
49	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 14.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SW (NW)	449	3	332448 407907

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
50	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 129.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NE (SE)	453	3	332926 407144
51	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 652.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NE (SE)	453	3	332926 407144
52	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 196.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SW (NW)	454	3	332433 407904
53	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 2.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18SE (NE)	480	3	333027 407871
54	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 18.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SE (NE)	480	3	333027 407871
55	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 434.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SE (NE)	491	3	333023 407890
56	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 62.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	492	3	333040 407876
57	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 107.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NW (NE)	497	3	333079 407839
58	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 270.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	498	3	333040 407884

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
59	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 15.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A19SW (NE)	498	3	333040 407884
60	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 202.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SE (SW)	499	3	332268 407265
61	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 233.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A17SE (NW)	501	3	332343 407891
62	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 149.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SW (N)	502	3	332516 408000
63	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 424.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	503	3	333033 407897
64	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 1.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	503	3	333033 407897
65	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 167.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: New Cut Catchment Name: Alt Primacy: 1	A12SE (W)	521	3	332183 407413
66	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 207.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NW (NE)	523	3	333157 407765
67	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 79.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NW (SW)	530	3	332387 407096

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
68	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 365.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NW (SW)	537	3	332451 407049
69	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 4.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NW (SW)	549	3	332364 407090
70	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 47.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14SW (SE)	553	3	333164 407245
71	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 210.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14SW (SE)	553	3	333164 407245
72	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 117.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NW (SW)	553	3	332361 407087
73	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 9.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A12NE (NW)	556	3	332242 407858
74	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 4.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SE (SW)	558	3	332241 407199
75	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 238.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9NW (SE)	562	3	333100 407146
76	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 262.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A12NE (NW)	562	3	332233 407856

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
77	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 314.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SE (SW)	563	3	332237 407197
78	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 294.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NE (SE)	581	3	333011 407046
79	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 624.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8NE (SE)	582	3	333002 407039
80	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 155.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14SW (E)	591	3	333278 407474
81	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 277.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14SW (SE)	598	3	333195 407210
82	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 548.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A14SW (SE)	598	3	333195 407210
83	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 117.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14SW (E)	601	3	333287 407463
84	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 10.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NW (E)	629	3	333311 407627
85	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 103.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NW (E)	635	3	333319 407620

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
86	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 340.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A8NE (S)	641	3	332751 406893
87	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 100.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SW (N)	650	3	332467 408140
88	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 223.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9NW (SE)	662	3	333174 407078
89	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 125.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18SW (NW)	664	3	332410 408132
90	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 53.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A18SW (N)	668	3	332557 408184
91	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 968.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18SW (N)	668	3	332454 408155
92	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NE (SW)	670	3	332286 406997
93	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 211.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18SW (N)	673	3	332509 408178
94	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 83.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18SW (N)	673	3	332509 408178

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
95	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 213.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9NW (SE)	674	3	333181 407068
96	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 25.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14SW (E)	674	3	333342 407359
97	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 142.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NE (SW)	675	3	332282 406993
98	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 130.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	682	3	332605 408206
99	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 48.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SE (W)	683	3	332032 407348
100	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 217.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: New Cut Catchment Name: Alt Primacy: 1	A12SE (W)	684	3	332035 407333
101	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 40.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A14SW (E)	691	3	333363 407374
102	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 9.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	693	3	332585 408214
103	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 83.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	693	3	332585 408214

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
104	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 420.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A12SW (W)	697	3	332011 407374
105	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 69.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SW (W)	697	3	332011 407374
106	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 361.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	702	3	332582 408224
107	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 2.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NE (E)	706	3	333396 407551
108	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 510.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NE (E)	708	3	333397 407550
109	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 10.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SW (W)	709	3	331988 407438
110	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 313.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SW (W)	710	3	331986 407449
111	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 124.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SW (W)	710	3	331986 407449
112	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 432.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	712	3	333221 408005

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
113	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 350.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	712	3	333244 407977
114	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 139.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17SE (NW)	714	3	332286 408117
115	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 385.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	720	3	332661 408249
116	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 58.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	720	3	332661 408249
117	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 17.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	724	3	332725 408253
118	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 24.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	724	3	332725 408253
119	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 125.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	733	3	332748 408260
120	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 1.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	739	3	332717 408268
121	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 131.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (W)	739	3	331952 407567

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
122	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 248.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (W)	739	3	331952 407567
123	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	740	3	332716 408269
124	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 328.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	745	3	332716 408275
125	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 8.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	745	3	332716 408275
126	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 157.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	749	3	332725 408278
127	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 10.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (W)	756	3	331954 407698
128	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 54.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (W)	760	3	331952 407708
129	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 1724.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Cheshire Lines Brook Catchment Name: Alt Primacy: 1	A19SW (NE)	762	3	333265 408030
130	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 878.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Cheshire Lines Brook Catchment Name: Alt Primacy: 1	A19SW (NE)	762	3	333244 408052

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
131	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 8.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A12NW (W)	770	3	331965 407787
132	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 327.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (W)	774	3	331952 407762
133	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 78.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (W)	774	3	331952 407762
134	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 384.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A12NW (W)	774	3	331964 407796
135	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 107.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A19SW (NE)	785	3	333245 408085
136	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 10.0 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	786	3	332868 408295
137	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 8.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	787	3	332880 408293
138	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 99.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17SE (NW)	790	3	332147 408104
139	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 52.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	793	3	332876 408300

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
140	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 19.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A19SW (NE)	798	3	333200 408144
141	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 206.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17SE (NW)	798	3	332231 408182
142	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 10.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (NW)	800	3	331954 407841
143	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 55.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	802	3	333339 408001
144	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 141.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12NW (NW)	804	3	331954 407851
145	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 254.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A19SW (NE)	805	3	333190 408161
146	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NE (SW)	818	3	332189 406884
147	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 3.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NE (SW)	824	3	332186 406880
148	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 4.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A7NE (SW)	826	3	332188 406875

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
149	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 118.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A7NE (SW)	827	3	332184 406877
150	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 3.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NE (SW)	827	3	332184 406877
151	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 36.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	841	3	332863 408353
152	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 6.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A7NE (SW)	842	3	332086 406945
153	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 169.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7SE (SW)	842	3	332208 406840
154	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 720.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NE (SW)	843	3	332172 406866
155	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 109.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A7NE (SW)	843	3	332081 406948
156	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 256.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7SE (SW)	850	3	332296 406778
157	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 158.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A7SE (SW)	850	3	332296 406778

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
158	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 101.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17SE (NW)	851	3	332049 408089
159	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 243.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SE (NE)	855	3	333428 407963
160	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 52.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SE (NE)	858	3	333386 408032
161	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 134.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NW (SW)	859	3	331950 407096
162	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 254.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9NW (SE)	863	3	333309 406930
163	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 7.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	864	3	333359 408076
164	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 6.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	865	3	333355 408083
165	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 180.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	865	3	333352 408088
166	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 298.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19SW (NE)	865	3	333352 408088

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
167	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 13.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	866	3	332895 408371
168	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 73.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	866	3	332895 408371
169	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 38.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9NE (SE)	869	3	333383 407006
170	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 133.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A7NW (SW)	871	3	331928 407109
171	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 166.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NW (SW)	871	3	331928 407109
172	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 685.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A9SW (SE)	873	3	333188 406814
173	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 11.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A9SW (SE)	873	3	333188 406814
174	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 11.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A7NW (SW)	873	3	331990 407009
175	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 260.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NE (E)	873	3	333512 407823

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
176	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 199.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A14NE (E)	873	3	333512 407823
177	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 129.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9SW (SE)	874	3	333198 406820
178	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 8.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9SW (SE)	874	3	333198 406820
179	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 292.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	877	3	332890 408383
180	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 7.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7NW (SW)	878	3	331981 407014
181	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 382.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17SW (NW)	878	3	331944 407992
182	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 104.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17SW (NW)	878	3	331944 407992
183	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 29.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	884	3	332471 408386
184	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 32.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	884	3	332471 408386

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
185	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 71.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	885	3	332443 408379
186	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 59.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	894	3	333002 408367
187	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 13.5 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A12SW (W)	895	3	331852 407218
188	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 107.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: New Cut Catchment Name: Alt Primacy: 1	A12SW (W)	899	3	331844 407229
189	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 17.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A8SW (S)	903	3	332518 406644
190	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 216.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A9NE (SE)	907	3	333410 406979
191	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 119.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9NE (SE)	907	3	333410 406979
192	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 232.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19NW (NE)	913	3	333260 408243
193	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 245.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19NW (NE)	913	3	333260 408243

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
194	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 152.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	916	3	332466 408418
195	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 295.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NW (N)	916	3	332466 408418
196	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 82.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8SW (S)	917	3	332506 406632
197	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 35.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	921	3	332957 408411
198	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 13.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A19NW (NE)	929	3	333062 408381
199	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 14.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	937	3	332996 408416
200	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 85.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A19NW (NE)	937	3	333056 408392
201	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 142.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A18NE (N)	937	3	332996 408416
202	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 274.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Leather Barrow's Ditch Catchment Name: Alt Primacy: 2	A18NE (N)	946	3	332988 408427

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
203	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 428.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A8SW (S)	952	3	332574 406585
204	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 771.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A9SW (SE)	963	3	333246 406744
205	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 244.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A9NE (SE)	963	3	333438 406924
206	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 385.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A12SW (W)	968	3	331727 407446
207	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 93.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A7SE (SW)	974	3	332094 406760
208	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 248.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 2	A9NE (SE)	974	3	333446 406917
209	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 334.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17SW (NW)	977	3	331876 408069
210	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 151.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Alt Primacy: 1	A17NE (NW)	995	3	332177 408381

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: West Lancashire District Council - Has supplied landfill data		0	4	332690 407530
	Local Authority Landfill Coverage Name: Lancashire County Council - Had landfill data but passed it to the relevant environment agency		0	5	332690 407530

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Triassic Rocks (Undifferentiated)	A13NE (NE)	0	1	332690 407530
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NE)	0	1	332690 407530
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil and Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SE (W)	693	1	332040 407291
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Potential for Compressible Ground Stability Hazards Hazard Potential: High Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	1	332690 407530

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
211	**Points of Interest - Manufacturing and Production** Name: J Balshaw & Son Location: Tyrers Farm 33, Lord Sefton Way, Liverpool, L37 5AA Category: Farming Class Code: Arable Farming Positional Accuracy: Positioned to address or location	A7SE (SW)	993	6	332129 406712

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
212	**Areas of Adopted Green Belt** Authority: West Lancashire District Council Plan Name: West Lancashire Local Plan **Status: Adopted** Plan Date: 16th October 2013	A13NE (NE)	0	7	332690 407530
213	**Nitrate Vulnerable Zones** Name: Alt Nvz Description: Surface Water Source: Environment Agency, Head Office	A13NE (NE)	0	9	332690 407530
214	**Sites of Special Scientific Interest** Name: Downholland Moss Multiple Areas: Y Total Area (m2): 215598.18 Source: Natural England Reference: 1005678 Designation Details: Geological Conservation Review Designation Date: 9th March 1990 Date Type: Notified Designation Details: Site Of Special Scientific Interest Designation Date: 9th March 1990 Date Type: Notified	A13NW (N)	143	10	332652 407667

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
West Lancashire District Council - Environmental Services	April 2014	Annual Rolling Update
Sefton Metropolitan Borough Council - Environmental Health Department	October 2017	Annual Rolling Update
Discharge Consents		
Environment Agency - North West Region	April 2018	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - North West Region	March 2013	As notified
Integrated Pollution Controls		
Environment Agency - North West Region	October 2008	Variable
Integrated Pollution Prevention And Control		
Environment Agency - North West Region	April 2018	Quarterly
Local Authority Integrated Pollution Prevention And Control		
Sefton Metropolitan Borough Council - Environmental Health Department	July 2015	Variable
West Lancashire District Council - Environmental Health Department	October 2014	Variable
Local Authority Pollution Prevention and Controls		
Sefton Metropolitan Borough Council - Environmental Health Department	July 2015	Annual Rolling Update
West Lancashire District Council - Environmental Health Department	October 2014	Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements		
Sefton Metropolitan Borough Council - Environmental Health Department	July 2015	Variable
West Lancashire District Council - Environmental Health Department	October 2014	Variable
Nearest Surface Water Feature		
Ordnance Survey	September 2017	
Pollution Incidents to Controlled Waters		
Environment Agency - North West Region	January 2000	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - North West Region	March 2013	As notified
Prosecutions Relating to Controlled Waters		
Environment Agency - North West Region	March 2013	As notified
Registered Radioactive Substances		
Environment Agency - North West Region	January 2015	
River Quality		
Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points		
Environment Agency - Head Office	July 2012	Annually
River Quality Chemistry Sampling Points		
Environment Agency - Head Office	July 2012	Annually
Substantiated Pollution Incident Register		
Environment Agency - North West Region - Central Area	April 2018	Quarterly
Environment Agency - North West Region - North Area	April 2018	Quarterly
Environment Agency - North West Region - South Area	April 2018	Quarterly
Water Abstractions		
Environment Agency - North West Region	April 2018	Quarterly
Water Industry Act Referrals		
Environment Agency - North West Region	October 2017	Quarterly
Groundwater Vulnerability		
Environment Agency - Head Office	April 2015	Not Applicable
Drift Deposits		
Environment Agency - Head Office	January 1999	Not Applicable
Bedrock Aquifer Designations		
British Geological Survey - National Geoscience Information Service	August 2015	As notified

Agency & Hydrological	Version	Update Cycle
Superficial Aquifer Designations British Geological Survey - National Geoscience Information Service	August 2015	As notified
Source Protection Zones Environment Agency - Head Office	January 2018	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2018	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2018	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	February 2018	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	February 2018	Quarterly
Flood Defences Environment Agency - Head Office	February 2018	Quarterly
OS Water Network Lines Ordnance Survey	January 2018	Quarterly
Surface Water 1 in 30 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 100 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 1000 year Flood Extent Environment Agency - Head Office	October 2013	As notified
Surface Water Suitability Environment Agency - Head Office	October 2013	As notified
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	As notified

Data Currency

Waste	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites		
Environment Agency - Head Office	April 2018	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - North West Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - North West Region - Central Area	April 2018	Quarterly
Environment Agency - North West Region - North Area	April 2018	Quarterly
Environment Agency - North West Region - South Area	April 2018	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - North West Region - Central Area	April 2018	Quarterly
Environment Agency - North West Region - North Area	April 2018	Quarterly
Environment Agency - North West Region - South Area	April 2018	Quarterly
Local Authority Landfill Coverage		
Lancashire County Council - Waste Management Group	May 2000	Not Applicable
Merseyside Waste Disposal Authority	May 2000	Not Applicable
Sefton Metropolitan Borough Council - Environmental Health Department	May 2000	Not Applicable
West Lancashire District Council - Environmental Health Department	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
West Lancashire District Council - Environmental Health Department	March 2004	Not Applicable
Lancashire County Council - Waste Management Group	May 2000	Not Applicable
Merseyside Waste Disposal Authority	May 2000	Not Applicable
Sefton Metropolitan Borough Council - Environmental Health Department	May 2000	Not Applicable
Potentially Infilled Land (Non-Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Registered Landfill Sites		
Environment Agency - North West Region - Central Area	March 2003	Not Applicable
Environment Agency - North West Region - North Area	March 2003	Not Applicable
Environment Agency - North West Region - South Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - North West Region - Central Area	March 2003	Not Applicable
Environment Agency - North West Region - North Area	March 2003	Not Applicable
Environment Agency - North West Region - South Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - North West Region - Central Area	March 2003	Not Applicable
Environment Agency - North West Region - North Area	March 2003	Not Applicable
Environment Agency - North West Region - South Area	March 2003	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	September 2017	Bi-Annually
Explosive Sites		
Health and Safety Executive	March 2017	Variable
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Lancashire County Council	February 2016	Variable
Sefton Metropolitan Borough Council	February 2016	Variable
West Lancashire District Council	February 2016	Variable
Planning Hazardous Substance Consents		
Lancashire County Council	February 2016	Variable
Sefton Metropolitan Borough Council	February 2016	Variable
West Lancashire District Council	February 2016	Variable

Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology		
British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry		
British Geological Survey - National Geoscience Information Service	October 2015	As notified
BGS Recorded Mineral Sites		
British Geological Survey - National Geoscience Information Service	May 2018	Bi-Annually
CBSCB Compensation District		
Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas		
The Coal Authority - Property Searches	March 2014	As notified
Mining Instability		
Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain		
British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Compressible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Ground Dissolution Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Landslide Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Running Sand Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	As notified
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	June 2015	As notified
Radon Potential - Radon Affected Areas		
British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures		
British Geological Survey - National Geoscience Information Service	July 2011	As notified

Data Currency

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	February 2018	Quarterly
Fuel Station Entries Catalist Ltd - Experian	April 2018	Quarterly
Gas Pipelines National Grid	July 2014	Quarterly
Points of Interest - Commercial Services PointX	March 2018	Quarterly
Points of Interest - Education and Health PointX	March 2018	Quarterly
Points of Interest - Manufacturing and Production PointX	March 2018	Quarterly
Points of Interest - Public Infrastructure PointX	March 2018	Quarterly
Points of Interest - Recreational and Environmental PointX	March 2018	Quarterly
Underground Electrical Cables National Grid	December 2015	Bi-Annually

Sensitive Land Use	Version	Update Cycle
Ancient Woodland		
Natural England	October 2017	Bi-Annually
Areas of Adopted Green Belt		
Sefton Metropolitan Borough Council	February 2018	As notified
West Lancashire District Council	February 2018	As notified
Areas of Unadopted Green Belt		
Sefton Metropolitan Borough Council	February 2018	As notified
West Lancashire District Council	February 2018	As notified
Areas of Outstanding Natural Beauty		
Natural England	February 2018	Bi-Annually
Environmentally Sensitive Areas		
Natural England	January 2017	
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Natural England	February 2018	Bi-Annually
Marine Nature Reserves		
Natural England	January 2018	Bi-Annually
National Nature Reserves		
Natural England	February 2018	Bi-Annually
National Parks		
Natural England	April 2017	Bi-Annually
Nitrate Vulnerable Zones		
Environment Agency - Head Office	December 2017	Bi-Annually
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	October 2015	
Ramsar Sites		
Natural England	February 2018	Bi-Annually
Sites of Special Scientific Interest		
Natural England	February 2018	Bi-Annually
Special Areas of Conservation		
Natural England	January 2018	Bi-Annually
Special Protection Areas		
Natural England	February 2018	Bi-Annually

Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	**Ordnance Survey** Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
4	**West Lancashire District Council - Environmental Health Department** Westec House, 52 Derby Street, Ormskirk, Lancashire, L39 2DF	Telephone: 01695 577177 Fax: 01695 571079 Website: www.westlancsdc.gov.uk
5	**Lancashire County Council - Waste Management Group** Environment Directorate, Guild House, Cross Street, Preston, Lancashire, PR1 8RD	Website: www.lancashire.gov.uk
6	**PointX** 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
7	**West Lancashire District Council** Westec House, 52 Derby Street, Ormskirk, Lancashire, L39 2DF	Telephone: 01695 577177 Fax: 01695 571079 Website: www.westlancsdc.gov.uk
8	**Sefton Metropolitan Borough Council** Magdalen House, 30 Trinity Road, Bootle, Merseyside, L20 3NJ	Telephone: 0151 922 4040 Fax: 0151 934 3587 Website: www.sefton.gov.uk
9	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
10	**Natural England** County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

APPENDIX B
INTRUSIVE GROUND INVESTIGATION REPORT

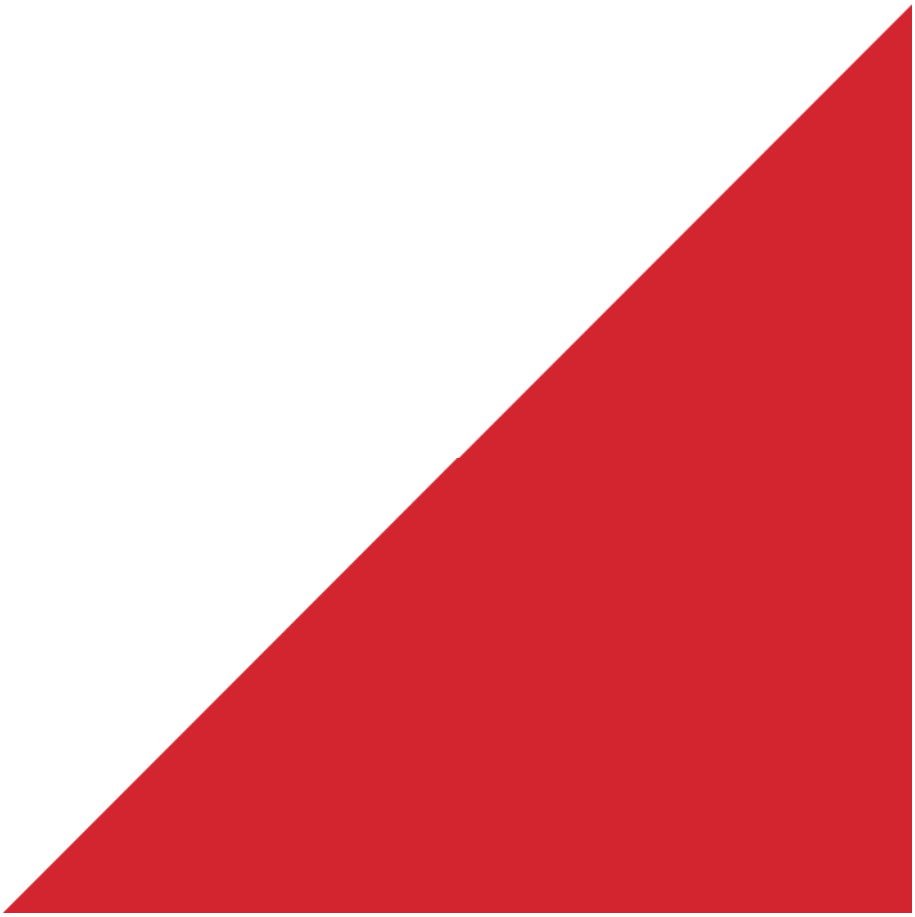
Ground Investigation Report

On a site at

Altcar, Formby

For

Zetland Group



Ground Investigation Report

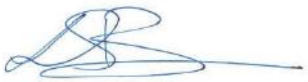
On a site at

Altcar, Formby

For

Zetland Group

Prepared By



Libby Brunskill
Geo-Environmental Engineer

Opus International Consultants (UK) Ltd

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Reviewed By

S Howard BSc (Hons) CEnv CSci MIEnvSc
Principal Geo-Environmental Engineer

Date: November 2017
Reference: J-W0621.00
Status: Final

Authorised By

S Howard BSc (Hons) CEnv CSci MIEnvSc
Principal Geo-Environmental Engineer

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EXECUTIVE SUMMARY

Location	The site is located at Altcar Moss, Formby, centred on approximate National Grid Reference 332755, 407603. The site currently comprises agricultural land and access is gained via an unnamed road which is accessed via Altcar Road (B5195).
Ground Conditions	**Topsoil** Topsoil was encountered in all the exploratory hole locations to a maximum encountered depth of 0.40m begl (BH01). **Alluvium** A soft CLAY with varying proportions of silt, peat and sand, as well as a very soft SILT with varying proportions of sand and peat was encountered beneath the topsoil in all exploratory hole locations to a maximum encountered depth of 1.20m begl (WS01). **Peat** Plastic pseudofibrous PEAT with varying proportions of clay and silt was encountered in all exploratory locations to a maximum depth of 1.50m begl (WS01 and WS05). **Downholland Silt** A very soft SILT comprising varying proportions of clay, sand and peat, was encountered beneath the peat in all exploratory hole locations to a maximum depth of 6.90m begl (BH01). **Shirdley Sand** A very loose to dense SAND with varying proportions of silt was encountered in all exploratory hole locations, with the exception of BH01, beneath the silt to a maximum encountered depth of 7.20m begl (WS02). **Glacial Till** A stiff to very stiff sandy gravelly CLAY (Boulder clay) was encountered in BH01 and WS03 to a maximum encountered depth of 10.50m (BH01). **Bedrock** Solid geology (Keuper Marl) was not encountered in any of the borehole locations.
Groundwater	Groundwater was encountered in five of the exploratory holes at depths of between 0.6m (WS04) and 6.0m (BH01). The groundwater in BH01 was monitored over a 20 minute period, after which time the water level rose up to 2.14m bgl. A groundwater monitoring well was installed within BH01 with a response zone from 2.0m. A continuous monitoring device was installed within the well to monitor the groundwater level fluctuations over a two week period. The results obtained from the monitoring device demonstrated that the levels varied between 0.81m bgl and 0.70m bgl, as such the groundwater is not considered to be influenced by tidal flow from the Irish Sea.
Chemical Testing	A baseline range (lowest and highest) has been created for the soil tested for those compounds which were identified on site at levels above the Limits of Detection (LoD). The percentage of Soil Organic Matter (SOM) ranged between 1.1 and 73%. No positive asbestos fibres were detected within any of the twelve samples tested.

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	Based on a comparison of the testing results against a commercial exposure model, Opus have determined that the site does not pose a chronic risk to future site workers.
Geotechnical Testing	**Atterberg Limits** The natural soil on site was identified as demonstrating an intermediate to extremely high plasticity. In accordance with NHBC Chapter 4.2, the most significant volume change potential should be assumed. Therefore, the natural soil should be classified as having an **extremely high** volume change potential. **pH & Sulphate** The results of the pH & SO4 testing show that the majority of soils on site are characteristic of Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete Classification (ACEC) Class AC-1s in accordance with BRE Special Digest 1 (2005). Two samples, however, are characteristic of DS-2 and AC-1s (WS04 at 0.7m and WS06 at 0.3m). **SPT Testing** The SPT N values, plotted on Figure 1, show a general trend increasing with depth, from the lowest uncorrected N value of N=0 between 1.20m and 5.00m begl to the highest uncorrected N value of N=42 at 6.00m begl. The lower N values were encountered within the PEAT (WS01, WS05), peaty sandy SILT (WS01) and a sandy SILT (WS04, WS06) that were encountered higher in the sequence directly beneath the subsoil. The higher N values were encountered in very sandy SILT (WS03), sandy gravelly CLAY (WS03) and SAND (WS05). **CBR Testing** The results show a general increase in CBR values with depth, with lower values typically being representative of the alluvium encountered near surface, and the slightly higher values representative of the peat beneath. An assessment of the likely California Bearing Ratio (CBR) for the near surface soils has been made and a design CBR value of 2% has been adopted for the upper 500mm of soils. It is recommended that the CBR values are suitably validated on site using plate load test methods on the formation soil once areas designated for highways have been confirmed.

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DRAWINGS

J-W0621.00/01 Site Location Plan
J-W0621.00/02 Exploratory Hole Location Plan

APPENDICES

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APPENDIX F Opus Tier I Screening Methodology

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1.0 INTRODUCTION

1.1 Background

Opus International Consultants (UK) Ltd (Opus) has been commissioned by the Client (Zetland Group) to undertake a Ground Investigation at a site in Altcar Moss, Formby.

Opus understands that Zetland are currently assessing the parcel of land with regards to access and site establishment.

1.2 Scope of Works

This report includes a preliminary stage of soil sampling and analysis to establish a 'Baseline' of existing ground conditions on site, together with continuous groundwater monitoring to ascertain whether the site is tidally influenced by the Irish Sea.

Opus will also factually report the geotechnical information obtained as part of the investigation and provide recommendations regarding future works required.

The report has been designed in general accordance with BS 10175:2011 and A1:2013 the British Standards Code of Practice for the Investigation of Potentially Contaminated sites and with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11)).

1.3 Objectives

The objectives of the intrusive investigation were to address the following:

- Provide a chemical 'Baseline' of existing ground conditions on site by targeted intrusive investigation;
- Ascertain whether the site is influenced by tidal impact from the Irish Sea; and,
- Identify any geotechnical constraints on site that would impede the site development;

1.4 Limitations

This report has been produced on behalf of the Client, Zetland Group, and no responsibility is accepted to any Third Party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of Opus. If any unauthorised Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

Findings and opinions conveyed within this report are based on information obtained from a variety of sources as detailed within this report, which Opus believes are reliable. Nevertheless, Opus cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The site plans enclosed in this report should not be used for scaling purposes.

2.0 THE SITE

2.1 Location & Access

The site is located at Altcar Moss, Formby, centred on approximate National Grid Reference 332755, 407603 as shown on the appended Drawing No. MR J-W0621.00/01 Site Location Plan.

The site currently comprises agricultural land and access is gained via an unnamed road which is accessed via Altcar Road (B5195).

2.2 Site Description

The following site description is based upon a site walkover undertaken during the site investigation on 25th October 2017 and the following observations were made:

- The site currently comprises agricultural farmland and site levels are generally flat across the site;
- The ground was generally noted to be hard, however there were some areas of soft ground and standing water;
- The site is bordered by agricultural fields to the north, east, south and west, with Great Altcar located to the south of the site; and,
- Several drainage ditches were noted on and surrounding the site.

3.0 GROUND INVESTIGATION

3.1 Clearance of Underground Services

Prior to the intrusive investigation works each exploratory hole location was referenced against the available service plans and was then scanned with a Cable Avoidance Tool (CAT) and signal generator for the potential presence of underground unknown services. Additionally, hand excavated service inspection pits were completed prior to the commencement of the boreholes.

3.2 Site Works

The following exploratory hole locations were completed on 25th October 2017:

- 1 No. cable percussive borehole (BH01) drilled to a depth of 10.50m below existing ground level (m begl);
- 6 No. windowless sample probeholes (WS01 – WS06) excavated to depths of between 5.00m and 7.45m begl; and,
- 6 No. Dynamic Cone Penetrometer tests.

All windowless sample probehole locations were backfilled with arisings upon completion. The borehole was installed with a groundwater monitoring well to a depth of 10.00m bgl, with response zone between 2.00m and 10.00m bgl.

Disturbed samples were taken from all exploratory holes at selected intervals from the strata encountered, placed in laboratory supplied containers and submitted for chemical and geotechnical testing.

The encountered geology was logged by an Opus Geo-Environmental Engineer in general accordance with BS EN ISO 14688-1. Any visual or olfactory evidence of potential contamination was also recorded.

The approximate locations of the exploratory holes are shown on Drawing No. MR J-W0621.00/02, with coordinates presented on the exploratory hole logs attached as Appendix 'A'.

3.3 Chemical Laboratory Testing

Twelve representative samples of topsoil and subsoil were submitted for selected chemical testing. The analysis was undertaken by Concept Life Sciences, a UKAS and MCERTS accredited laboratory, with the results enclosed as Appendix 'B'.

The following analyses were undertaken:

- Asbestos ID - 12 samples;
- Heavy Metals - 12 samples;
- Total Petroleum Hydrocarbon (CWG) inc. BTEX, MTBE - 12 samples;
- Polycyclic Aromatic Hydrocarbon (PAH) - 12 samples;
- pH & Sulphate - 12 samples, and,

- Salinity - 12 samples.

3.4 Groundwater Monitoring

A continuous groundwater monitoring well was installed within BH01 in order to determine the tidal influence of the Irish Sea on groundwater levels across the site. The results of the monitoring are presented in Appendix 'C' and discussed in further detail in Section 4.2.

3.5 Geotechnical Laboratory Testing

Eight representative samples of natural clay were submitted for selected geotechnical testing. The analysis was undertaken by Professional Soils Laboratory Ltd (PSL) and Derwentside Environmental Testing Services (DETS), both UKAS accredited laboratories, with the results presented in Appendix 'B' and 'D'.

The following analyses were undertaken:

- Atterberg Limits - 8 samples;
- Moisture Content - 8 samples; and,
- pH & Sulphate - 3 samples.

4 RESULTS OF THE GROUND INVESTIGATION

4.1 Strata Encountered

4.1.1 Topsoil

Topsoil was encountered in all the exploratory hole locations to a maximum encountered depth of 0.40m begl (BH01).

The Topsoil typically comprised a clayey SAND or sandy SILT with frequent rootlets.

4.1.2 Alluvium

A soft CLAY with varying proportions of silt, peat and sand, as well as a very soft SILT with varying proportions of sand and peat was encountered beneath the topsoil in all exploratory hole locations to a maximum encountered depth of 1.20m begl (WS01).

4.1.3 Peat

Plastic pseudofibrous PEAT with varying proportions of clay and silt was encountered in all exploratory locations to a maximum depth of 1.50m begl (WS01 and WS05).

The peat was encountered at greatest thickness in WS05 at 1.10m in thickness.

4.1.4 Downholland Silt

A very soft SILT comprising varying proportions of clay, sand and peat, was encountered beneath the peat in all exploratory hole locations to a maximum depth of 6.90m begl (BH01).

The silt was shown to be at greatest thicknesses in WS06 at 5.60m in thickness.

4.1.5 Shirdley Sand

A very loose to dense SAND with varying proportions of silt was encountered in all exploratory hole locations, with the exception of BH01, beneath the silt to a maximum encountered depth of 7.20m begl (WS02).

The sand was shown to be at greatest thicknesses in WS04 at 2.20m in thickness.

4.1.6 Glacial Till

A stiff to very stiff sandy gravelly CLAY (Boulder clay) was encountered in BH01 and WS03 to a maximum encountered depth of 10.50m (BH01).

4.1.7 Bedrock

Solid geology (Keuper Marl) was not encountered in any of the borehole locations.

4.2 Groundwater Observations

Groundwater was encountered in WS01, WS02, WS04, WS06 and BH01 at depths of between 0.6m (WS04) and 6.0m (BH01). An oily sheen was noted on the groundwater detected in each of the

exploratory holes. This is considered to be associated with naturally occurring hydrocarbons in the area.

The groundwater in BH01 was monitored over a 20 minute period, after which time the water level rose to 2.14 bgl. A groundwater monitoring well was installed within BH01 with a response zone from 2.0m. A continuous monitoring device was installed within the well to monitor the groundwater level fluctuations over a two week period.

The results obtained from the monitoring device show that the minimum (0.81m bgl) and maximum (0.70m bgl) groundwater levels do not vary significantly enough to be considered to be influenced by tidal flow from the Irish Sea.

Based upon the shallow depth of groundwater across the site, it is likely that groundwater will be encountered during foundation construction, and it is considered that sump and pump dewatering techniques will be required to form foundations, drilling cellars and perimeter ditches.

Where excavations need to be greater than 2.0m, a suitable solution to remove the water and prevent sidewall collapse will need to be established. The depth of groundwater and infiltration could be assessed on site further during the excavations undertaken for the construction of the foundations, and a dewatering system can then be devised. If discharge into nearby surface water features is to be an option, an Environment Agency discharge consent will be required.

It should also be noted that groundwater conditions could change in the future due to climatic and seasonal effects.

4.3 Chemical Testing

A baseline range (lowest and highest) has been created for the soil tested (as detailed in Table 1 below), for those inorganic and organic compounds which were identified on site at levels above the Limits of Detection (LoD). The percentage of Soil Organic Matter (SOM) ranged between 1.1 and 73% and no positive asbestos fibres were detected within any of the twelve samples tested.

The full set of chemical testing results are enclosed as Appendix 'B'.

Table 1 Summary of Analysed Soil Concentrations

Contaminant	Range Lowest – Highest (mg/kg)
Arsenic	5 - 32
Barium	19 - 76
Chromium	10 - 48
Copper	6 - 29
Lead	6 - 65
Nickel	10 - 39
Vanadium	12 - 71
Zinc	23 - 95
TPH (C10-C12 Aliphatic)	4 - 4

Contaminant	Range Lowest – Highest (mg/kg)
TPH (C12-C16 Aliphatic)	6 – 22
TPH (C16-C21 Aliphatic)	1 - 94
TPH (C21-C35 Aliphatic)	2 - 95
TPH (C8-C10 Aromatic)	0.13 – 0.13
TPH (C10-C12 Aromatic)	12 – 12
TPH (C12-C16 Aromatic)	2 - 40
TPH (C16-C21 Aromatic)	3 - 27
TPH (C21-C35 Aromatic)	1 - 93
Salinity (%)	1.8 – 2.3
pH	<4 – 7.7

Opus have compared the results to a commercial exposure model based on a 1% SOM soil, to determine if any further assessment of the chronic risk to future site occupants is required. The area is known for its naturally occurring shallow hydrocarbon deposits, however, none of the above compounds exceeded the Opus Tier 1 Soil Screening Values. The Opus Screening Methodology is included in Appendix F.

4.4 Geotechnical Testing

The results of the geotechnical testing are presented in Tables 2 and 3 and discussed in Section 5.0. The testing certificates are included within Appendix 'B' and 'D'.

4.4.1 Atterberg Limits

Table 2 Atterberg Limit Testing Results

Location	Sample Number	Depth (m)	Plasticity Index (p)	Moisture Content (%)	Modified Plasticity Index (p')	Volume Change Potential	Strata
WS01	D3	0.4	42	38	42	High	Sandy CLAY
WS02	D3	0.3	45	45	45	Very High	Peaty SILT
WS04	D4	1.5	19	33	19	Intermediate	Sandy SILT
WS06	D3	0.4	64	109	63	Extremely High	Silty PEAT
BH01	D15	4.0	10	34	10	Intermediate	Clayey sandy SILT
BH01	D23	8.0	19	17	17	Intermediate	Sandy gravelly CLAY

The natural soil on site was identified as demonstrating an intermediate to extremely high plasticity. In accordance with NHBC Chapter 4.2, the most significant volume change potential should be assumed. Therefore, the natural soil should be classified as having an extremely high volume change potential.

4.4.2 pH and Sulphate Testing

The chemical analyses for pH and water soluble sulphate content are presented in Appendix 'B' and summarised in Table 3.

Table 3 pH and Sulphate Testing Results

Location	Depth (m)	SO_4 in 2:1 water / soil (Mg/l)	pH Value
WS01	0.15	10	7.1
WS01	0.3	40	7.7
WS02	0.2	30	5.2
WS02	0.5	320	<4
WS03	0.1	<10	4.9
WS03	1.2	190	6.8
WS04	0.1	20	5.1
WS04	0.7	690	4.7
WS04	3.0	84	8.6
WS05	0.1	20	5.0
WS05	1.2	30	4.2
WS06	0.2	30	4.3
WS06	0.3	530	<4
BH01	6.0	240	8.4
BH01	9.0	200	8.4

The results of the pH and sulphate analysis have been assessed for potential aggression to buried concrete in accordance with the Building Research Establishment: Special Digest 1: Concrete in Aggressive Ground (BRE 2005). It is considered that the site can be classified as a greenfield site with regard to aggressive ground risks.

Based upon the results of the chemical analyses undertaken to date, it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-2, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

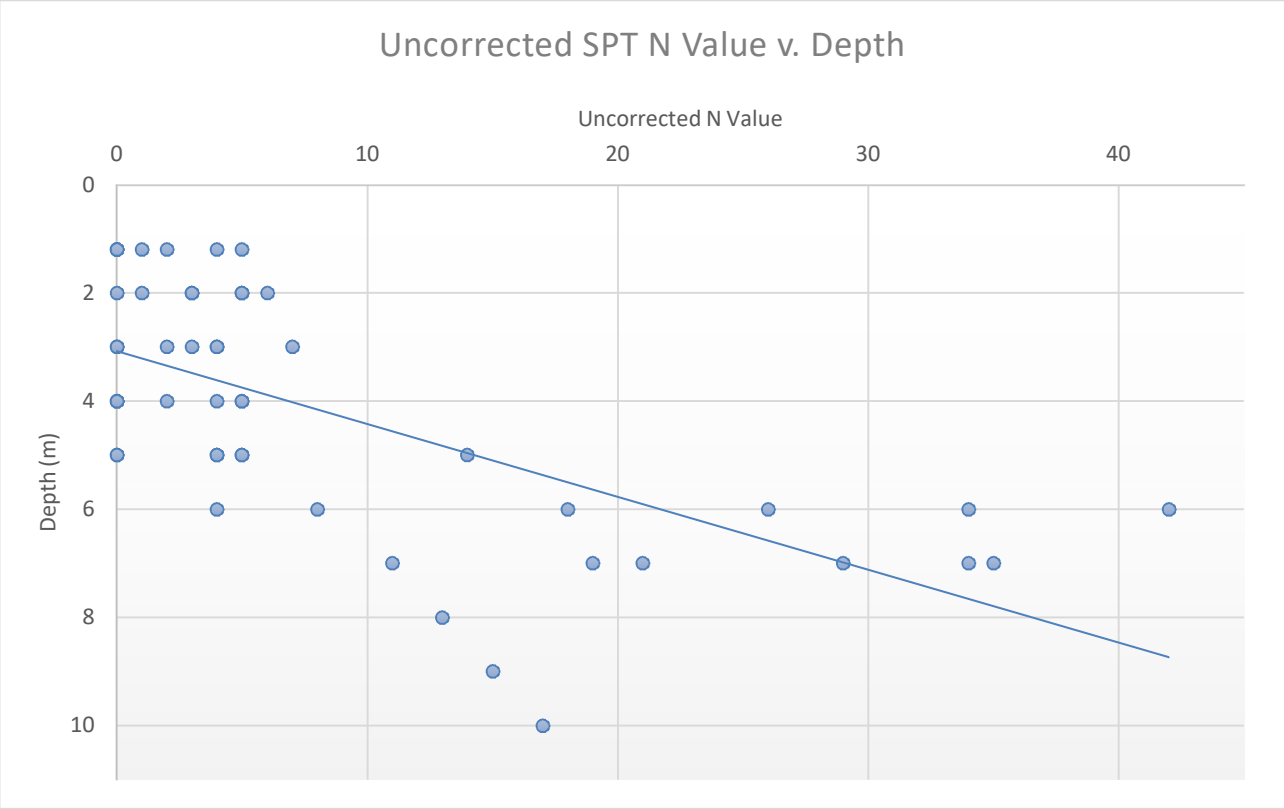
The specific concrete mixes for the Design Concrete Class (DCC) to be used on site will be determined by the site specific concrete requirements in terms of the required durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM), detailed in Part 2 with further guidance in Parts 3 and 4 of BRE Special Digest 1.

4.5 In-Situ Testing

4.5.1 Standard Penetration Testing

In-situ Standard Penetration Testing (SPT) was undertaken in all exploratory holes with the results of the testing shown in Figure 1 (overleaf).

Figure 1 SPT Results



The SPT N values, plotted on Figure 1, show a general trend increasing with depth, from the lowest uncorrected N value of N=0 between 1.20m and 5.00m begl to the highest uncorrected N value of N=42 at 6.00m begl.

The lower N values represent a PEAT (WS01, WS05), peaty sandy SILT (WS01) and a sandy SILT (WS04, WS06) that are encountered higher in the sequence beneath the subsoil. The higher N values represent a very sandy SILT (WS03), sandy gravelly CLAY (WS03) and SAND (WS05).

4.5.2 CBR Testing

Dynamic Cone Penetrometer (DCP) testing was undertaken on site by use of a Transport Research Laboratory (TRL) probe. The results of the testing are summarised in Table 4 below, with the full set of results presented in Appendix 'E'.

Table 4 Results of DCP Testing

Location	Range Top (m bgl)	Range Bottom (m bgl)	Blow Count	CBR (%)	Stratum
DCP01	195	302	1	2.16	Sandy CLAY
	302	855	16	7.11	Sandy peaty SILT
DCP02	101	373	3	2.58	Peaty SILT
	373	593	4	4.37	Silty PEAT
	593	870	8	7.13	
DCP03	137	600	4	1.99	Silty PEAT
	600	941	5	3.48	
DCP04	66	225	1	1.42	TOPSOIL: Clayey SAND
	225	400	2	2.67	Silty peaty CLAY
	400	731	6	4.36	
	731	750	1	13.44	Clayey silty PEAT
	750	849	2	4.88	
DCP05	65	231	1	1.36	Silty peaty CLAY
	231	370	2	3.41	
	370	917	14	6.27	Clayey silty PEAT
DCP06	131	290	2	2.96	Silty peaty CLAY
	290	386	2	5.05	
	386	854	14	7.40	Clayey silty PEAT

The results show a general increase in CBR values with depth, with lower values typically being representative of the alluvium encountered near surface, and the higher values representative of the peat beneath.

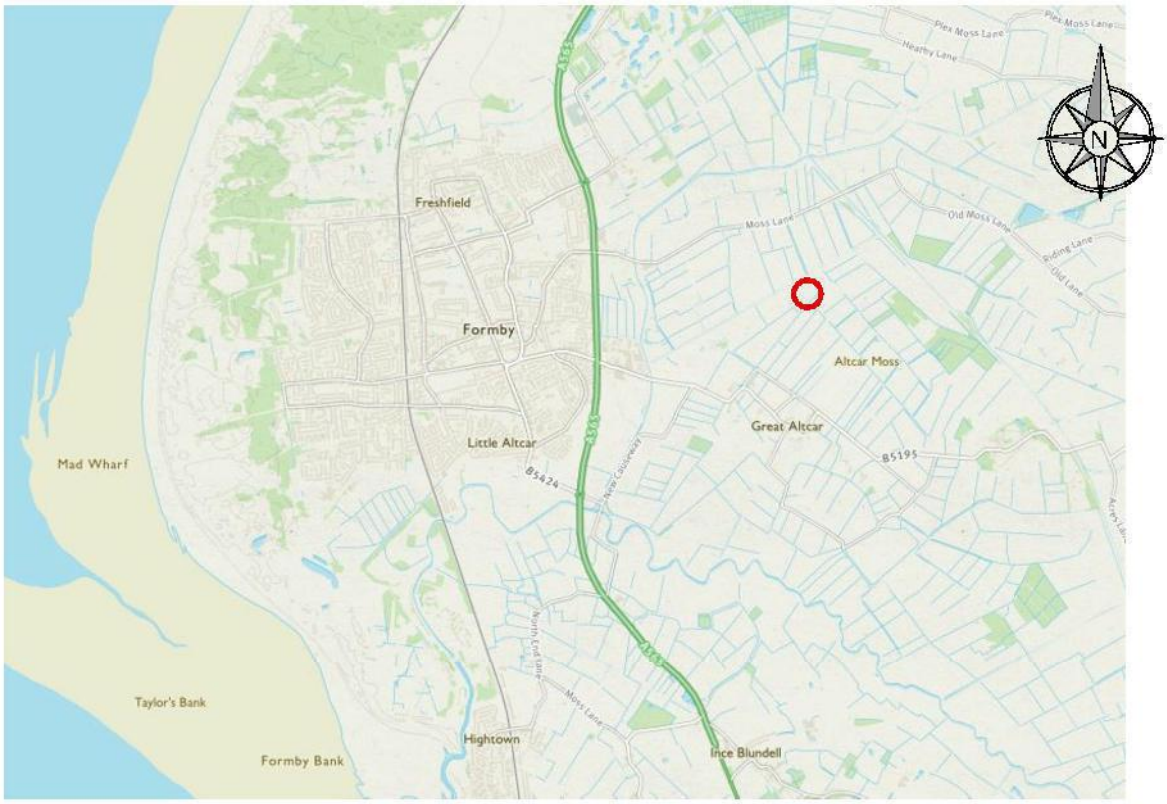
An assessment of the likely California Bearing Ratio (CBR) for the near surface soils has been made using the above testing results and the description of the materials encountered in the exploratory holes. Furthermore, a design CBR value of 2% has been adopted for the upper 500mm of soils.

It is recommended that the CBR values are suitably validated on site using plate load test methods on the formation soil once areas designated for highways have been confirmed.

DRAWINGS

1:1 @ A4

0 10 20 30 40 mm



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FINAL

ZETLAND GROUP
FROM CONCEPTION TO COMPLETION

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Revision	Amendment	Approved	Date

Designed	Approved	Approved Date
LB	SH	OCT '17

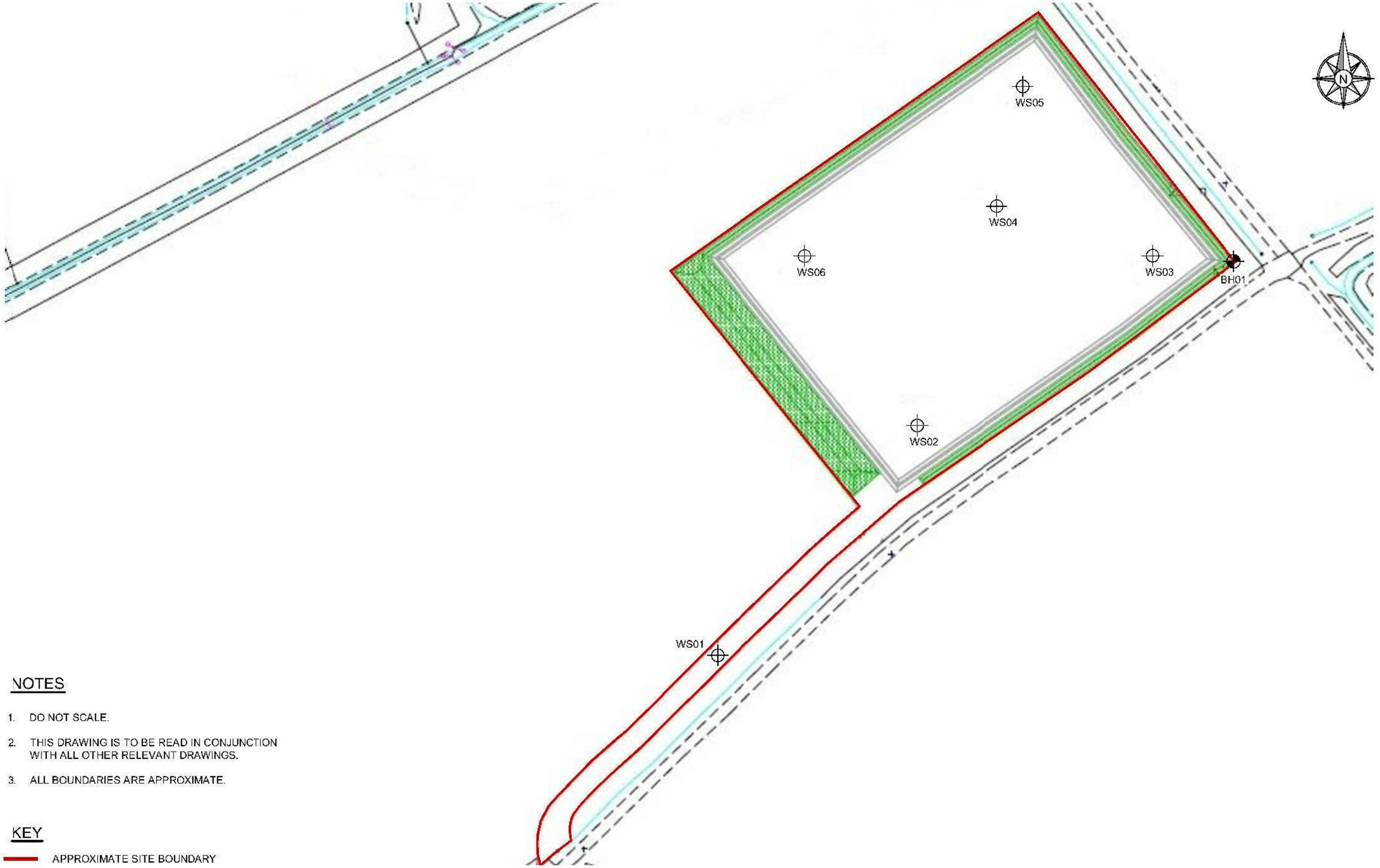
Drawn	Scale
NT	NOT TO SCALE

Title:
ALTCAR MOSS,
FORMBY

Size:
SITE LOCATION PLAN

Project No.	Sheet No.	Revision
J-W0621.00	01	-

Original Sheet Size A1 [210x297]



NOTES

1. DO NOT SCALE.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
3. ALL BOUNDARIES ARE APPROXIMATE.

KEY

APPROXIMATE SITE BOUNDARY

BH01 — APPROXIMATE BOREHOLE LOCATION WITH GROUNDWATER MONITORING WELL

WS01 — APPROXIMATE WINDOW SAMPLE LOCATION

1:1 @ A3 — 0 10 20 30 40 50 mm

FOR INFORMATION

Revision	Amendment	Approved	Revision Date

ZETLAND GROUP
FROM CONCEPTION TO COMPLETION

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Designed	Approved	Approved Date
LB	SH	OCT 17

Drawn	Scale
NF	NOT TO SCALE

Project: ALTCAR MOSS, FORMBY

Sheet: EXPLORATORY HOLE LOCATION PLAN

Project No.	Sheet No.	Revision
J-W0621.00	02	-

Original Sheet Size A3 [420x297]

APPENDIX A
Exploratory Hole Logs

Exploratory Hole ID:	Client:		
BH01	Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 25/10/2017	End Date: 26/10/2017
Drilling Equipment/ Excavation Method: Dando 2000	Co-ords: 332847E - 407605N	Backfill Date: 26/10/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB	Chkd: SH / Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown clayey fine to medium SAND with frequent rootlets.	0.40			D2	0.30			
Soft grey brown silty peaty CLAY.	0.70			ES1 D4	0.50			
Plastic dark brown clayey silty pseudofibrous PEAT.	1.40			ES3 D6	0.70			
Very soft becoming soft grey clayey slightly sandy SILT.				ES5 D7	1.00			
				D8	1.20			
				D9		N=1 (S)	2.14	
				D10	2.00			
				D11		N=3 (S)		
				D12	3.00			
				D13		N=4 (S)		
				D14	4.00			
				D15		N=4 (S)		
				D16	5.00			
				D17		N=4 (S)		
				D18	6.00		6.00	
				D19		N=4 (S)		
Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subrounded medium to coarse of mudstone.	6.90			D20	7.00			
				D21		N=11 (S)		
				D22	8.00			
				D23		N=13 (S)		
				D24	9.00			
				D25		N=15 (S)		
				D26	10.00			

Remarks:

1. Borehole end depth at 10.50m begl.
2. Groundwater encountered at 6.00m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.
4. Groundwater monitoring well installed upon completion with response zone between 2.00 and 10.00m begl.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Exploratory Hole ID:	Client:		
BH01	Client: Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 25/10/2017	End Date: 26/10/2017
Drilling Equipment/ Excavation Method: Dando 2000	Co-ords: 332847E - 407605N	Backfill Date: 26/10/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
	10.50			D27	10.50	N=17 (S)		

Remarks:

1. Borehole end depth at 10.50m begl.
2. Groundwater encountered at 6.00m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.
4. Groundwater monitoring well installed upon completion with response zone between 2.00 and 10.00m begl.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 2 of 2

Exploratory Hole ID:	Client:		
WS01	Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 25/10/2017	End Date: 25/10/2017
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig	Co-ords: 332708E - 407499N	Backfill Date: 25/10/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown black slightly sandy SILT with frequent rootlets and organic matter.	0.20			ES1	0.15			
				ES2	0.30			
Soft to firm grey brown mottled orange and black slightly sandy CLAY with occasional organic fragments.	0.50			D3	0.40			
				D4	0.60		0.80 ▼	
Very soft grey slightly sandy slightly peaty SILT.								
	1.20					N=0 (S)		
Plastic dark brown grey very silty pseudofibrous PEAT.	1.50							
Very soft grey slightly peaty sandy SILT with black inclusions and pockets of grey very silty sand. Becoming less peaty with depth.				D5	1.60			
						N=0 (S)		
				D6	2.60			
						N=0 (S)		
				D7	3.60			
						N=0 (S)		
				D8	4.60			
						N=5 (S)		
Loose becoming medium dense brown grey very silty fine to medium SAND with occasional black inclusions. Pockets of dark brown grey slightly sandy slightly peaty SILT between 5.10m and 6.20m bgl. Becoming less silty with depth.	5.10			D9	5.60			
						N=8 (S)		
Pockets of dark brown grey slightly sandy slightly peaty SILT between 6.60m and 6.70m bgl.				D10	6.60			
	7.00					N=21 (S)		

Remarks:

1. Probehole end depth at 7.00m begl with Dynamic Probing to 10.00m begl.
2. Groundwater encountered at 0.80m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:	
WS02	Zetland Group	
	Site: Altcar, Formby	
Job No: J-W0621.00		

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Start Date:	End Date:
25/10/2017	25/10/2017

Drilling Equipment/ Excavation Method:	Co-ords:	Backfill Date:	Field Records:
Tracked Windowless Sampling Rig	332762E - 407562N	25/10/2017	LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising soft dark brown black very organic slightly sandy SILT with frequent rootlets.	0.20			ES1	0.20			
				D3	0.30			
Soft grey peaty SILT with dark grey and brown organic inclusions.	0.40			ES2				
				ES4	0.50		0.80 ▼	
Plastic dark brown silty pseudofibrous PEAT.	1.00			D5	1.00			
Soft grey brown very sandy slightly peaty SILT with occasional fibrous organic matter.	1.40					N=4 (S)		
Loose becoming very loose grey very silty SAND with occasional pockets of soft very sandy silt.				D6	2.00	N=6 (S)		
				D7	3.00	N=3 (S)		
				D8	4.00	N=2 (S)		
Pocket of very soft grey very sandy SILT between 4.20m and 4.30m bgl.				D9	4.20	N=0 (S)		
Medium dense brown grey silty fine to medium SAND.	6.00			D10	6.20	N=18 (S)		
	7.20					N=29 (S)		

Remarks:

1. Probehole end depth at 7.20m begl with Dynamic Probing to 10.00m begl.
2. Groundwater encountered at 0.80m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key	Test Type Key
D - Disturbed Representative	(C) - Cone SPT
B - Bulk Representative	(S) - Spoon SPT
S - Spot Non-Representative	P - Pocket Penetrometer Reading
W - Water	PID - PID Reading
U - Undisturbed Representative	V - Hand Shear Vane Reading
J - Jar Sample	
ES - Environmental Sample	

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:		
WS03	Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 25/10/2017	End Date: 25/10/2017
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig	Co-ords: 332825E - 407606N	Backfill Date: 25/10/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB	Chkd: SH / Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown clayey fine to medium SAND with frequent rootlets.	0.20			ES1	0.10			
Soft grey brown silty peaty CLAY. Plastic dark brown clayey silty pseudofibrous PEAT.	0.40			ES2	0.60			
Very soft grey slightly sandy slightly peaty SILT.	1.00			ES3	1.20			
Loose grey silty fine to medium SAND with occasional organic fragments.	1.40			D4	1.50	N=5 (S)		
Firm grey very sandy SILT.	2.00					N=5 (S)		
				D5	2.50			
						N=7 (S)		
				D6	3.50			
Becoming more sandy from 3.80m bgl.						N=5 (S)		
				D7	4.50			
						N=5 (S)		
Sand lense between 5.80m and 5.90m bgl.						N=42 (S)		
Dense yellow brown fine to medium SAND.	6.60							
Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subrounded medium to coarse of mudstone.	7.00					N=35 (S)		
	7.45							

Remarks:

1. Probehole end depth at 7.45m begl with Dynamic Probing to 9.3m begl.
2. Groundwater not encountered.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:		
WS04	Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 25/10/2017	End Date: 25/10/2017
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig	Co-ords: 332783E - 407620N	Backfill Date: 25/10/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown clayey fine to medium SAND with frequent rootlets.	0.20			ES1	0.10			
				ES2	0.40			
Soft grey brown silty peaty CLAY.	0.60			ES3	0.70		0.60 ▼	
Plastic dark brown clayey silty pseudofibrous PEAT.	1.00					N=0 (S)		
Very soft grey sandy SILT.				D4	1.50	N=1 (S)		
Very loose grey silty fine SAND.	2.80			D5	3.00	N=4 (S)		
						N=0 (S)		
	5.00					N=14 (S)		

Remarks:

1. Probehole end depth at 5.00m begl with Dynamic Probing to 9.60m begl.
2. Groundwater encountered at 0.60m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:		
WS05	Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 25/10/2017	End Date: 25/10/2017
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig	Co-ords: 332791E - 407652N	Backfill Date: 25/10/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown clayey fine to medium SAND with frequent rootlets.	0.10			ES1	0.05			
Soft grey brown silty peaty CLAY.	0.40			ES2	0.20			
Plastic dark brown clayey silty pseudofibrous PEAT.				ES3	0.50	N=0 (S)		
Soft grey sandy SILT. Occasional organic fragments between 1.50m and 1.60m bgl.	1.50			D4	2.00	N=3 (S)		
Very loose becoming loose grey silty fine SAND.	2.60					N=2 (S)		
						N=5 (S)		
Very soft grey sandy SILT.	5.00			D5	5.50	N=0 (S)		
Dense yellow brown fine to medium SAND.	5.90			D6	6.00	N=34 (S)		
Grey sandy SILT.	6.50							
	7.00					N=34 (S)		

Remarks:

1. Probehole end depth at 7.00m begl with Dynamic Probing to 9.5m begl.
2. Groundwater not encountered.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:		
WS06	Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 25/10/2017	End Date: 25/10/2017
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig	Co-ords: 332732E - 407606N	Backfill Date: 25/10/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown black very silty SAND with rootlets and frequent organic matter.	0.20			ES1	0.20			
				ES2	0.30			
Soft grey peaty SILT with dark grey and brown inclusions.	0.40			D3	0.40			
				D4	0.50			
Plastic dark brown silty pseudofibrous PEAT.							1.00 ▼	
Very soft grey brown slightly sandy slightly peaty SILT.	1.00					N=2 (S)		
				D5	1.30			
Loose grey very silty SAND with brown organic fragments and occasional black inclusions.	1.60					N=5 (S)		
				D6	2.10			
Fewer organic fragments from 2.50m bgl.						N=0 (S)		
				D7	3.10			
Very soft grey sandy SILT with occasional dark brown black inclusions.	3.90			D8	4.00	N=0 (S)		
				D9	5.00	N=4 (S)		
Lenses of grey to dark grey black very silty sand between 5.70m and 5.90m bgl.				D10	6.00			
Brown grey slightly silty fine to medium SAND.	6.60							
	7.00							

Remarks:

1. Probehole end depth at 7.00m begl with Dynamic Probing to 10.00m begl.
2. Groundwater encountered at 1.00m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 1 of 1

APPENDIX B
Chemical Testing Results

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 692792-1

Date of Report: 09-Nov-2017

Customer: OPUS International Consultants (UK) Ltd.
1st Floor
Maclaren House
Talbot Road
Manchester
M32 0FP

Customer Contact: Mr Robin Atkinson

Customer Job Reference: J-W0621.00
Customer Purchase Order: MR 21318
Customer Site Reference: Altcar, Formby
Date Job Received at Concept: 26-Oct-2017
Date Analysis Started: 30-Oct-2017
Date Analysis Completed: 09-Nov-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked
and authorised by :
Aneta Dybek-Echtermeyer
Customer Service Advisor

Issued by :
Aneta Dybek-Echtermeyer
Customer Service Advisor

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	**35**	**27**	**47**	**78**	**44**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	**23**	**55**	**87**	**37**	**35**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	**45**	**47**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Salinity	T7	AR		%o	**1.9**	**1.9**	**1.9**	**2.0**	**1.9**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Salinity	T7	AR		%o	**1.9**	**1.9**	**2.1**	**1.8**	**1.9**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Salinity	T7	AR		%o	**1.9**	**2.3**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
OPUS North West hydrocarbon MCERTS CWG suite

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**16**	**18**	**15**	**9**	**14**
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Barium	T6	A40	1	mg/kg	**59**	**49**	**54**	**40**	**63**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2	<2
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**31**	**42**	**25**	**18**	**25**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**20**	**20**	**24**	**18**	**25**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(free)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Lead	T6	M40	1	mg/kg	**39**	**24**	**51**	**22**	**57**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**24**	**39**	**20**	**35**	**20**
pH	T7	AR			**7.1**	**7.7**	**5.2**	<4.0	**4.9**
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Soil Organic Matter	T287	A40	0.1	%	**22**	**5.0**	**45**	**73**	**50**
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	**0.01**	**0.04**	**0.03**	**0.32**	<0.01
SO4(Total)	T6	A40	0.01	%	**0.29**	**0.12**	**0.51**	**1.2**	**0.56**
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	**0.21**	**0.08**	**0.46**	**1.8**	**0.52**
Vanadium	T6	M40	1	mg/kg	**38**	**53**	**32**	**19**	**33**
Zinc	T6	M40	1	mg/kg	**63**	**95**	**48**	**79**	**50**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
OPUS North West hydrocarbon MCERTS CWG suite

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**6**	**13**	**5**	**17**	**32**
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Barium	T6	A40	1	mg/kg	**19**	**76**	**30**	**74**	**75**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2	<2
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	**2**	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**16**	**25**	**10**	**30**	**48**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**6**	**29**	**9**	**29**	**22**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(free)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Lead	T6	M40	1	mg/kg	**6**	**65**	**15**	**62**	**36**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**14**	**24**	**10**	**24**	**25**
pH	T7	AR			**6.8**	**5.1**	**4.7**	**5.0**	**4.2**
Phenols(Mono)	T546	AR	1	mg/kg	<1	**3**	<1	**2**	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Soil Organic Matter	T287	A40	0.1	%	**1.1**	**61**	**71**	**50**	**21**
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	**0.19**	**0.02**	**0.69**	**0.02**	**0.03**
SO4(Total)	T6	A40	0.01	%	**0.17**	**0.60**	**2.5**	**0.53**	**0.68**
Sulphide	T4	AR	10	mg/kg	**26**	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	**0.50**	**0.59**	**2.1**	**0.49**	**0.45**
Vanadium	T6	M40	1	mg/kg	**18**	**29**	**12**	**40**	**71**
Zinc	T6	M40	1	mg/kg	**31**	**55**	**23**	**65**	**64**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
OPUS North West hydrocarbon MCERTS CWG suite

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Arsenic	T6	M40	2	mg/kg	**16**	**22**
Asbestos ID	T27	AR			N.D.	N.D.
Barium	T6	A40	1	mg/kg	**66**	**55**
Beryllium	T6	A40	2	mg/kg	<2	<2
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	<1
Chromium	T6	M40	1	mg/kg	**27**	**45**
Chromium VI	T6	AR	1	mg/kg	<1	<1
Copper	T6	M40	1	mg/kg	**27**	**23**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1
Cyanide(free)	T546	AR	1	mg/kg	<1	<1
Lead	T6	M40	1	mg/kg	**64**	**32**
Mercury	T6	M40	1	mg/kg	<1	<1
Nickel	T6	M40	1	mg/kg	**24**	**33**
pH	T7	AR			**4.3**	<4.0
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3
Soil Organic Matter	T287	A40	0.1	%	**53**	**19**
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	**0.03**	**0.53**
SO4(Total)	T6	A40	0.01	%	**0.62**	**1.2**
Sulphide	T4	AR	10	mg/kg	<10	<10
Sulphur (total)	T6	A40	0.01	%	**0.53**	**1.4**
Vanadium	T6	M40	1	mg/kg	**36**	**57**
Zinc	T6	M40	1	mg/kg	**52**	**80**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

					Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
					Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
					Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
					Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
					Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
TPH (CWG) with MTBE, BTEX

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10	(13) <10	(109,13) <45	(13) <10
Toluene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	(109) <0.450	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	(13) <1	(100,13) <10	(100,13) <10
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	(13) <1	**(13) 22**	(100,13) <10
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 2**	**(13) 94**	(13,100) <10
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	(13) <2	(13) <2	**(13) 24**	**(13) 92**	**(13) 50**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	**0.13**
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	(13) <2	(13) <2	(13) <2	(13,100) <10	(100,13) <10
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 2**	**(13) 40**	(100,13) <10
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 3**	**(13) 22**	**(13) 10**
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 14**	(13,100) <10	**(13) 16**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
TPH (CWG) with MTBE, BTEX

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	M105	10	µg/kg	(13) <10	(109,13) <22	(109,13) <77	(13) <10	(13) <10
Toluene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	(109) <0.220	(109) <0.770	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 4**	(100,13) <10	(13) <1
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 6**	(100,13) <10	(13) <1
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	(13) <1	**(13) 2**	**(13) 21**	**(13) 11**	**(13) 1**
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	**(13) 2**	**(13) 23**	**(13) 95**	**(13) 60**	**(13) 9**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	(13) <2	(13) <2	**(13) 12**	(100,13) <10	(13) <2
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	(13) <1	**(13) 5**	**(13) 28**	(100,13) <10	(13) <1
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	(13) <1	**(13) 3**	**(13) 27**	(100,13) <10	(13) <1
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	**(13) 1**	**(13) 17**	**(13) 93**	(100,13) <10	(13) <1

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
TPH (CWG) with MTBE, BTEX

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10
Toluene	T209	M105	10	µg/kg	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	**(13) 3**	(13) <1
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	**(13) 39**	**(13) 6**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	(13) <2	(13) <2
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	**(13) 3**	(13) <1
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	**(13) 4**	(13) <1
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	**(13) 20**	(13) <1

Index to symbols used in 692792-1

Value	Description
A40	Assisted dried < 40C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
AR	As Received
N.D.	Not Detected
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
109	LOD raised due to high moisture content of the sample.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Salinity was transferred within group to CLS East Kilbride.
Asbestos was subcontracted to REC Asbestos.

Method Index

Value	Description
T27	PLM
T209	GC/MS (Head Space)(MCERTS)
T287	Calc TOC/0.58
T4	Colorimetry
T546	Colorimetry (CF)
T2	Grav
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T7	Probe

T909	GCxGC
T6	ICP/OES
T162	Grav (1 Dec) (105 C)
T207	GC/MS (MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Salinity	T7	AR		%o	N	001-003,005-006,008-009,011-012,014-016
Arsenic	T6	M40	2	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Asbestos ID	T27	AR			SU	001-003,005-006,008-009,011-012,014-016
Barium	T6	A40	1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Beryllium	T6	A40	2	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-003,005-006,008-009,011-012,014-016
Cadmium	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Chromium	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Chromium VI	T6	AR	1	mg/kg	N	001-003,005-006,008-009,011-012,014-016
Copper	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Cyanide(Total)	T546	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Cyanide(free)	T546	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Lead	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Mercury	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Nickel	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
pH	T7	AR			M	001-003,005-006,008-009,011-012,014-016
Phenols(Mono)	T546	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Selenium	T6	M40	3	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Soil Organic Matter	T287	A40	0.1	%	N	001-003,005-006,008-009,011-012,014-016
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	N	001-003,005-006,008-009,011-012,014-016
SO4(Total)	T6	A40	0.01	%	N	001-003,005-006,008-009,011-012,014-016
Sulphide	T4	AR	10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
Sulphur (total)	T6	A40	0.01	%	N	001-003,005-006,008-009,011-012,014-016
Vanadium	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Zinc	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Naphthalene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Acenaphthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Fluorene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Phenanthrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Anthracene	T207	M105	0.1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Chrysene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
PAH(total)	T207	M105	0.1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Benzene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
Toluene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
EthylBenzene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
M/P Xylene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
O Xylene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Retained on 10mm sieve	T2	M40	0.1	%	N	001-003,005-006,008-009,011-012,014-016
Moisture @105C	T162	AR	0.1	%	N	001-003,005-006,008-009,011-012,014-016

Certificate of Analysis

Certificate Number 17-15757

17-Nov-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-15757

Client Reference PSL17/5359

Order No (not supplied)

Contract Title Altcar Formby

Description 2 Soil samples.

Date Received 15-Nov-17

Date Started 15-Nov-17

Date Completed 17-Nov-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 17-15757
Client Ref PSL17/5359
Contract Title Altcar Formby

			Lab No	1258592	1258593
			Sample ID	WS04	BH01
			Depth	3.00	6.00
			Other ID	5	19
			Sample Type	D	D
			Sampling Date	n/s	n/s
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Inorganics					
pH	DETSC 2008#			8.6	8.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	84	240
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.06	0.08

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 17-15757
Client Ref PSL17/5359
Contract Altcar Formby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1258592	WS04 3.00 SOIL		P(other)	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	
1258593	BH01 6.00 SOIL		P(other)	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	

Key: P-Plastic

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Certificate of Analysis

Certificate Number 17-15134-1

21-Nov-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-15134-1

Client Reference PSL17/5359

Order No (not supplied)

Contract Title J-W0621.00 ALTCAR FORMBY

Description One Soil sample.

Date Received 08-Nov-17

Date Started 08-Nov-17

Date Completed 21-Nov-17

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 17-15134. Extra testing.**

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 17-15134-1
Client Ref PSL17/5359
Contract Title J-W0621.00 ALTCAR FORMBY

Lab No	1255151
Sample ID	BH01
Depth	9.00
Other ID	25
Sample Type	D
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
pH	DETSC 2008#			8.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	200
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.09

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 17-15134-1
Client Ref PSL17/5359
Contract J-W0621.00 ALTCAR FORMBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1255151	BH01 9.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

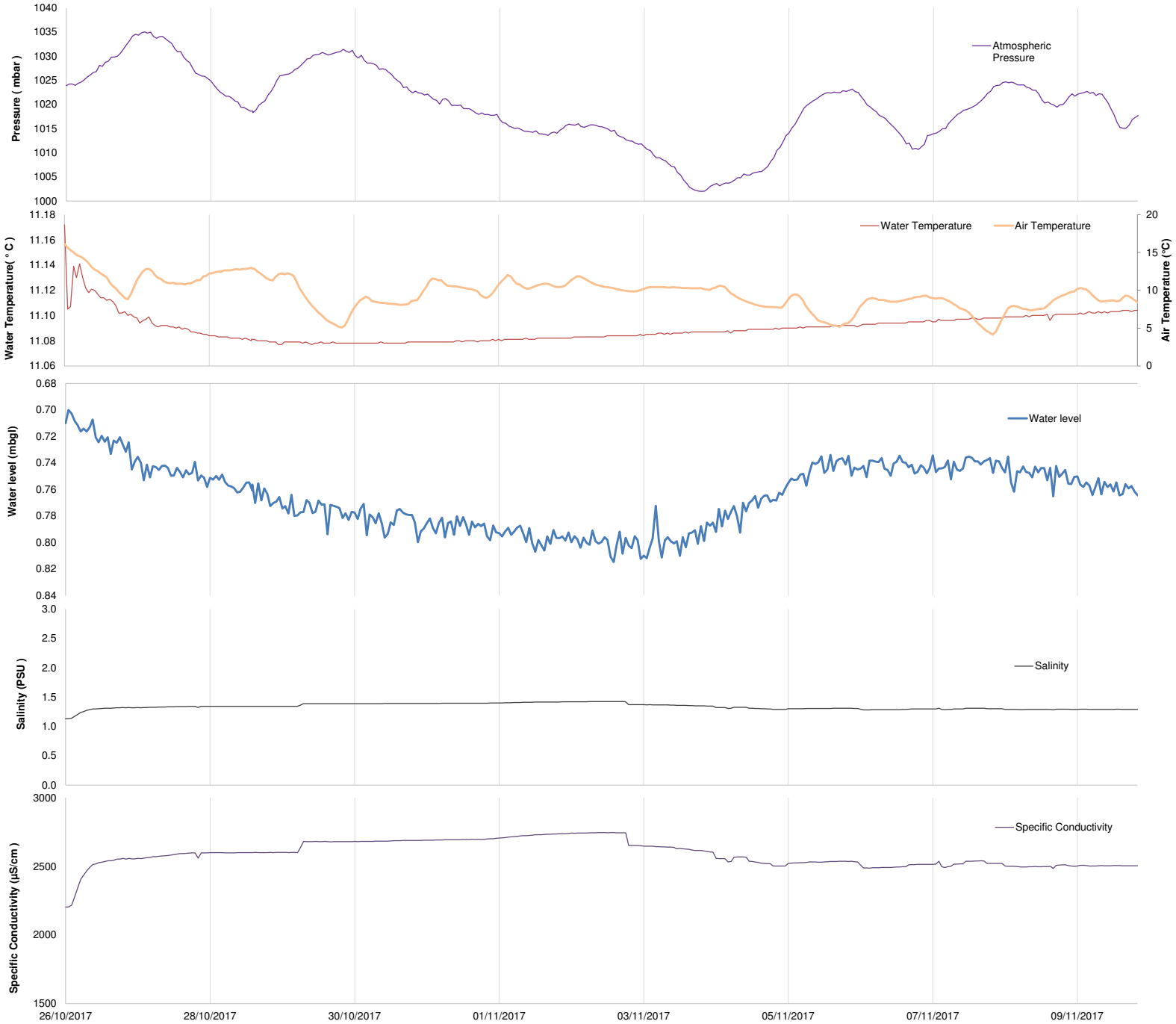
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

APPENDIX C
Groundwater Monitoring Results



Experts in Continuous Monitoring

Title:

MW1, Time Series Graphs, Altcar Moss

Project:

GGS1412

Client:

Opus International Ltd

Minimum / Maximum Table		
Parameter	**Minimum**	**Maximum**
Water level	0.81	0.70
Air Temperature	4.12	16.13
Water Temperature	11.08	11.17
Atmospheric Pressure	1002.0	1035.1
Specific Conductivity	2204	2748
Salinity	1.13	1.42
TDS	1.43	1.79

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GGS Time Series Data

Doc Ref: QMS-TSNW v1.1
Issue Date: 23/02/2017

Experts in Continuous Monitoring

Project Ref:	GGS1412		
Location:	Altcar Moss		
Borehole ref:	MW1		
Logger ID	339609	Days of monitoring:	14
Start Date:	26/10/2017 12:00	Monitoring Frequency (mins):	60
End Date:	10/11/2017 08:00	Total samples taken:	358

Minimum, Maximum and Range Table

	Total Dissolved Solic	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
Minimum	1.43	1.13	2204	1002.0	11.08	4.12	0.81
Maximum	1.79	1.42	2748	1035.1	11.17	16.13	0.70
Range	0.35	0.30	544	33.1	0.10	12.0	0.11

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
26/10/2017 12:00	1.432	1.13	2203.7	1023.9	11.17	16.13	0.71
26/10/2017 13:00	1.433	1.13	2204.9	1024.3	11.11	15.68	0.70
26/10/2017 14:00	1.443	1.14	2219.5	1024.3	11.11	15.27	0.70
26/10/2017 15:00	1.484	1.17	2282.7	1023.9	11.14	15.02	0.71
26/10/2017 16:00	1.523	1.20	2343.0	1024.4	11.13	14.67	0.71
26/10/2017 17:00	1.565	1.24	2407.5	1024.6	11.14	14.51	0.72
26/10/2017 18:00	1.584	1.26	2437.7	1025.2	11.13	14.31	0.71
26/10/2017 19:00	1.605	1.27	2469.2	1025.7	11.12	13.95	0.72
26/10/2017 20:00	1.622	1.29	2495.4	1026.1	11.12	13.60	0.71
26/10/2017 21:00	1.634	1.30	2513.9	1026.6	11.12	13.04	0.71
26/10/2017 22:00	1.638	1.30	2519.3	1026.8	11.12	12.73	0.72
26/10/2017 23:00	1.643	1.30	2528.2	1028.1	11.12	12.52	0.72
27/10/2017 00:00	1.645	1.31	2531.1	1027.9	11.11	12.22	0.72
27/10/2017 01:00	1.649	1.31	2536.3	1028.8	11.11	11.96	0.72
27/10/2017 02:00	1.652	1.31	2541.4	1028.9	11.11	11.70	0.72
27/10/2017 03:00	1.653	1.31	2542.4	1029.8	11.11	11.03	0.73
27/10/2017 04:00	1.655	1.31	2545.5	1029.8	11.11	10.57	0.72
27/10/2017 05:00	1.66	1.32	2553.7	1030.0	11.11	10.26	0.72
27/10/2017 06:00	1.66	1.32	2553.8	1030.7	11.10	9.79	0.72
27/10/2017 07:00	1.663	1.32	2559.0	1031.4	11.10	9.38	0.73
27/10/2017 08:00	1.66	1.32	2553.8	1032.4	11.10	8.96	0.73
27/10/2017 09:00	1.663	1.32	2558.6	1033.2	11.10	8.80	0.72
27/10/2017 10:00	1.661	1.32	2556.0	1034.2	11.10	9.48	0.74
27/10/2017 11:00	1.661	1.32	2555.6	1034.5	11.10	10.47	0.74
27/10/2017 12:00	1.663	1.32	2558.5	1034.3	11.10	11.29	0.74
27/10/2017 13:00	1.662	1.32	2556.5	1034.9	11.09	11.96	0.74
27/10/2017 14:00	1.665	1.32	2561.1	1035.1	11.10	12.47	0.75
27/10/2017 15:00	1.666	1.32	2563.8	1034.8	11.10	12.78	0.74
27/10/2017 16:00	1.667	1.33	2565.2	1035.0	11.10	12.83	0.75
27/10/2017 17:00	1.671	1.33	2570.4	1034.1	11.09	12.58	0.74
27/10/2017 18:00	1.672	1.33	2571.7	1033.7	11.09	12.01	0.74
27/10/2017 19:00	1.673	1.33	2574.0	1034.0	11.09	11.65	0.75
27/10/2017 20:00	1.674	1.33	2575.8	1034.1	11.09	11.50	0.74
27/10/2017 21:00	1.676	1.33	2578.3	1033.6	11.09	11.14	0.74
27/10/2017 22:00	1.677	1.33	2579.9	1033.1	11.09	10.98	0.74
27/10/2017 23:00	1.68	1.34	2583.9	1032.7	11.09	10.93	0.75
28/10/2017 00:00	1.682	1.34	2587.0	1031.6	11.09	10.98	0.75
28/10/2017 01:00	1.684	1.34	2590.0	1031.0	11.09	10.88	0.74
28/10/2017 02:00	1.686	1.34	2593.4	1031.0	11.09	10.88	0.75
28/10/2017 03:00	1.686	1.34	2594.1	1029.9	11.09	10.88	0.75
28/10/2017 04:00	1.687	1.34	2595.5	1029.2	11.09	10.78	0.75
28/10/2017 05:00	1.689	1.34	2598.2	1028.7	11.09	10.93	0.75
28/10/2017 06:00	1.689	1.34	2598.5	1027.5	11.09	10.93	0.75
28/10/2017 07:00	1.69	1.34	2599.8	1026.5	11.09	11.14	0.74
28/10/2017 08:00	1.665	1.32	2561.5	1026.2	11.09	11.34	0.75
28/10/2017 09:00	1.69	1.34	2599.9	1025.9	11.09	11.34	0.75
28/10/2017 10:00	1.69	1.34	2600.0	1025.9	11.09	11.81	0.75
28/10/2017 11:00	1.69	1.34	2599.8	1025.4	11.09	11.91	0.76
28/10/2017 12:00	1.69	1.34	2600.3	1024.9	11.08	12.22	0.75
28/10/2017 13:00	1.69	1.34	2600.6	1024.1	11.08	12.27	0.75
28/10/2017 14:00	1.69	1.34	2600.6	1023.3	11.08	12.37	0.75
28/10/2017 15:00	1.69	1.34	2600.4	1022.6	11.08	12.47	0.75
28/10/2017 16:00	1.691	1.34	2601.1	1022.2	11.08	12.47	0.75
28/10/2017 17:00	1.69	1.34	2599.9	1021.7	11.08	12.63	0.75
28/10/2017 18:00	1.69	1.34	2599.8	1021.7	11.08	12.63	0.76
28/10/2017 19:00	1.689	1.34	2598.6	1021.3	11.08	12.63	0.76
28/10/2017 20:00	1.69	1.34	2599.8	1020.8	11.08	12.73	0.76
28/10/2017 21:00	1.69	1.34	2600.3	1020.6	11.08	12.78	0.76
28/10/2017 22:00	1.69	1.34	2600.6	1019.4	11.08	12.73	0.76
28/10/2017 23:00	1.691	1.34	2601.0	1019.4	11.08	12.78	0.76
29/10/2017 00:00	1.69	1.34	2600.2	1019.0	11.08	12.83	0.75
29/10/2017 01:00	1.691	1.34	2601.4	1018.7	11.08	12.88	0.75
29/10/2017 02:00	1.691	1.34	2600.8	1018.6	11.08	12.98	0.76
29/10/2017 02:00	1.691	1.34	2601.5	1018.3	11.08	12.93	0.76
29/10/2017 03:00	1.691	1.34	2601.7	1018.9	11.08	12.83	0.77
29/10/2017 04:00	1.691	1.34	2601.6	1019.8	11.08	12.47	0.76
29/10/2017 05:00	1.691	1.34	2601.7	1020.3	11.08	12.22	0.77
29/10/2017 06:00	1.691	1.34	2600.9	1020.8	11.08	11.91	0.76
29/10/2017 07:00	1.69	1.34	2600.6	1021.9	11.08	11.60	0.76
29/10/2017 08:00	1.691	1.35	2602.2	1022.7	11.08	11.39	0.77
29/10/2017 09:00	1.691	1.34	2601.7	1023.7	11.08	11.29	0.77
29/10/2017 10:00	1.692	1.35	2602.3	1025.1	11.08	11.75	0.77
29/10/2017 11:00	1.692	1.35	2603.0	1025.9	11.08	12.11	0.77
29/10/2017 12:00	1.692	1.35	2603.3	1026.1	11.08	12.22	0.77
29/10/2017 13:00	1.692	1.35	2602.7	1026.2	11.08	12.11	0.77
29/10/2017 14:00	1.691	1.34	2601.6	1026.4	11.08	12.27	0.78

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
29/10/2017 15:00	1.692	1.35	2602.6	1026.7	11.08	12.11	0.76
29/10/2017 16:00	1.692	1.35	2603.0	1027.3	11.08	11.91	0.78
29/10/2017 17:00	1.691	1.34	2601.6	1027.6	11.08	11.14	0.78
29/10/2017 18:00	1.714	1.36	2636.7	1028.1	11.08	10.26	0.78
29/10/2017 19:00	1.744	1.39	2683.3	1028.7	11.08	9.64	0.78
29/10/2017 20:00	1.743	1.39	2681.3	1029.5	11.08	9.06	0.77
29/10/2017 21:00	1.742	1.39	2680.4	1029.5	11.08	8.49	0.77
29/10/2017 22:00	1.743	1.39	2681.2	1030.2	11.08	8.02	0.78
29/10/2017 23:00	1.744	1.39	2682.4	1030.3	11.08	7.60	0.78
30/10/2017 00:00	1.743	1.39	2681.3	1030.4	11.08	7.13	0.77
30/10/2017 01:00	1.743	1.39	2681.0	1030.8	11.08	6.82	0.77
30/10/2017 02:00	1.743	1.39	2682.1	1030.5	11.08	6.45	0.77
30/10/2017 03:00	1.743	1.39	2681.4	1030.2	11.08	6.03	0.79
30/10/2017 04:00	1.742	1.39	2680.1	1030.4	11.08	5.82	0.77
30/10/2017 05:00	1.742	1.39	2680.5	1030.7	11.08	5.60	0.77
30/10/2017 06:00	1.742	1.39	2680.2	1030.9	11.08	5.39	0.77
30/10/2017 07:00	1.742	1.39	2680.8	1031.0	11.08	5.18	0.77
30/10/2017 08:00	1.742	1.39	2680.6	1031.4	11.08	5.07	0.78
30/10/2017 09:00	1.742	1.39	2680.7	1031.1	11.08	5.34	0.78
30/10/2017 10:00	1.743	1.39	2681.1	1030.8	11.08	6.08	0.78
30/10/2017 11:00	1.742	1.39	2680.5	1031.3	11.08	6.92	0.78
30/10/2017 12:00	1.744	1.39	2682.8	1030.1	11.08	7.66	0.78
30/10/2017 13:00	1.743	1.39	2681.1	1029.7	11.08	8.18	0.78
30/10/2017 14:00	1.743	1.39	2682.1	1030.2	11.08	8.65	0.77
30/10/2017 15:00	1.744	1.39	2682.7	1029.1	11.08	8.91	0.77
30/10/2017 16:00	1.744	1.39	2682.4	1028.6	11.08	9.17	0.79
30/10/2017 17:00	1.744	1.39	2682.4	1028.6	11.08	8.96	0.78
30/10/2017 18:00	1.744	1.39	2683.1	1028.5	11.08	8.54	0.78
30/10/2017 19:00	1.745	1.39	2684.2	1028.1	11.08	8.49	0.79
30/10/2017 20:00	1.745	1.39	2684.5	1027.3	11.08	8.39	0.78
30/10/2017 21:00	1.745	1.39	2684.4	1027.4	11.08	8.34	0.79
30/10/2017 22:00	1.745	1.39	2685.2	1027.3	11.08	8.34	0.80
30/10/2017 23:00	1.745	1.39	2685.1	1026.7	11.08	8.23	0.79
31/10/2017 00:00	1.746	1.39	2686.6	1026.2	11.08	8.23	0.78
31/10/2017 01:00	1.747	1.39	2687.5	1025.5	11.08	8.18	0.79
31/10/2017 02:00	1.747	1.39	2687.9	1024.9	11.08	8.18	0.78
31/10/2017 03:00	1.748	1.39	2688.5	1024.6	11.08	8.07	0.77
31/10/2017 04:00	1.748	1.39	2689.4	1023.5	11.08	8.07	0.78
31/10/2017 05:00	1.748	1.39	2689.0	1023.6	11.08	8.13	0.78
31/10/2017 06:00	1.748	1.39	2689.4	1022.9	11.08	8.18	0.78
31/10/2017 07:00	1.748	1.39	2689.4	1022.4	11.08	8.54	0.78
31/10/2017 08:00	1.748	1.39	2689.8	1022.8	11.08	8.65	0.78
31/10/2017 09:00	1.748	1.39	2689.9	1022.4	11.08	8.70	0.80
31/10/2017 10:00	1.749	1.39	2690.4	1022.3	11.08	9.22	0.79
31/10/2017 11:00	1.75	1.39	2691.7	1022.0	11.08	9.90	0.79
31/10/2017 12:00	1.749	1.39	2691.2	1022.2	11.08	10.47	0.79
31/10/2017 13:00	1.75	1.39	2691.9	1021.6	11.08	11.14	0.78
31/10/2017 14:00	1.75	1.39	2692.0	1021.1	11.08	11.55	0.79
31/10/2017 15:00	1.75	1.39	2692.8	1020.8	11.08	11.50	0.79
31/10/2017 16:00	1.75	1.39	2692.4	1020.1	11.08	11.34	0.79
31/10/2017 17:00	1.751	1.40	2694.0	1021.1	11.08	11.29	0.78
31/10/2017 18:00	1.751	1.40	2694.1	1021.2	11.08	10.93	0.80
31/10/2017 19:00	1.752	1.40	2694.7	1020.7	11.08	10.62	0.79
31/10/2017 20:00	1.752	1.40	2695.1	1019.8	11.08	10.57	0.78
31/10/2017 21:00	1.751	1.40	2694.6	1019.8	11.08	10.52	0.79
31/10/2017 22:00	1.751	1.40	2694.5	1019.8	11.08	10.52	0.78
31/10/2017 23:00	1.752	1.40	2694.8	1019.9	11.08	10.41	0.79
01/11/2017 00:00	1.753	1.40	2696.5	1019.2	11.08	10.36	0.78
01/11/2017 01:00	1.753	1.40	2696.3	1019.1	11.08	10.26	0.79
01/11/2017 02:00	1.753	1.40	2696.4	1019.1	11.08	10.21	0.79
01/11/2017 03:00	1.754	1.40	2697.9	1018.7	11.08	10.15	0.78
01/11/2017 04:00	1.753	1.40	2697.5	1018.3	11.08	10.00	0.79
01/11/2017 05:00	1.753	1.40	2697.6	1018.0	11.08	9.90	0.79
01/11/2017 06:00	1.753	1.40	2696.7	1018.3	11.08	9.38	0.79
01/11/2017 07:00	1.754	1.40	2698.9	1017.9	11.08	9.12	0.79
01/11/2017 08:00	1.755	1.40	2700.0	1018.0	11.08	8.96	0.80
01/11/2017 09:00	1.756	1.40	2701.9	1017.8	11.08	9.22	0.80
01/11/2017 10:00	1.756	1.40	2701.9	1017.7	11.08	9.58	0.79
01/11/2017 11:00	1.758	1.40	2705.2	1017.9	11.08	10.15	0.79
01/11/2017 12:00	1.759	1.40	2706.3	1016.9	11.08	10.72	0.79
01/11/2017 13:00	1.76	1.40	2708.2	1016.2	11.08	11.19	0.80
01/11/2017 14:00	1.762	1.40	2710.2	1016.1	11.08	11.60	0.79
01/11/2017 15:00	1.764	1.41	2713.4	1015.5	11.08	12.01	0.79
01/11/2017 16:00	1.765	1.41	2715.8	1015.3	11.08	11.86	0.79
01/11/2017 17:00	1.767	1.41	2718.1	1015.0	11.08	11.34	0.79
01/11/2017 18:00	1.768	1.41	2720.0	1015.1	11.08	10.88	0.79
01/11/2017 19:00	1.769	1.41	2722.0	1014.8	11.08	10.78	0.79
01/11/2017 20:00	1.771	1.41	2723.9	1014.5	11.08	10.47	0.79
01/11/2017 21:00	1.771	1.41	2724.6	1014.5	11.08	10.26	0.80
01/11/2017 22:00	1.773	1.41	2727.0	1014.3	11.08	10.21	0.79
01/11/2017 23:00	1.773	1.41	2728.1	1014.2	11.08	10.36	0.80
02/11/2017 00:00	1.775	1.42	2731.0	1014.6	11.08	10.52	0.81
02/11/2017 01:00	1.775	1.42	2731.4	1013.9	11.08	10.67	0.80
02/11/2017 02:00	1.775	1.42	2731.3	1013.9	11.08	10.78	0.80
02/11/2017 03:00	1.776	1.42	2732.6	1013.8	11.08	10.88	0.81
02/11/2017 04:00	1.778	1.42	2734.7	1013.6	11.08	10.88	0.80
02/11/2017 05:00	1.778	1.42	2734.9	1014.1	11.08	10.78	0.80
02/11/2017 06:00	1.779	1.42	2736.3	1014.3	11.08	10.57	0.79
02/11/2017 07:00	1.779	1.42	2737.6	1014.0	11.08	10.47	0.80
02/11/2017 08:00	1.78	1.42	2737.7	1014.7	11.08	10.41	0.80
02/11/2017 09:00	1.78	1.42	2738.5	1015.1	11.08	10.47	0.80
02/11/2017 10:00	1.781	1.42	2739.3	1015.7	11.08	10.62	0.80
02/11/2017 11:00	1.782	1.42	2740.8	1015.9	11.08	10.93	0.79
02/11/2017 12:00	1.783	1.42	2742.9	1015.8	11.08	11.29	0.80
02/11/2017 13:00	1.782	1.42	2741.6	1015.7	11.08	11.60	0.80
02/11/2017 14:00	1.783	1.42	2742.9	1016.0	11.08	11.86	0.80

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
02/11/2017 15:00	1.784	1.42	2744.0	1015.4	11.08	11.86	0.80
02/11/2017 16:00	1.784	1.42	2744.5	1015.3	11.08	11.65	0.80
02/11/2017 17:00	1.784	1.42	2743.9	1015.5	11.08	11.45	0.80
02/11/2017 18:00	1.784	1.42	2745.3	1015.8	11.08	11.19	0.80
02/11/2017 19:00	1.785	1.42	2745.5	1015.8	11.08	10.98	0.79
02/11/2017 20:00	1.785	1.42	2745.8	1015.7	11.08	10.78	0.80
02/11/2017 21:00	1.786	1.42	2747.3	1015.4	11.08	10.67	0.80
02/11/2017 22:00	1.785	1.42	2746.9	1015.4	11.08	10.57	0.80
02/11/2017 23:00	1.786	1.42	2747.5	1015.1	11.08	10.47	0.80
03/11/2017 00:00	1.785	1.42	2745.9	1014.9	11.08	10.41	0.80
03/11/2017 01:00	1.786	1.42	2746.9	1014.4	11.08	10.36	0.81
03/11/2017 02:00	1.786	1.42	2747.7	1014.7	11.08	10.31	0.81
03/11/2017 03:00	1.785	1.42	2746.2	1013.7	11.08	10.15	0.80
03/11/2017 04:00	1.785	1.42	2745.9	1013.4	11.08	10.10	0.79
03/11/2017 05:00	1.785	1.42	2746.1	1013.2	11.08	10.00	0.81
03/11/2017 06:00	1.784	1.42	2744.9	1012.6	11.08	9.95	0.80
03/11/2017 07:00	1.724	1.37	2652.9	1012.5	11.08	9.90	0.80
03/11/2017 08:00	1.724	1.37	2652.5	1012.4	11.08	9.84	0.80
03/11/2017 09:00	1.724	1.37	2652.9	1012.0	11.08	9.84	0.80
03/11/2017 10:00	1.724	1.37	2652.5	1011.7	11.08	9.90	0.80
03/11/2017 11:00	1.723	1.37	2651.5	1011.8	11.09	10.00	0.81
03/11/2017 12:00	1.721	1.37	2648.0	1011.2	11.08	10.15	0.81
03/11/2017 13:00	1.721	1.37	2647.8	1010.7	11.09	10.31	0.81
03/11/2017 14:00	1.721	1.37	2648.4	1010.5	11.09	10.41	0.80
03/11/2017 15:00	1.721	1.37	2647.7	1009.5	11.09	10.41	0.80
03/11/2017 16:00	1.719	1.37	2644.7	1008.9	11.09	10.41	0.77
03/11/2017 17:00	1.719	1.37	2644.2	1009.0	11.09	10.41	0.80
03/11/2017 18:00	1.718	1.37	2643.4	1008.6	11.09	10.41	0.81
03/11/2017 19:00	1.718	1.37	2642.8	1008.4	11.09	10.41	0.80
03/11/2017 20:00	1.717	1.37	2641.7	1007.7	11.09	10.36	0.80
03/11/2017 21:00	1.716	1.37	2640.5	1007.2	11.09	10.36	0.80
03/11/2017 22:00	1.716	1.37	2639.6	1007.0	11.09	10.41	0.80
03/11/2017 23:00	1.709	1.36	2629.5	1005.9	11.09	10.36	0.80
04/11/2017 00:00	1.711	1.36	2632.3	1005.4	11.09	10.36	0.81
04/11/2017 01:00	1.709	1.36	2628.5	1004.3	11.09	10.31	0.80
04/11/2017 02:00	1.707	1.36	2626.4	1003.7	11.09	10.31	0.80
04/11/2017 03:00	1.707	1.36	2625.6	1002.8	11.09	10.31	0.79
04/11/2017 04:00	1.703	1.36	2620.7	1002.5	11.09	10.26	0.79
04/11/2017 05:00	1.701	1.35	2616.6	1002.2	11.09	10.26	0.79
04/11/2017 06:00	1.701	1.35	2616.5	1002.1	11.09	10.26	0.80
04/11/2017 07:00	1.7	1.35	2616.0	1002.0	11.09	10.31	0.79
04/11/2017 08:00	1.699	1.35	2613.5	1002.1	11.09	10.15	0.80
04/11/2017 09:00	1.696	1.35	2609.8	1002.5	11.09	10.10	0.78
04/11/2017 10:00	1.694	1.35	2605.5	1003.1	11.09	10.05	0.79
04/11/2017 11:00	1.693	1.35	2604.2	1003.4	11.09	10.26	0.78
04/11/2017 12:00	1.664	1.32	2559.9	1003.6	11.09	10.36	0.79
04/11/2017 13:00	1.663	1.32	2558.0	1003.1	11.09	10.57	0.77
04/11/2017 14:00	1.663	1.32	2558.1	1003.5	11.09	10.57	0.79
04/11/2017 15:00	1.663	1.32	2558.0	1003.7	11.09	10.47	0.78
04/11/2017 16:00	1.646	1.31	2532.5	1003.7	11.09	10.05	0.78
04/11/2017 17:00	1.649	1.31	2536.3	1003.9	11.09	9.64	0.78
04/11/2017 18:00	1.669	1.33	2567.5	1004.4	11.09	9.38	0.77
04/11/2017 19:00	1.67	1.33	2569.5	1004.8	11.09	9.12	0.78
04/11/2017 20:00	1.67	1.33	2569.3	1004.8	11.09	8.91	0.79
04/11/2017 21:00	1.67	1.33	2568.7	1005.6	11.09	8.70	0.77
04/11/2017 22:00	1.669	1.33	2567.0	1005.3	11.09	8.54	0.78
04/11/2017 23:00	1.65	1.31	2537.9	1005.3	11.09	8.39	0.77
05/11/2017 00:00	1.648	1.31	2535.8	1005.8	11.09	8.28	0.77
05/11/2017 01:00	1.646	1.31	2532.8	1005.9	11.09	8.13	0.76
05/11/2017 02:00	1.644	1.31	2528.9	1006.0	11.09	8.02	0.77
05/11/2017 03:00	1.641	1.30	2524.3	1006.1	11.09	7.92	0.77
05/11/2017 04:00	1.64	1.30	2522.6	1006.7	11.09	7.86	0.76
05/11/2017 05:00	1.639	1.30	2520.9	1007.1	11.09	7.81	0.76
05/11/2017 06:00	1.638	1.30	2520.4	1008.2	11.09	7.81	0.77
05/11/2017 07:00	1.628	1.29	2503.9	1008.9	11.09	7.76	0.77
05/11/2017 08:00	1.627	1.29	2503.0	1010.5	11.09	7.76	0.77
05/11/2017 09:00	1.627	1.29	2502.8	1011.1	11.09	7.71	0.76
05/11/2017 10:00	1.627	1.29	2503.8	1012.1	11.09	7.71	0.76
05/11/2017 11:00	1.627	1.29	2503.0	1013.6	11.09	8.18	0.76
05/11/2017 12:00	1.639	1.30	2521.8	1014.0	11.09	8.75	0.76
05/11/2017 13:00	1.641	1.30	2524.3	1015.1	11.09	9.22	0.75
05/11/2017 14:00	1.641	1.30	2525.1	1015.9	11.09	9.43	0.75
05/11/2017 15:00	1.642	1.30	2525.8	1017.0	11.09	9.43	0.75
05/11/2017 16:00	1.643	1.30	2527.2	1018.1	11.09	9.17	0.75
05/11/2017 17:00	1.643	1.30	2528.0	1019.2	11.09	8.65	0.75
05/11/2017 18:00	1.645	1.31	2530.1	1019.8	11.09	7.92	0.76
05/11/2017 19:00	1.646	1.31	2532.1	1020.3	11.09	7.34	0.75
05/11/2017 20:00	1.646	1.31	2532.7	1020.7	11.09	6.87	0.74
05/11/2017 21:00	1.646	1.31	2532.4	1021.1	11.09	6.50	0.74
05/11/2017 22:00	1.645	1.31	2530.5	1021.5	11.09	6.03	0.74
05/11/2017 23:00	1.645	1.31	2531.1	1022.0	11.09	5.87	0.74
06/11/2017 00:00	1.646	1.31	2532.5	1022.3	11.09	5.76	0.75
06/11/2017 01:00	1.648	1.31	2535.5	1022.5	11.09	5.66	0.74
06/11/2017 02:00	1.648	1.31	2535.7	1022.4	11.09	5.45	0.73
06/11/2017 03:00	1.649	1.31	2537.1	1022.6	11.09	5.34	0.75
06/11/2017 04:00	1.649	1.31	2537.1	1022.4	11.09	5.34	0.74
06/11/2017 05:00	1.649	1.31	2537.5	1022.4	11.09	5.18	0.74
06/11/2017 06:00	1.65	1.31	2537.7	1022.8	11.09	5.39	0.74
06/11/2017 07:00	1.649	1.31	2537.6	1022.7	11.09	5.60	0.74
06/11/2017 08:00	1.648	1.31	2536.0	1022.9	11.09	5.66	0.73
06/11/2017 09:00	1.65	1.31	2538.0	1023.2	11.09	6.03	0.75
06/11/2017 10:00	1.647	1.31	2534.3	1022.7	11.09	6.50	0.74
06/11/2017 11:00	1.646	1.31	2532.9	1022.5	11.09	7.24	0.74
06/11/2017 12:00	1.631	1.29	2509.4	1021.6	11.09	7.86	0.74
06/11/2017 13:00	1.618	1.28	2488.6	1020.9	11.09	8.28	0.74
06/11/2017 14:00	1.618	1.28	2488.5	1019.9	11.09	8.70	0.75

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
06/11/2017 15:00	1.617	1.28	2488.1	1019.5	11.09	8.91	0.74
06/11/2017 16:00	1.619	1.28	2490.7	1018.9	11.09	8.96	0.74
06/11/2017 17:00	1.619	1.28	2490.6	1018.5	11.09	8.91	0.74
06/11/2017 18:00	1.619	1.28	2491.5	1017.8	11.09	8.75	0.74
06/11/2017 19:00	1.62	1.29	2492.2	1017.5	11.09	8.70	0.74
06/11/2017 20:00	1.62	1.29	2492.3	1017.1	11.09	8.70	0.74
06/11/2017 21:00	1.621	1.29	2493.3	1016.4	11.09	8.54	0.75
06/11/2017 22:00	1.621	1.29	2493.3	1015.8	11.09	8.49	0.75
06/11/2017 23:00	1.621	1.29	2494.5	1015.2	11.09	8.49	0.74
07/11/2017 00:00	1.622	1.29	2495.8	1014.5	11.09	8.49	0.74
07/11/2017 01:00	1.623	1.29	2496.5	1013.8	11.09	8.54	0.73
07/11/2017 02:00	1.623	1.29	2497.5	1013.0	11.09	8.65	0.74
07/11/2017 03:00	1.623	1.29	2497.4	1011.8	11.09	8.75	0.74
07/11/2017 04:00	1.632	1.30	2511.3	1012.0	11.10	8.86	0.74
07/11/2017 05:00	1.634	1.30	2514.0	1010.7	11.10	8.91	0.74
07/11/2017 06:00	1.634	1.30	2514.4	1010.9	11.10	9.06	0.75
07/11/2017 07:00	1.635	1.30	2514.7	1010.7	11.10	9.12	0.75
07/11/2017 08:00	1.635	1.30	2515.0	1011.2	11.10	9.17	0.74
07/11/2017 09:00	1.635	1.30	2515.2	1011.7	11.10	9.27	0.74
07/11/2017 10:00	1.635	1.30	2515.6	1013.6	11.10	9.27	0.75
07/11/2017 11:00	1.635	1.30	2514.6	1013.7	11.10	9.06	0.74
07/11/2017 12:00	1.635	1.30	2516.1	1013.9	11.10	8.96	0.73
07/11/2017 13:00	1.636	1.30	2517.2	1014.1	11.10	8.91	0.75
07/11/2017 14:00	1.65	1.31	2538.8	1014.4	11.10	8.96	0.74
07/11/2017 15:00	1.623	1.29	2497.3	1015.0	11.10	8.96	0.74
07/11/2017 16:00	1.621	1.29	2493.7	1015.0	11.10	8.80	0.74
07/11/2017 17:00	1.624	1.29	2498.9	1016.0	11.10	8.65	0.74
07/11/2017 18:00	1.626	1.29	2501.8	1016.7	11.10	8.44	0.75
07/11/2017 19:00	1.636	1.30	2517.1	1017.3	11.10	8.18	0.74
07/11/2017 20:00	1.636	1.30	2517.4	1017.9	11.10	7.97	0.74
07/11/2017 21:00	1.637	1.30	2518.5	1018.3	11.10	7.60	0.75
07/11/2017 22:00	1.638	1.30	2519.5	1018.8	11.10	7.50	0.74
07/11/2017 23:00	1.649	1.31	2537.4	1018.9	11.10	7.34	0.74
08/11/2017 00:00	1.65	1.31	2538.4	1019.2	11.10	7.08	0.74
08/11/2017 01:00	1.649	1.31	2537.6	1019.5	11.10	6.66	0.74
08/11/2017 02:00	1.65	1.31	2539.2	1019.8	11.10	6.08	0.74
08/11/2017 03:00	1.651	1.31	2540.7	1020.3	11.10	5.66	0.74
08/11/2017 04:00	1.652	1.31	2541.2	1020.9	11.10	5.29	0.74
08/11/2017 05:00	1.651	1.31	2539.8	1021.5	11.10	4.92	0.74
08/11/2017 06:00	1.64	1.30	2522.8	1022.3	11.10	4.60	0.74
08/11/2017 07:00	1.64	1.30	2523.1	1022.7	11.10	4.38	0.74
08/11/2017 08:00	1.64	1.30	2522.5	1023.7	11.10	4.12	0.75
08/11/2017 09:00	1.64	1.30	2522.8	1023.9	11.10	4.54	0.74
08/11/2017 10:00	1.639	1.30	2521.8	1024.0	11.10	5.39	0.74
08/11/2017 11:00	1.639	1.30	2521.7	1024.6	11.10	6.13	0.74
08/11/2017 12:00	1.627	1.29	2502.6	1024.7	11.10	6.92	0.75
08/11/2017 13:00	1.626	1.29	2501.4	1024.5	11.10	7.60	0.74
08/11/2017 14:00	1.626	1.29	2501.6	1024.7	11.10	7.86	0.75
08/11/2017 15:00	1.626	1.29	2500.8	1024.4	11.10	7.92	0.76
08/11/2017 16:00	1.624	1.29	2499.0	1024.1	11.10	7.86	0.75
08/11/2017 17:00	1.622	1.29	2495.5	1024.1	11.10	7.71	0.75
08/11/2017 18:00	1.623	1.29	2496.6	1024.1	11.10	7.55	0.74
08/11/2017 19:00	1.623	1.29	2497.2	1023.5	11.10	7.50	0.75
08/11/2017 20:00	1.623	1.29	2497.5	1023.4	11.10	7.39	0.75
08/11/2017 21:00	1.624	1.29	2498.5	1022.9	11.10	7.34	0.75
08/11/2017 22:00	1.624	1.29	2499.0	1023.0	11.10	7.45	0.74
08/11/2017 23:00	1.624	1.29	2498.8	1022.2	11.10	7.50	0.75
09/11/2017 00:00	1.623	1.29	2497.7	1021.0	11.10	7.55	0.74
09/11/2017 01:00	1.624	1.29	2499.2	1020.3	11.10	7.60	0.74
09/11/2017 02:00	1.624	1.29	2498.1	1020.6	11.10	7.92	0.75
09/11/2017 03:00	1.626	1.29	2502.1	1020.1	11.10	8.28	0.74
09/11/2017 04:00	1.616	1.28	2486.6	1019.9	11.10	8.65	0.77
09/11/2017 05:00	1.631	1.29	2508.9	1019.4	11.10	8.91	0.74
09/11/2017 06:00	1.631	1.29	2509.6	1019.9	11.10	9.12	0.75
09/11/2017 07:00	1.633	1.30	2512.4	1020.0	11.10	9.27	0.75
09/11/2017 08:00	1.633	1.30	2511.6	1020.6	11.10	9.43	0.75
09/11/2017 09:00	1.63	1.29	2507.0	1021.6	11.10	9.64	0.76
09/11/2017 10:00	1.627	1.29	2503.5	1022.2	11.10	9.79	0.76
09/11/2017 11:00	1.626	1.29	2502.2	1021.7	11.10	9.84	0.75
09/11/2017 12:00	1.628	1.29	2503.9	1022.2	11.10	10.15	0.75
09/11/2017 13:00	1.63	1.29	2508.2	1022.3	11.10	10.31	0.76
09/11/2017 14:00	1.631	1.29	2509.1	1022.5	11.10	10.21	0.76
09/11/2017 15:00	1.629	1.29	2506.6	1022.7	11.10	10.10	0.75
09/11/2017 16:00	1.627	1.29	2502.7	1022.3	11.10	9.79	0.76
09/11/2017 17:00	1.627	1.29	2502.6	1022.5	11.10	9.38	0.76
09/11/2017 18:00	1.627	1.29	2503.2	1021.9	11.10	9.01	0.76
09/11/2017 19:00	1.628	1.29	2504.6	1022.2	11.10	8.65	0.75
09/11/2017 20:00	1.629	1.29	2506.0	1022.1	11.10	8.49	0.76
09/11/2017 21:00	1.629	1.29	2505.6	1021.2	11.10	8.54	0.75
09/11/2017 22:00	1.628	1.29	2505.3	1020.4	11.10	8.60	0.76
09/11/2017 23:00	1.629	1.29	2505.4	1019.1	11.10	8.65	0.76
10/11/2017 00:00	1.629	1.29	2506.1	1017.8	11.10	8.65	0.76
10/11/2017 01:00	1.629	1.29	2506.3	1016.2	11.10	8.54	0.75
10/11/2017 02:00	1.629	1.29	2506.6	1015.2	11.10	8.60	0.76
10/11/2017 03:00	1.628	1.29	2505.3	1015.1	11.10	8.96	0.76
10/11/2017 04:00	1.628	1.29	2504.9	1015.1	11.10	9.32	0.76
10/11/2017 05:00	1.628	1.29	2505.0	1015.7	11.10	9.22	0.76
10/11/2017 06:00	1.628	1.29	2504.8	1016.9	11.10	9.01	0.76
10/11/2017 07:00	1.628	1.29	2504.4	1017.3	11.10	8.70	0.76
10/11/2017 08:00	1.628	1.29	2504.3	1017.7	11.10	8.39	0.76

APPENDIX D
Geotechnical Testing Results

LABORATORY REPORT

4043

Contract Number: PSL17/5359

Report Date: 15 November 2017

Client's Reference: J-W0621.00

Client Name: Opus International
1-2 Aire House
Sidings Court
Richmond Business Park
Doncaster
DN4 5NL

For the attention of: Libby Brunskill

Contract Title: Altcar, Formby

Date Received: 3/11/2017
Date Commenced: 3/11/2017
Date Completed: 15/11/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	A Fry (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS01	3	D	0.40		Brown mottled grey slightly sandy CLAY.
WS02	3	D	0.30		Brown mottled grey CLAY with some organic material.
WS04	4	D	1.50		Grey sandy very silty CLAY.
WS06	3	D	0.40		Grey slightly gravelly organic CLAY.
BH01	15	D	4.00		Brown slightly gravelly sandy very clayey SILT.
BH01	23	D	8.00		Reddish brown slightly gravelly very sandy CLAY.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Altcar, Former	Contract No:
	PSL17/5359
	Client Ref:
	J-W0621.00

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

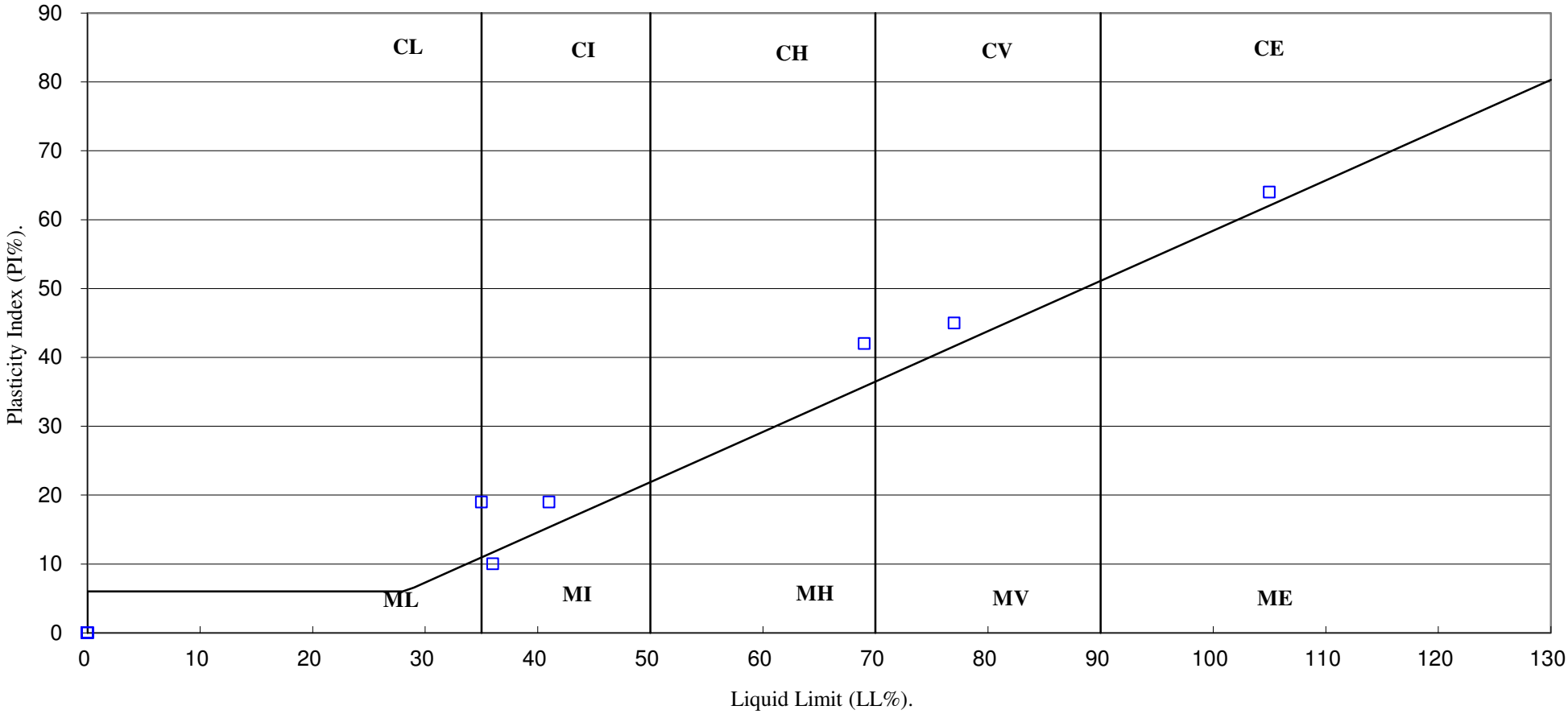
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS01	3	D	0.40		38			69	27	42	100	High plasticity CH.
WS02	3	D	0.30		45			77	32	45	100	Very high plasticity CV.
WS04	4	D	1.50		33			41	22	19	100	Intermediate plasticity CI.
WS06	3	D	0.40		109			105	41	64	98	Extremely high plasticity CE.
BH01	15	D	4.00		34			36	26	10	98	Intermediate plasticity MI.
BH01	23	D	8.00		17			35	16	19	92	Intermediate plasticity CI.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Altcar, Former**	**Contract No:** PSL17/5359 **Client Ref:** J-W0621.00

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Altcar, Former**	**Contract No:** PSL17/5359 **Client Ref:** J-W0621.00

APPENDIX E
CBR Testing Results

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP01
Depth at Start of Test: 0.19m begl
Date of Test: 25/10/2017

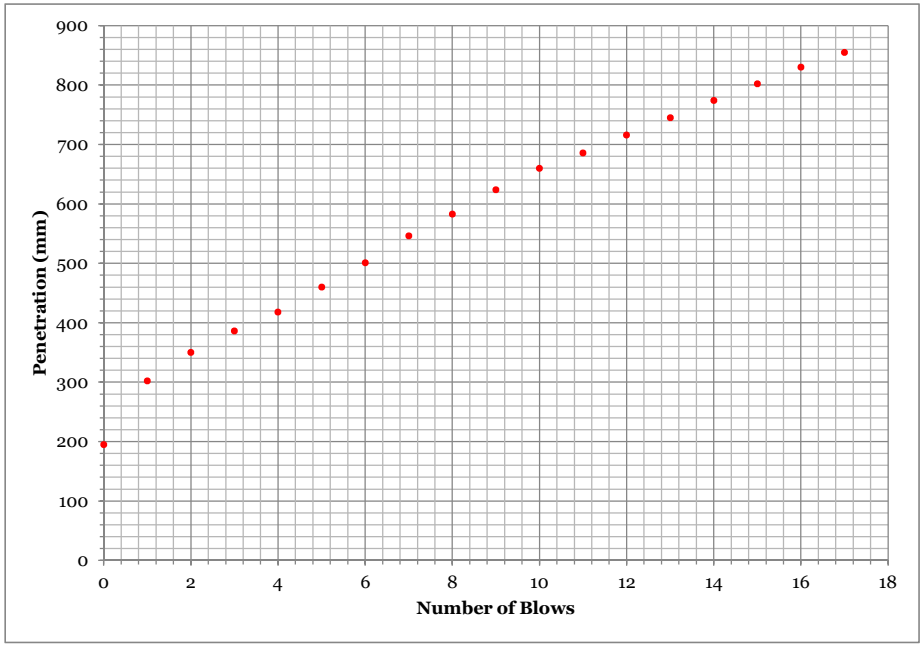
No. of Blows	*Reading (mm)*
0	195
1	302
2	350
3	386
4	418
5	460
6	501
7	546
8	583
9	624
10	660
11	686
12	716
13	745
14	774
15	802
16	830
17	855

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP01
Depth at Start of Test: 0.19m begl
Date of Test: 25/10/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
195	302	1	2.16	Sandy CLAY
302	855	16	7.14	Sandy peaty SILT

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP02
Depth at Start of Test: 0.10m begl
Date of Test: 25/10/2017

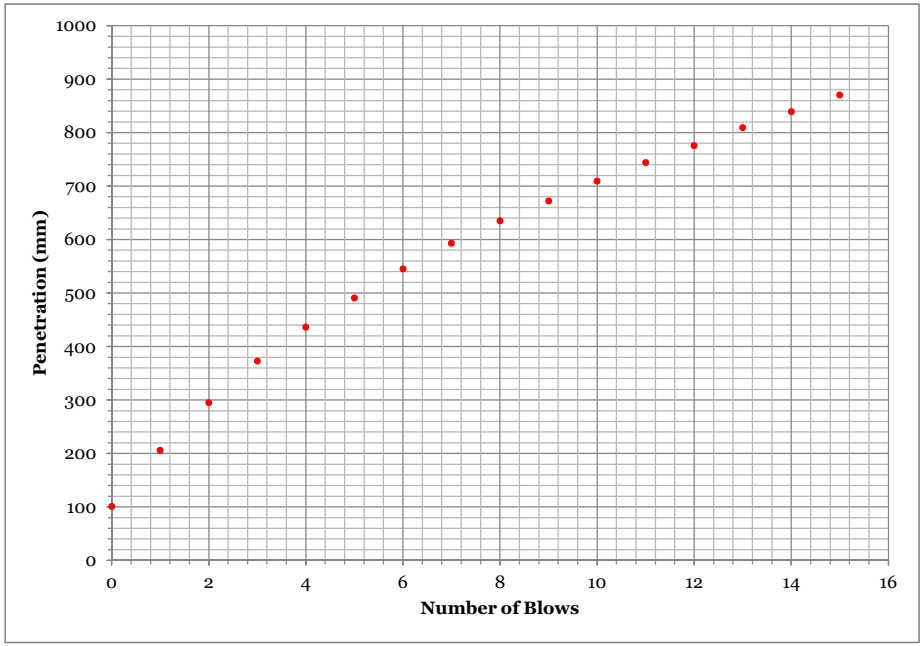
No. of Blows	*Reading (mm)*
0	101
1	206
2	295
3	373
4	436
5	491
6	545
7	593
8	635
9	672
10	709
11	744
12	776
13	809
14	839
15	870

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP02
Depth at Start of Test: 0.10m begl
Date of Test: 25/10/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
101	373	3	2.58	Peaty SILT
373	593	4	4.37	Silty PEAT
593	870	8	7.13	

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP03
Depth at Start of Test: 0.13m begl
Date of Test: 25/10/2017

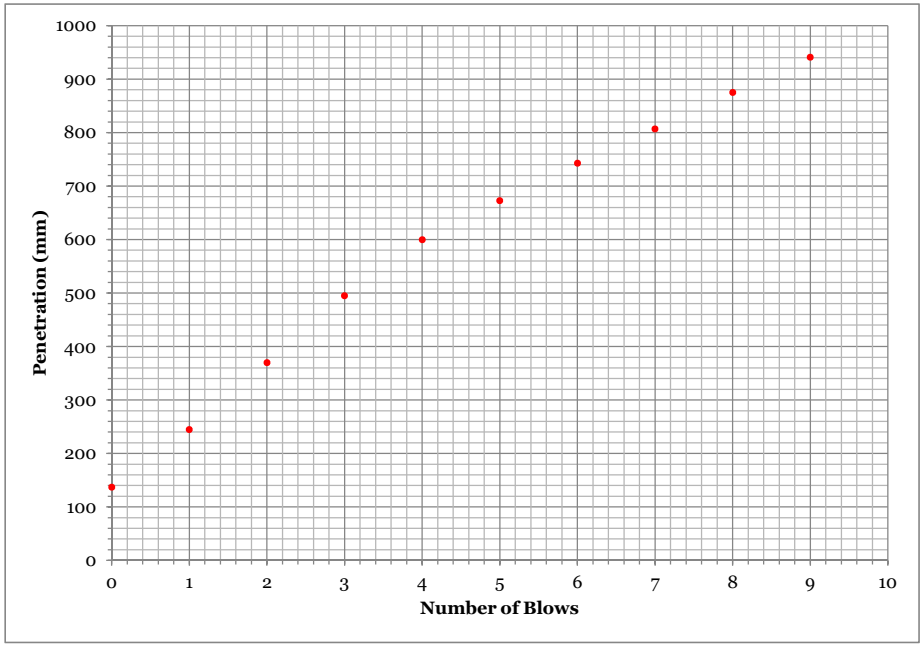
No. of Blows	*Reading (mm)*
0	137
1	245
2	370
3	495
4	600
5	673
6	743
7	807
8	875
9	941

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP03
Depth at Start of Test: 0.13m begl
Date of Test: 25/10/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
137	600	4	1.99	Silty PEAT
600	941	5	3.48	

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP04
Depth at Start of Test: 0.06m begl
Date of Test: 25/10/2017

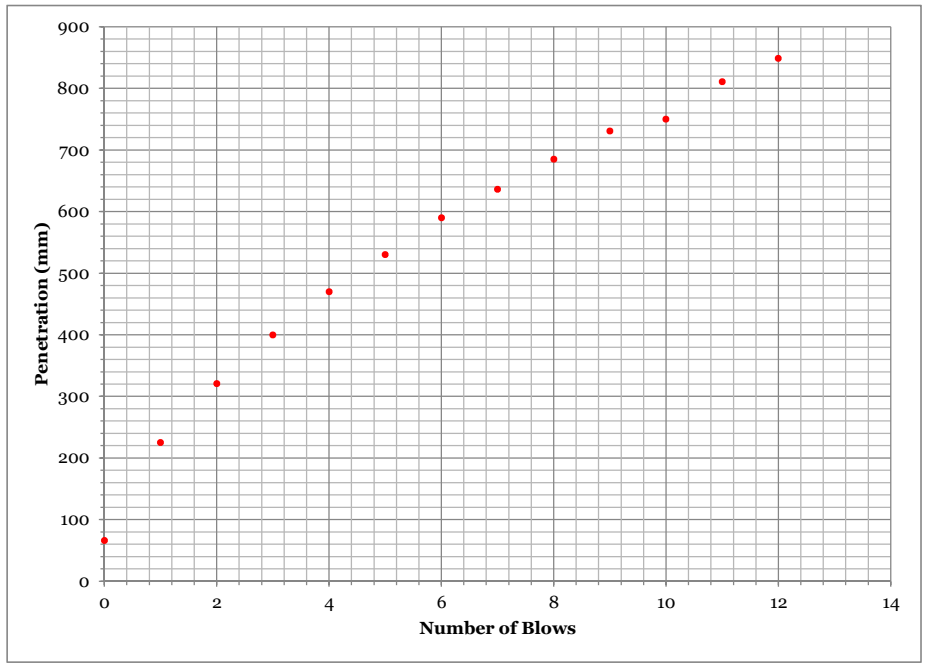
No. of Blows	*Reading (mm)*
0	66
1	225
2	321
3	400
4	470
5	530
6	590
7	636
8	685
9	731
10	750
11	811
12	849

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP04
Depth at Start of Test: 0.06m begl
Date of Test: 25/10/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
66	225	1	1.42	TOPSOIL: Clayey SAND
225	400	2	2.67	Silty peaty CLAY
400	731	6	4.36	
731	750	1	13.44	Clayey silty PEAT
750	849	2	4.88	

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP05
Depth at Start of Test: 0.06m begl
Date of Test: 25/10/2017

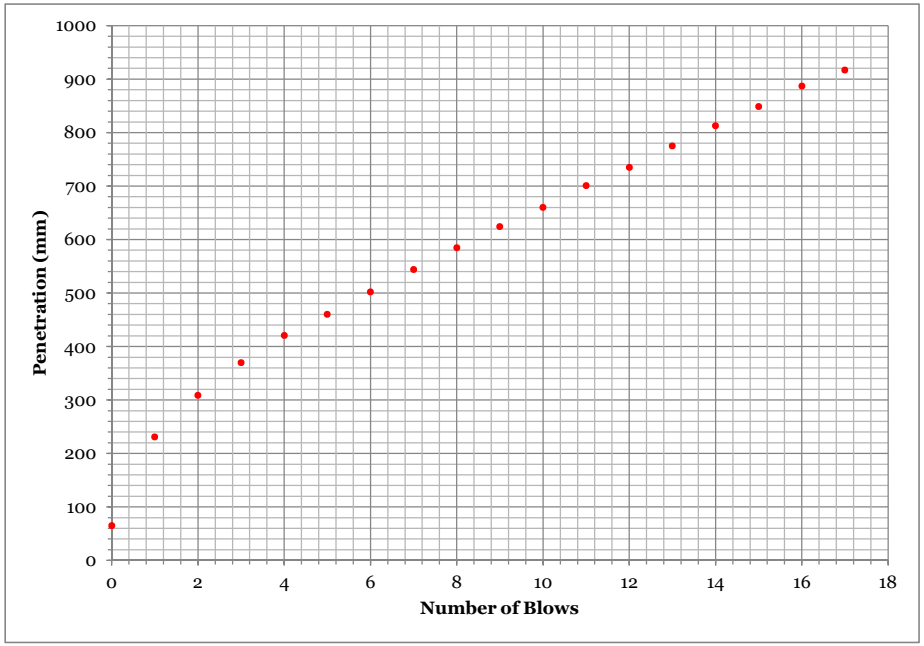
No. of Blows	*Reading (mm)*
0	65
1	231
2	309
3	370
4	421
5	460
6	502
7	544
8	585
9	624
10	660
11	701
12	735
13	775
14	813
15	849
16	887
17	917

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP05
Depth at Start of Test: 0.06m begl
Date of Test: 25/10/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
65	231	1	1.36	Silty peaty CLAY
231	370	2	3.41	
370	917	14	6.27	Clayey silty PEAT

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP06
Depth at Start of Test: 0.13m begl
Date of Test: 25/10/2017

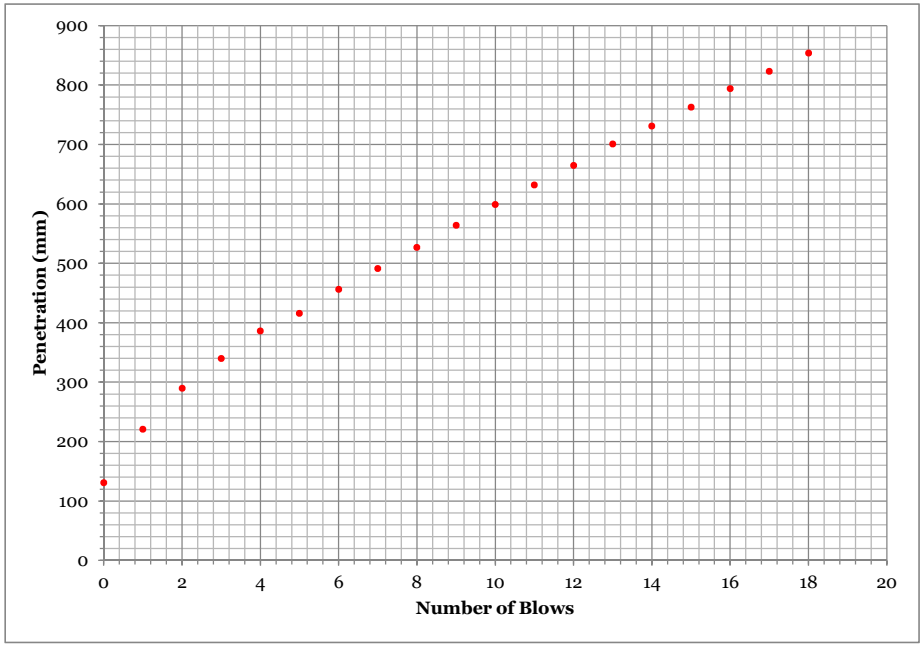
No. of Blows	*Reading (mm)*
0	131
1	221
2	290
3	340
4	386
5	416
6	456
7	491
8	527
9	564
10	599
11	632
12	665
13	701
14	731
15	763
16	794
17	823
18	854

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP06
Depth at Start of Test: 0.13m begl
Date of Test: 25/10/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
131	290	2	2.96	Silty peaty CLAY
290	386	2	5.05	
386	854	14	7.40	Clayey silty PEAT

Notes

APPENDIX F
Opus Tier I Screening Methodology

Opus Methodology for the Screening of Soils in Terms of the Risk to Human Health

Legislative Background for England

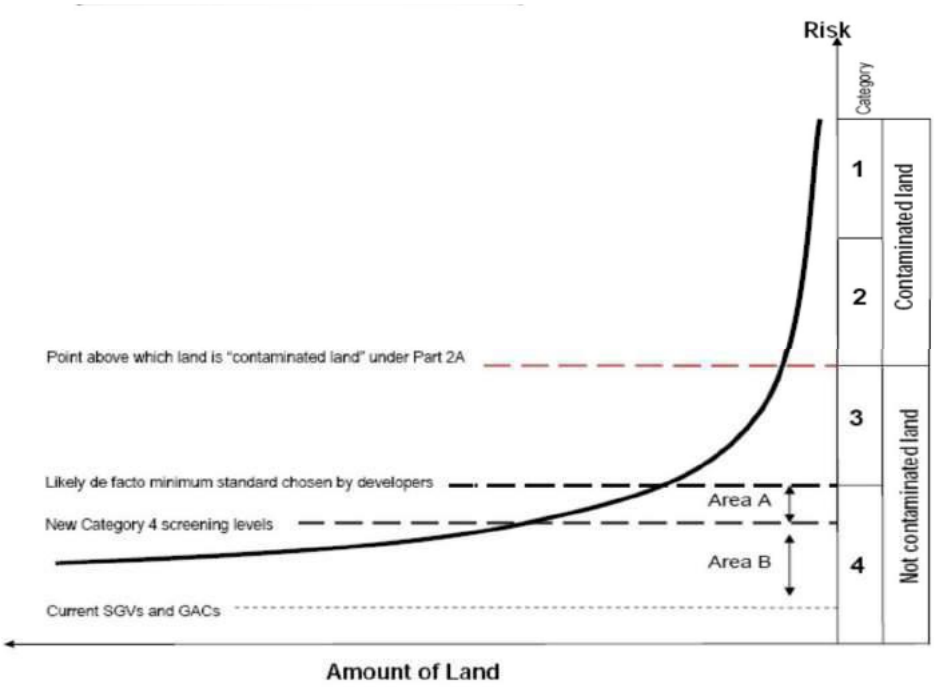
The legislative framework for the regulation of contaminated land is contained in Part 2A of the Environmental Protection Act 1990, which was implemented in the Contaminated Land (England) Regulations 2000 (and subsequent amendments). This legislation allows for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment. The basis of the UK contaminated land policy is the 'Suitable for Use' approach, which states that land should be suitable for its current use and made suitable for any new use as official permission (through the planning process) is given for that use.

Under Part 2A of the Environmental Protection Act 1990, contaminated land is defined as land where 'significant harm' is being caused or there is a 'significant possibility of such harm' being caused or where 'significant pollution of controlled waters' is being caused, or there is a 'significant possibility of such pollution' being caused. For contaminated land to occur under Part 2A, a **contaminant linkage** must exist i.e. there must be a **contaminant,** a relevant **receptor** and a plausible **migration pathway** by which the contaminant can impact the receptor.

In 2012, the Part 2A Statutory Guidance was revised and this introduced four categories of land to assist in defining risk to human health from contaminated land. With respect to contaminants that pose a risk to human health, statutory contaminated land comprises Category 1 (where significant harm is being caused) and Category 2 (where significant possibility of such harm (SPOSH) is being caused). Category 3 is land not capable of being determined as SPOSH and Category 4 is uncontaminated.

Under the National Planning Policy Framework (NPPF) introduced in England in 2012, land should be suitable for its new use taking the effects of ground contamination into consideration. To this end, adequate site investigation should be undertaken and prepared by competent persons. After remediation, as a minimum, land should be incapable of being determined as Part 2A contaminated land. Where a site is affected by contamination, responsibility for securing safe development rests with the developer and/or landowner.

The Defra impact assessment report accompanying the revised Part 2A Statutory Guidance indicated that most developers will want to ensure that under the planning regime their land is safely within Category 4 and this is the approach adopted by Opus in the preparation of this report (see below):



Published Human Health Generic Assessment Criteria

To assist with the implementation of Part 2A and contamination assessments under the planning process, Defra commissioned a research project to derive new Category 4 Screening Levels (C4SLs). In 2014, Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead for six categories of land use, namely:

- Residential with home-grown produce;
- Residential without home-grown produce;
- Allotments;
- Commercial;
- Public open space 1 (public land near residential properties i.e. grassed area outside residential housing); and
- Public open space 2 (public land away from residential properties i.e. public parks).

The C4SLs differ from the earlier Soil Guideline Values (SGVs) in that they are considered by Defra to be more pragmatic (albeit still strongly precautionary) and indicate the concentration of a contaminant in soil that would potentially pose a *'low risk'* to human health, whereas the SGVs are considered indicative of *'minimal risk'*.

In 2015, Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) published additional generic assessment criteria (GAC), referred to as Suitable 4 Use Values (S4ULs). These S4ULs replaced the earlier LQM/CIEH human health GAC (2nd Edition) that were published in 2009.

The C4SLs and S4ULs both utilise updated exposure parameters from those used in version 1.06 of the Environment Agency's Contaminated Land Exposure Assessment (CLEA) model. CLEA version 1.06 was also used to derive the following other human health GAC:

- Environment Agency SGVs (*either withdrawn or superseded by the C4SLs and S4ULs*);
- EIC/AGS/CL:AIRE publication 'Soil Generic Assessment Criteria for Human Health Risk Assessment', dated January 2010; and
- Atkins ATRISK^{soil} Soil Screening Values dated January 2015.

Whilst the C4SLs and S4ULs both use updated exposure parameters, they differ in that C4SLs have utilised Low Levels of Toxicological Concern (LLTC) in their derivation, whereas S4ULs use Health Criteria Values (HCVs). As a consequence of using LLTC the C4SLs are indicative of a '*low risk'* to human health, whereas the S4ULs, SGVs, EIC/AGS/CL:AIRE and Atkins ATRISK^{soil} GAC (which use HCVs), are all considered indicative of *'minimal risk'* to human health.

With respect to the consumption of home produce grown in contaminated soil, the C4SLs have adopted the 90th percentile consumption rates for the 'top two' produce types, but mean consumption rates for the remaining four produce types, in contrast with the S4ULs, SGVs, EIC/AGS/CL:AIRE and Atkins ATRISK^{soil} approach, which applies the 90th percentile consumption rates to all produce types.

Despite the differences in approach (e.g. *low risk* / *minimal risk* and produce consumption rates), all the above referenced GAC lie comfortably within Category 4 of the Part 2A Statutory Guidance, indicating that for the contaminant of concern, the land is uncontaminated and incapable of being determined under Part 2A.

Opus Tier 1 Soil Screening Values

The Tier 1 human health risk assessment methodology employed by Opus in this report is as follows:

Firstly, reference has been made to the published C4SLs. However, for compounds where there are no C4SLs available, reference has also been made to following other published GAC in the following descending order of preference:

- LQM/CIEH S4ULs for Human Health Risk Assessment dated 2015 *[Copyright Land Quality Management Limited reproduced with permission; Publication No. S4UL3028. All rights reserved];*
- EIC/AGS/CL:AIRE GAC; and
- Atkins ATRISK^{soil} Soil Screening Values.

Utilising the above referenced sources, Opus has compiled a database of published human health GAC, referred to as Opus Tier 1 Soil Screening Values (SSVs) and is currently using Version 2016.1 dated 21 November 2016. This database comprises GAC for 131 individual contaminants, of which 19 are inorganic and 112 organic substances.

Using Version 1.071 of the CLEA model, Opus has replicated the published GAC for organic contaminants at 1.0%, 2.5% and 6% soil organic matter (SOM) contents. In order to assess natural soils which can have a much lower SOM content than 1%, Opus has also derived Tier 1 SSVs at 0.25% SOM content for selected commonly occurring contaminants, so as to provide a sufficiently conservative output.

These GAC relate solely to the protection of human health from chronic exposure to contaminants in soil. The risks to other receptors (e.g. controlled waters, ecology and property) needs to be considered separately.

The GAC are based on a sandy loam soil type, except the ATRISK^{soil} values at 1% SOM which are based on a sand soil type (as defined in Environment Agency Science Report SC050021/SR3 dated 2009). For all substances it has been assumed that 100% of the intake would reach the systemic circulation (i.e. is 100% bioavailable).

The GAC for organic contaminants assume that non-aqueous phase liquid (NAPL) / free phase contamination is not present. Where the GAC exceeds the aqueous solubility or the saturated vapour concentration, the lower of these saturation limits is also presented in brackets. The soil saturation concentration is the theoretical concentration at which soil vapour and/or pore water have become fully saturated. This can indicate that NAPL is likely to be present. However, for contaminants that are strongly sorbed to soils (i.e. have high Koc) and that have a low aqueous solubility and vapour pressure, exceedance of the soil saturation concentration does not necessarily imply that NAPL is present. The presence of NAPL therefore needs to be considered qualitatively before applying these GAC.

In addition, the Tier 1 SSVs do not consider the additive or synergistic effects of any compounds.

Depending upon the conceptual site model for a given piece of land, exceedance of an Opus Tier 1 SSV may indicate that a **potential contaminant linkage** exists. In such circumstance this would indicate a requirement for further assessment, such as supplementary investigation and/or detailed quantitative risk assessment (DQRA). In the absence of further assessment, a **significant contaminant linkage** may be deemed to exist requiring remediation of the contamination on human health protection grounds.

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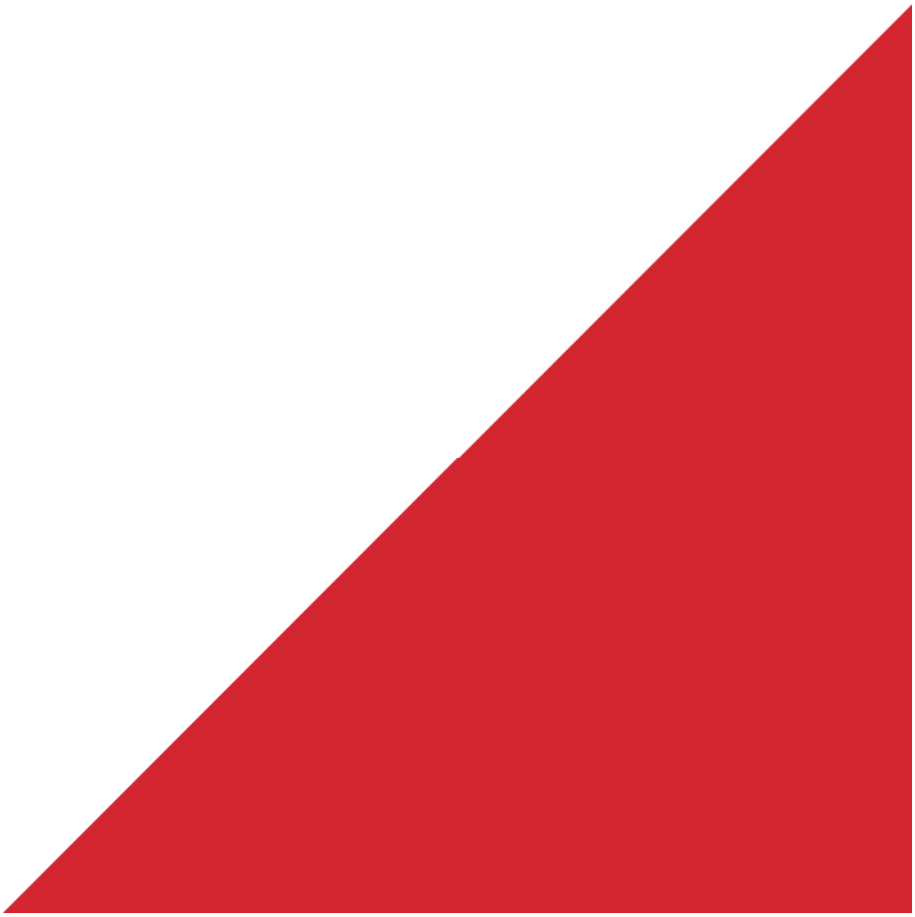
Supplementary Ground Investigation Report

On a site at

Altcar, Formby

For

Zetland Group



Supplementary Ground Investigation Report

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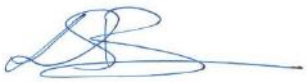
Prepared By



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Date: December 2017
Reference: J-W0621.00_01
Status: Final

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EXECUTIVE SUMMARY

Location	The site is located at Altcar Moss, Formby, centred on approximate National Grid Reference 332591, 407422. The site currently comprises agricultural land and access is gained via Suttons Lane, which is accessed via Lord Sefton Way (B5195).
Ground Conditions	**Topsoil** Topsoil was encountered in all the exploratory hole locations to a maximum encountered depth of 0.30m begl (WS09 and WS10). The Topsoil typically comprised a clayey SAND or clayey gravelly SAND. **Alluvium** A soft CLAY with varying proportions of silt and sand, as well as a clayey SAND was encountered beneath the topsoil in all exploratory hole locations to a maximum encountered depth of 1.7m begl (WS10). **Peat** Plastic pseudofibrous PEAT with varying proportions of clay and sand was encountered in all exploratory locations to a maximum depth of 2.60m begl (WS09). The peat was encountered at greatest thickness in WS07 at 0.55m in thickness. **Downholland Silt** A soft to very soft CLAY comprising varying proportions of silt and sand was encountered beneath the peat in WS07 and WS10 to depths of 1.50m and 4.70m respectively. **Shirdley Sand** A very loose to very dense SAND with varying proportions of clay and silt was encountered in all exploratory hole locations to a maximum encountered depth of 7.00m begl (WS07 – WS09). The sand was shown to be at greatest thicknesses in WS07 at 5.50m in thickness. **Glacial Till** Glacial Till was not encountered in any of the exploratory hole locations. **Bedrock** Solid geology (Keuper Marl) was not encountered in any of the exploratory hole locations.
Groundwater	Groundwater was encountered in WS07 at 0.80m begl. Although groundwater strikes were not noted in the remaining three exploratory holes, the arisings were noted to be wet throughout. A groundwater monitoring well was installed within BH01 with a response zone from 2.0m. A continuous monitoring device was installed within the well to monitor the groundwater level fluctuations over a two week period. The results obtained from the monitoring device show that the minimum (0.81m bgl) and maximum (0.70m bgl) groundwater levels do not vary significantly enough to be considered to be influenced by tidal flow from the Irish Sea.

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Chemical Testing	A baseline range (lowest and highest) has been created for the soil tested for those compounds which were identified on 'Site B' at levels above the Limits of Detection (LoD). It is considered that these testing results are representative of the ground conditions also encountered on 'Site A' due to the comparable nature of the material. No olfactory or visual evidence of contamination was encountered on 'Site A' that warranted additional testing. The percentage of Soil Organic Matter (SOM) ranged between 1.1 and 73%. No positive asbestos fibres were detected within any of the twelve samples tested. Based on a comparison of the testing results against a commercial exposure model, Opus have determined that the site does not pose a chronic risk to future site workers.
Geotechnical Testing	**Atterberg Limits** The natural soil on site was identified as demonstrating an intermediate to extremely high plasticity. In accordance with NHBC Chapter 4.2, the most significant volume change potential should be assumed. Therefore, the natural soil should be classified as having an **extremely high** volume change potential. **pH & Sulphate** The results of the pH & SO4 testing show that the majority of soils on site are characteristic of Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete Classification (ACEC) Class AC-1s in accordance with BRE Special Digest 1 (2005). Two samples, however, are characteristic of DS-2 and AC-1s (WS04 at 0.7m and WS06 at 0.3m). **SPT Testing** The SPT N values, plotted on Figure 1, show a general trend increasing with depth, from the lowest uncorrected N value of N=0 between 1.00m and 4.00m begl to the highest uncorrected N value of N=50 at 7.00m begl, encountered in WS07-WS09. The lower N values represent a PEAT, soft to very soft CLAY and very loose SAND that are encountered higher in the sequence beneath the subsoil. The higher N values, typically encountered from 5.0m begl, represent a medium dense SAND. This is shown to be underlain by looser soils with lower N values at around 6.0m depth, with the highest N values at 7.0m begl in a dense to very dense SAND. **CBR Testing** An assessment of the likely California Bearing Ratio (CBR) for the near surface soils has been made using the above testing results and the description of the materials encountered in the exploratory holes. The results show a general increase in CBR values with depth, a design CBR value of 2% has been adopted for the upper 500mm of soils. It is recommended that the CBR values are suitably validated on site using plate load test methods on the formation soil once areas designated for highways have been confirmed.

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1.0 INTRODUCTION

1.1 Background

Opus International Consultants (UK) Ltd (Opus) has been commissioned by the Client (Zetland Group) to undertake a Supplementary Ground Investigation at a site in Altcar Moss, Formby (Site A). Opus understands that Zetland are currently assessing the parcel of land with regards to access and site establishment.

Opus has previously undertaken a Ground Investigation on an adjacent site (Site B) in November 2017 to investigate the ground conditions, collect soil samples for chemical and geotechnical analysis, permit in-situ testing comprising SPT testing, CBR testing and allow for the installation of a groundwater monitoring well for continuous groundwater analysis.

Following analysis of the information collated as part of the previous Ground Investigation, the Client has requested investigation into Site A to determine the suitability of the site for the proposed development.

1.2 Scope of Works

This report includes a preliminary stage of soil sampling and analysis, undertaken as part of the investigation into Site B, to establish a 'Baseline' of existing ground conditions on site, together with continuous groundwater monitoring to ascertain whether the site is tidally influenced by the Irish Sea.

Opus will also factually report the geotechnical information obtained as part of the investigation and provide recommendations regarding future works required.

The report has been designed in general accordance with BS 10175:2011 and A1:2013 the British Standards Code of Practice for the Investigation of Potentially Contaminated sites and with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11)).

1.3 Objectives

The objectives of the intrusive investigation were to address the following:

- Compare ground conditions on Site A to those encountered on Site B;
- Provide a chemical 'Baseline' of existing ground conditions on site by targeted intrusive investigation;
- Ascertain whether the site is influenced by tidal impact from the Irish Sea; and,
- Identify any geotechnical constraints on site that would impede the site development;

1.4 Limitations

This report has been produced on behalf of the Client, Zetland Group, and no responsibility is accepted to any Third Party for all or any part. This report should not be relied upon or transferred

to any other parties without the express written authorisation of Opus. If any unauthorised Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

Findings and opinions conveyed within this report are based on information obtained from a variety of sources as detailed within this report, which Opus believes are reliable. Nevertheless, Opus cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The site plans enclosed in this report should not be used for scaling purposes.

2.0 THE SITE

2.1 Location & Access

The site is located at Altcar Moss, Formby, centred on approximate National Grid Reference 332591, 407422 as shown on the appended Drawing No. MR J-W0621.00/101 Site Location Plan.

The site currently comprises agricultural land and access is gained via Suttons Lane, which is accessed via Lord Sefton Way (B5195).

2.2 Site Description

The following site description is based upon a site walkover undertaken during the site investigation on 5th December 2017 and the following observations were made:

- The site currently comprises agricultural farmland and site levels are generally flat across the site;
- The ground was generally noted to be hard, however there were some areas of soft ground;
- The site is bordered by agricultural fields to the north, east, south and west, with Great Altcar located to the south of the site; and,
- Several drainage ditches were noted to surround the site.

3.0 GROUND INVESTIGATION

3.1 Clearance of Underground Services

Prior to the intrusive investigation works each exploratory hole location was referenced against the available service plans and was then scanned with a Cable Avoidance Tool (CAT) and signal generator for the potential presence of underground unknown services. Additionally, hand excavated service inspection pits were completed prior to the commencement of the boreholes.

3.2 Site Works

The following exploratory hole locations were completed on 5th December 2017:

- 4 No. windowless sample probeholes (WS07 – WS10) excavated to depths of between 5.00m and 7.00m begl; and,
- 4 No. Dynamic Cone Penetrometer tests.

The above supplements the previous exploratory holes undertaken as part of the Ground Investigation on 'Site B', as follows:

- 1 No. cable percussive borehole (BH01) with groundwater monitoring well drilled to a depth of 10.50m below existing ground level (m begl);
- 6 No. windowless sample probeholes (WS01 – WS06) excavated to depths of between 5.00m and 7.45m begl; and,
- 6 No. Dynamic Cone Penetrometer tests.

All windowless sample probehole locations were backfilled with arisings upon completion.

Disturbed samples were taken from BH01 and WS01-WS06 at selected intervals from the strata encountered, placed in laboratory supplied containers and submitted for chemical and geotechnical testing.

The encountered geology was logged by an Opus Geo-Environmental Engineer in general accordance with BS EN ISO 14688-1. Any visual or olfactory evidence of potential contamination was also recorded.

The approximate locations of the exploratory holes are shown on Drawing No. MR J-W0621.00/02/A, with coordinates presented on the exploratory hole logs attached as Appendix 'A'.

3.3 Chemical Laboratory Testing

Twelve representative samples of topsoil and subsoil from 'Site B' were submitted for selected chemical testing. The analysis was undertaken by Concept Life Sciences, a UKAS and MCERTS accredited laboratory, with the results enclosed as Appendix 'B'.

The following analyses were undertaken:

- Asbestos ID - 12 samples;

- Heavy Metals - 12 samples;
- Total Petroleum Hydrocarbon (CWG) inc. BTEX, MTBE - 12 samples;
- Polycyclic Aromatic Hydrocarbon (PAH) - 12 samples;
- pH & Sulphate - 12 samples, and,
- Salinity - 12 samples.

3.4 Groundwater Monitoring

A continuous groundwater monitoring well with response zone between 2.0 and 10.0m begl was installed within BH01 in order to determine the tidal influence of the Irish Sea on groundwater levels across the site. The results of the monitoring are presented in Appendix 'C' and discussed in further detail in Section 4.2.

3.5 Geotechnical Laboratory Testing

Eight representative samples of natural clay from 'Site B' were submitted for selected geotechnical testing. The analysis was undertaken by Professional Soils Laboratory Ltd (PSL) and Derwentside Environmental Testing Services (DETS), both UKAS accredited laboratories, with the results presented in Appendix 'B' and 'D'.

The following analyses were undertaken:

- Atterberg Limits - 8 samples;
- Moisture Content - 8 samples; and,
- pH & Sulphate - 3 samples.

4 RESULTS OF THE GROUND INVESTIGATION

4.1 Strata Encountered – 'Site A'

4.1.1 Topsoil

Topsoil was encountered in all the exploratory hole locations to a maximum encountered depth of 0.30m begl (WS09 and WS10).

The Topsoil typically comprised a clayey SAND or clayey gravelly SAND.

4.1.2 Alluvium

A soft CLAY with varying proportions of silt and sand, as well as a clayey SAND was encountered beneath the topsoil in all exploratory hole locations to a maximum encountered depth of 1.7m begl (WS10).

4.1.3 Peat

Plastic pseudofibrous PEAT with varying proportions of clay and sand was encountered in all exploratory locations to a maximum depth of 2.60m begl (WS09).

The peat was encountered at greatest thickness in WS07 at 0.55m in thickness.

4.1.4 Downholland Silt

A soft to very soft CLAY comprising varying proportions of silt and sand was encountered beneath the peat in WS07 and WS10 to depths of 1.50m and 4.70m respectively.

4.1.5 Shirdley Sand

A very loose to very dense SAND with varying proportions of clay and silt was encountered in all exploratory hole locations to a maximum encountered depth of 7.00m begl (WS07 – WS09).

The sand was shown to be at greatest thicknesses in WS07 at 5.50m in thickness.

4.1.6 Glacial Till

Glacial Till was not encountered in any of the exploratory hole locations.

4.1.7 Bedrock

Solid geology (Keuper Marl) was not encountered in any of the exploratory hole locations.

4.2 Strata Encountered – 'Site B'

4.2.1 Topsoil

Topsoil was encountered in all the exploratory hole locations to a maximum encountered depth of 0.40m begl (BH01).

The Topsoil typically comprised a clayey SAND or sandy SILT with frequent rootlets.

4.2.2 Alluvium

A soft CLAY with varying proportions of silt, peat and sand, as well as a very soft SILT with varying proportions of sand and peat was encountered beneath the topsoil in all exploratory hole locations to a maximum encountered depth of 1.20m begl (WS01).

4.2.3 Peat

Plastic pseudofibrous PEAT with varying proportions of clay and silt was encountered in all exploratory locations to a maximum depth of 1.50m begl (WS01 and WS05).

The peat was encountered at greatest thickness in WS05 at 1.10m in thickness.

4.2.4 Downholland Silt

A very soft SILT comprising varying proportions of clay, sand and peat, was encountered beneath the peat in all exploratory hole locations to a maximum depth of 6.90m begl (BH01).

The silt was shown to be at greatest thicknesses in WS06 at 5.60m in thickness.

4.2.5 Shirdley Sand

A very loose to dense SAND with varying proportions of silt was encountered in all exploratory hole locations, with the exception of BH01, beneath the silt to a maximum encountered depth of 7.20m begl (WS02).

The sand was shown to be at greatest thicknesses in WS04 at 2.20m in thickness.

4.2.6 Glacial Till

A stiff to very stiff sandy gravelly CLAY (Boulder clay) was encountered in BH01 and WS03 to a maximum encountered depth of 10.50m (BH01).

4.2.7 Bedrock

Solid geology (Keuper Marl) was not encountered in any of the borehole locations.

4.3 Groundwater Observations

Groundwater was encountered in WS07 at 0.80m begl. Although groundwater strikes were not noted in the remaining three exploratory holes, the arisings were noted to be wet throughout.

A groundwater monitoring well was installed within BH01 (Site B) with a response zone from 2.0m. A continuous monitoring device was installed within the well to monitor the groundwater level fluctuations over a two week period.

The results obtained from the monitoring device show that the minimum (0.81m bgl) and maximum (0.70m bgl) groundwater levels do not vary significantly enough to be considered to be influenced by tidal flow from the Irish Sea.

Based upon the shallow depth of groundwater across the eastern half of the site, it is likely that groundwater will be encountered during foundation construction, and it is considered that sump and

pump dewatering techniques will be required to form foundations, drilling cellars and perimeter ditches.

Where excavations need to be greater than 2.0m, a suitable solution to remove the water and prevent sidewall collapse will need to be established. The depth of groundwater and infiltration could be assessed on site further during the excavations undertaken for the construction of the foundations, and a dewatering system can then be devised. If discharge into nearby surface water features is to be an option, an Environment Agency discharge consent will be required.

It should also be noted that groundwater conditions could change in the future due to climatic and seasonal effects.

4.4 Chemical Testing

A baseline range (lowest and highest) has been created for the soil tested from 'Site B' (as detailed in Table 1 below), for those inorganic and organic compounds which were identified on site at levels above the Limits of Detection (LoD). It is considered that these testing results are representative of the ground conditions also encountered on 'Site A' due to the comparable nature of the material. No olfactory or visual evidence of contamination was encountered on 'Site A' that warranted additional testing.

The percentage of Soil Organic Matter (SOM) from the samples tested ranged between 1.1 and 73% and no positive asbestos fibres were detected within any of the twelve samples tested.

The full set of chemical testing results are enclosed as Appendix 'B'.

Table 1 Summary of Analysed Soil Concentrations

Contaminant	Range Lowest – Highest (mg/kg)
Arsenic	5 - 32
Barium	19 - 76
Chromium	10 - 48
Copper	6 - 29
Lead	6 - 65
Nickel	10 - 39
Vanadium	12 - 71
Zinc	23 - 95
TPH (C10-C12 Aliphatic)	4 - 4
TPH (C12-C16 Aliphatic)	6 – 22
TPH (C16-C21 Aliphatic)	1 - 94
TPH (C21-C35 Aliphatic)	2 - 95
TPH (C8-C10 Aromatic)	0.13 – 0.13
TPH (C10-C12 Aromatic)	12 – 12
TPH (C12-C16 Aromatic)	2 - 40

Contaminant	Range Lowest – Highest (mg/kg)
TPH (C16-C21 Aromatic)	3 - 27
TPH (C21-C35 Aromatic)	1 - 93
Salinity (%)	1.8 – 2.3
pH	<4 – 7.7

Opus have compared the results to a commercial exposure model based on a 1% SOM soil, to determine if any further assessment of the chronic risk to future site occupants is required. The area is known for its naturally occurring shallow hydrocarbon deposits, however, none of the above compounds exceeded the Opus Tier 1 Soil Screening Values. The Opus Screening Methodology is included in Appendix F.

4.5 Geotechnical Testing

The results of the geotechnical testing from 'Site B' are presented in Tables 2 and 3 and discussed in Section 5.0. The testing certificates are included within Appendix 'B' and 'D'.

4.5.1 Atterberg Limits

Table 2 Atterberg Limit Testing Results

Location	Sample Number	Depth (m)	Plasticity Index (p)	Moisture Content (%)	Modified Plasticity Index (p')	Volume Change Potential	Strata
WS01	D3	0.4	42	38	42	High	Sandy CLAY
WS02	D3	0.3	45	45	45	Very High	Peaty SILT
WS04	D4	1.5	19	33	19	Intermediate	Sandy SILT
WS06	D3	0.4	64	109	63	Extremely High	Silty PEAT
BH01	D15	4.0	10	34	10	Intermediate	Clayey sandy SILT
BH01	D23	8.0	19	17	17	Intermediate	Sandy gravelly CLAY

The natural soil on 'Site B' was identified as demonstrating an intermediate to extremely high plasticity. In accordance with NHBC Chapter 4.2, the most significant volume change potential should be assumed. Therefore, the natural soil should be classified as having an extremely high volume change potential.

4.5.2 pH and Sulphate Testing

The chemical analyses for pH and water soluble sulphate content are presented in Appendix 'B' and summarised in Table 3.

Table 3 pH and Sulphate Testing Results

Location	Depth (m)	SO_4 in 2:1 water / soil (Mg/l)	pH Value
WS01	0.15	10	7.1
WS01	0.3	40	7.7
WS02	0.2	30	5.2
WS02	0.5	320	<4
WS03	0.1	<10	4.9
WS03	1.2	190	6.8
WS04	0.1	20	5.1
WS04	0.7	690	4.7
WS04	3.0	84	8.6
WS05	0.1	20	5.0
WS05	1.2	30	4.2
WS06	0.2	30	4.3
WS06	0.3	530	<4
BH01	6.0	240	8.4
BH01	9.0	200	8.4

The results of the pH and sulphate analysis have been assessed for potential aggression to buried concrete in accordance with the Building Research Establishment: Special Digest 1: Concrete in Aggressive Ground (BRE 2005). It is considered that the site can be classified as a greenfield site with regard to aggressive ground risks.

Based upon the results of the chemical analyses undertaken, it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-2, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE Special Digest 1 (2005).

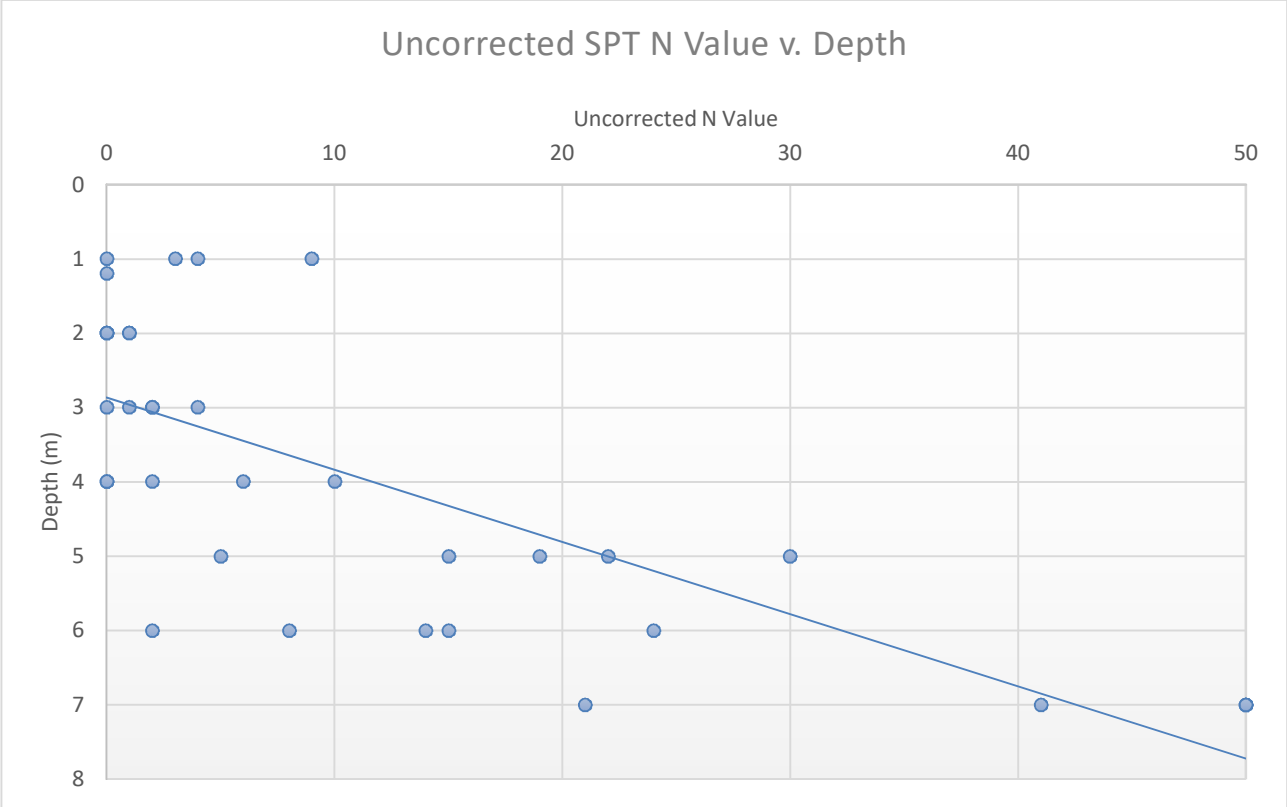
The specific concrete mixes for the Design Concrete Class (DCC) to be used on site will be determined by the site specific concrete requirements in terms of the required durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM), detailed in Part 2 with further guidance in Parts 3 and 4 of BRE Special Digest 1.

4.6 In-Situ Testing

4.6.1 Standard Penetration Testing

In-situ Standard Penetration Testing (SPT) was undertaken in all exploratory holes with the results of the testing shown in Figure 1 (overleaf). As WS01 falls inside the site boundary for 'Site A', these results have also been included in the following sections.

Figure 1 SPT Results



The SPT N values, plotted on Figure 1, show a general trend increasing with depth, from the lowest uncorrected N value of N=0 between 1.00m and 4.00m begl to the highest uncorrected N value of N=50 at 7.00m begl, encountered in WS07-WS09.

The lower N values represent a PEAT, soft to very soft CLAY and very loose SAND that are encountered higher in the sequence beneath the subsoil. The higher N values, typically encountered from 5.0m begl, represent a medium dense SAND. This is shown to be underlain by looser soils with lower N values at around 6.0m depth, with the highest N values at 7.0m begl in a dense to very dense SAND.

4.6.2 CBR Testing

Dynamic Cone Penetrometer (DCP) testing was undertaken on site by use of a Transport Research Laboratory (TRL) probe. The results of the testing are summarised in Table 4 below, with the full set of results presented in Appendix 'E'.

Table 4 Results of DCP Testing

Location	Range Top (m bgl)	Range Bottom (m bgl)	Blow Count	CBR (%)	Stratum
DCP01	195	302	1	2.16	Sandy CLAY
	302	855	16	7.11	Sandy peaty SILT
DCP07	120	402	2	1.62	Silty sandy CLAY
	402	608	1	1.08	(Overleaf)

Location	Range Top (m bgl)	Range Bottom (m bgl)	Blow Count	CBR (%)	Stratum
	608	903	3	2.36	Silty sandy CLAY / PEAT
DCP08	64	263	1	1.12	Sandy CLAY
	263	904	7	2.55	
DCP09	70	318	1	0.89	TOPSOIL
	318	520	3	3.53	SAND
	520	924	4	2.30	Sandy CLAY
DCP10	77	542	5	2.51	TOPSOIL / SAND
	542	734	1	1.17	Sandy CLAY
	734	896	2	2.90	

An assessment of the likely California Bearing Ratio (CBR) for the near surface soils has been made using the above testing results and the description of the materials encountered in the exploratory holes. The results show a general increase in CBR values with depth, a design CBR value of 2% has been adopted for the upper 500mm of soils.

It is recommended that the CBR values are suitably validated on site using plate load test methods on the formation soil once areas designated for highways have been confirmed.

DRAWINGS

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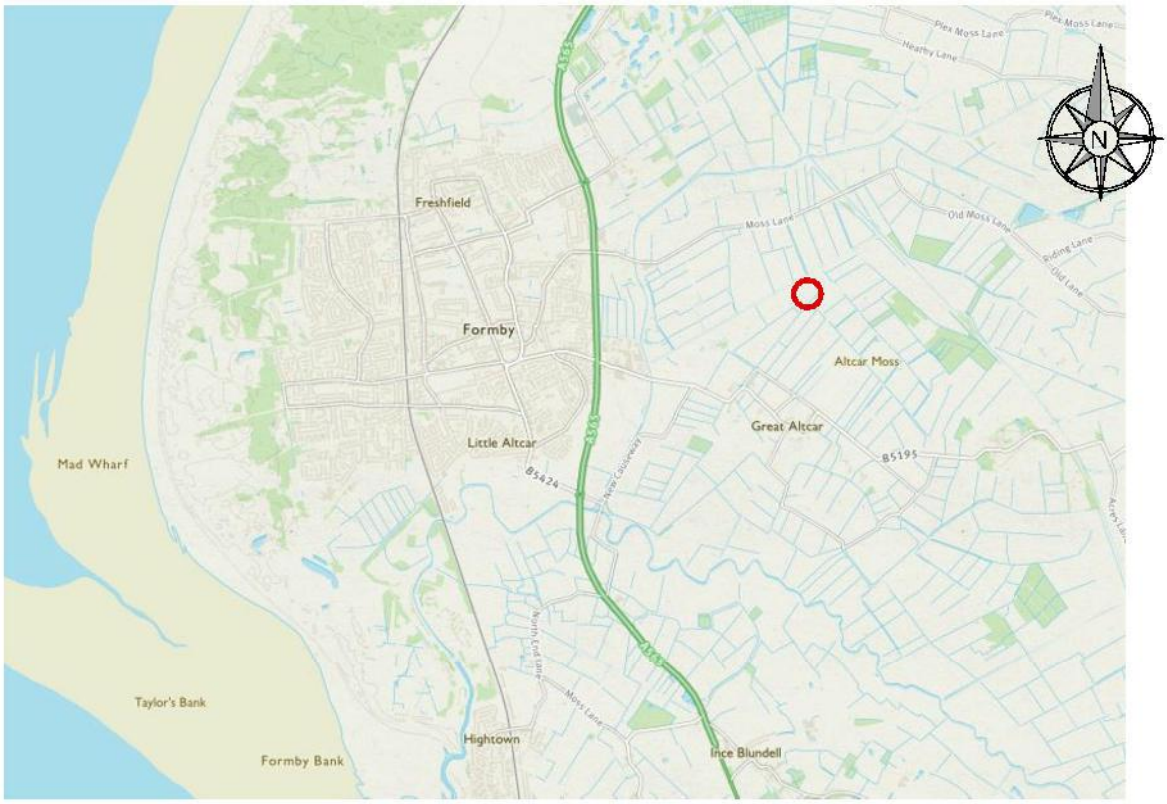

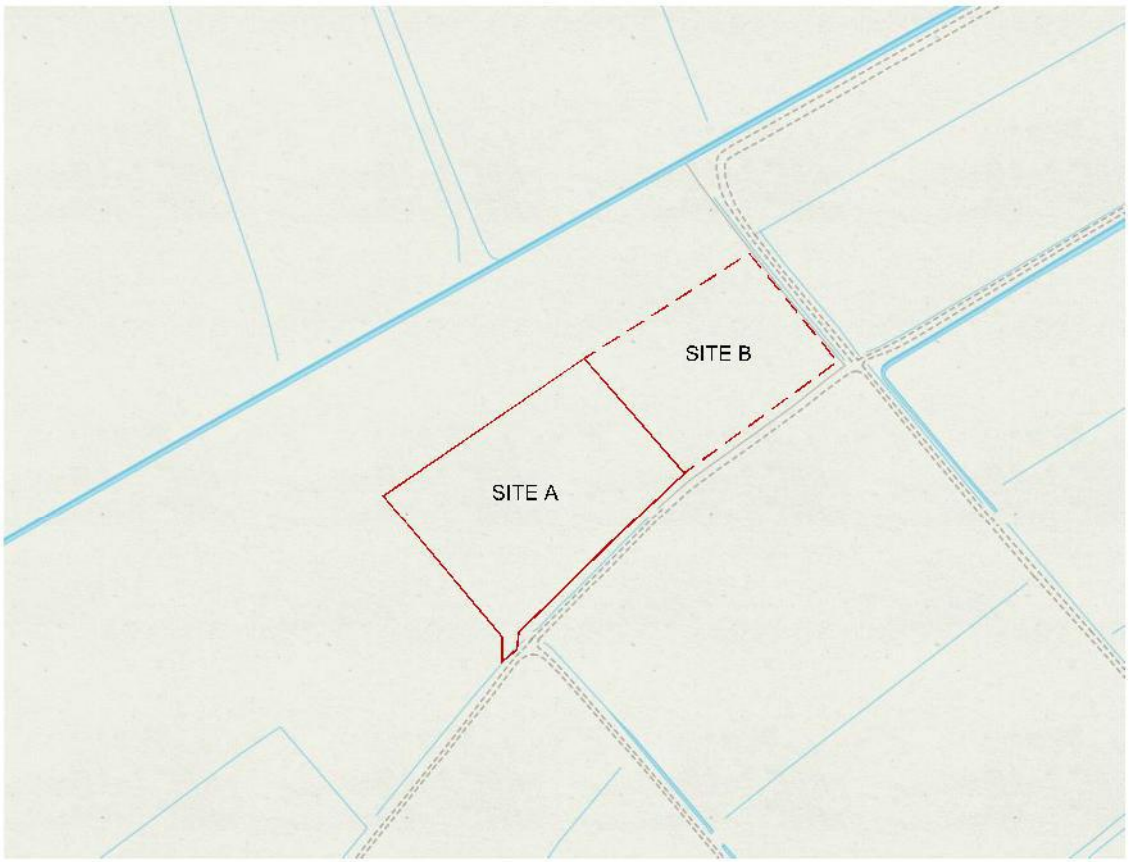

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FINAL

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Revision	Amendment	Approved	Date

Designed	Approved	Approved Date
LB	SH	DEC '17
Drawn	Scale	
NT	NOT TO SCALE	

Title:
ALTCAR MOSS,
FORMBY

Size:
SITE LOCATION PLAN

Project No.	Sheet No.	Revision
J-W0621.00	101	-

Original Sheet Size A1 [210x297]

NOTES

1. DO NOT SCALE.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
3. ALL BOUNDARIES ARE APPROXIMATE.

KEY

APPROXIMATE SITE BOUNDARY

BH01 — APPROXIMATE BOREHOLE LOCATION WITH GROUNDWATER MONITORING WELL

WS01 — APPROXIMATE WINDOW SAMPLE LOCATION

1:1 @ A3 — 0 10 20 30 40 50 mm

FOR INFORMATION

Revision	Amendment	Approved	Revision Date
A	Window Samples WS07 - WS10 Added	SH	DEC '17

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Designed	Approved	Approved Date
LB	SH	OCT '17
Drawn	Scale	Project No.	Sheet No.	Revision
NF	NOT TO SCALE	J-W0621.00	02	A

Project: ALTCAR MOSS, FORMBY

Title: EXPLORATORY HOLE LOCATION PLAN

Original Sheet Size A3 [420x297]

APPENDIX A
Exploratory Hole Logs

Exploratory Hole ID:	Client:		
WS07	Zetland Group		
	Site: Altcar, Formby		
Job No: J-W0621.00		Start Date: 05/12/2017	End Date: 05/12/2017
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig	Co-ords: 332698E - 407577N	Backfill Date: 05/12/2017	Field Records: LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

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Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown very clayey gravelly fine to medium sand. Gravel is subangular to subrounded fine to medium of mixed lithology.	0.25							
Soft grey mottled orange silty sandy CLAY. Land drain encountered at 0.6m begl. Service inspection pit widened.	0.80					N=9 (S)	0.80 ▼	
Plastic dark brown clayey sandy pseudofibrous PEAT.	1.35							
Soft brown silty sandy CLAY.	1.50							
Very loose grey blue clayey silty fine to medium SAND.						N=1 (S)		
Very silty between 3.0 and 4.0m begl.						N=2 (S)		
						N=0 (S)		
Medium dense from around 5.0m begl.						N=22 (S)		
Medium dense grey blue silty fine to medium SAND.	5.80					N=24 (S)		
Very dense grey brown fine to medium SAND.	6.70							
	7.00					N=50 (S)		

Remarks:

1. Probehole end depth at 7.00m begl due to refusal.
2. Groundwater encountered at 0.80m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:	OPUS
WS08	Zetland Group	www.opusinternational.co.uk
Job No:	Site:	Start Date: / End Date:
J-W0621.00	Altcar, Formby	05/12/2017 / 05/12/2017

Drilling Equipment/ Excavation Method:	Co-ords:	Backfill Date:	Field Records:
Tracked Windowless Sampling Rig	332694E - 407539N	05/12/2017	LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown very clayey fine to medium sand.	0.20							
Orange mottled grey very clayey fine to medium SAND.	0.40							
Soft orange mottled grey very sandy CLAY.						N=4 (S)		
Plastic dark brown black pseudofibrous PEAT.	1.65							
Grey blue clayey silty fine to medium SAND.	1.90					N=0 (S)		
Plastic dark brown black very clayey PEAT.	2.30							
Very loose grey blue clayey silty fine to medium SAND.	2.50					N=2 (S)		
Medium dense from around 4.00m begl.						N=10 (S)		
Very silty between 5.0 and 5.7m begl.						N=19 (S)		
Medium dense grey silty fine to medium SAND.	5.70					N=15 (S)		
	7.00					N=50 (S)		

Remarks:

1. Probehole end depth at 7.00m begl due to refusal.
2. Groundwater not encountered but arisings noted to be wet from 2.5m to 5.7m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key	Test Type Key
D - Disturbed Representative	(C) - Cone SPT
B - Bulk Representative	(S) - Spoon SPT
S - Spot Non-Representative	P - Pocket Penetrometer Reading
W - Water	PID - PID Reading
U - Undisturbed Representative	V - Hand Shear Vane Reading
J - Jar Sample	
ES - Environmental Sample	

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:	
WS09	Zetland Group	
	Site: Altcar, Formby	

OPUS
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Job No:	Start Date:	End Date:
J-W0621.00	05/12/2017	05/12/2017

Drilling Equipment/ Excavation Method:	Co-ords:	Backfill Date:	Field Records:
Tracked Windowless Sampling Rig	332629E - 407520N	05/12/2017	LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown clayey slightly gravelly fine to medium sand. Gravel is fine to medium subangular to subrounded of mixed lithology.	0.30							
Grey mottled orange fine to medium SAND.	0.50							
Soft grey mottled orange sandy CLAY.						N=0 (S)		
Plastic dark brown black pseudofibrous PEAT.	1.25							
Grey blue clayey silty fine to medium SAND.	1.70					N=1 (S)		
Plastic dark brown black pseudofibrous PEAT.	2.30							
Loose grey blue clayey silty fine to medium SAND.	2.60					N=4 (S)		
No recovery between 3.0 and 4.0m begl.						N=6 (S)		
						N=15 (S)		
Very loose grey blue silty fine to medium SAND.	5.50					N=2 (S)		
Very dense grey brown fine to medium SAND.	6.80					N=50 (S)		
	7.00							

Remarks:

1. Probehole end depth at 7.00m begl due to refusal.
2. Groundwater not encountered but arisings noted to be wet from 3.0m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key
- D - Disturbed Representative
- B - Bulk Representative
- S - Spot Non-Representative
- W - Water
- U - Undisturbed Representative
- J - Jar Sample
- ES - Environmental Sample

Test Type Key
- (C) - Cone SPT
- (S) - Spoon SPT
- P - Pocket Penetrometer Reading
- PID - PID Reading
- V - Hand Shear Vane Reading

Sheet: Sheet 1 of 1

Exploratory Hole ID:	Client:	OPUS
WS10	Zetland Group	www.opusinternational.co.uk
Job No:	Site:	Start Date: / End Date:
J-W0621.00	Altcar, Formby	05/12/2017 / 05/12/2017

Drilling Equipment/ Excavation Method:	Co-ords:	Backfill Date:	Field Records:
Tracked Windowless Sampling Rig	332660E - 407459N	05/12/2017	LSB
	Ground Level (mAOD):	Logged: LSB / Chkd: SH	Appr: SH

Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
TOPSOIL comprising dark brown clayey fine to medium sand.	0.30							
Soft to firm orange mottled grey sandy CLAY.						N=3 (S)		
Plastic dark brown black pseudofibrous PEAT.	1.70							
Very soft grey blue very silty CLAY.	1.90					N=0 (S)		
						N=1 (S)		
Very soft grey blue silty sandy CLAY.	3.55					N=2 (S)		
Dense grey blue very silty fine SAND.	4.70					N=30 (S)		
	5.00					N=14 (S)		
						N=41 (S)		

Remarks:

1. Probehole end depth at 5.00m begl with SPT from 5.0m to 7.0m begl.
2. Groundwater not encountered but arisings noted to be wet from 1.9m and 4.7m begl.
3. Log based on field engineer's log to BS EN ISO 14688-1.

Sample Type Key	Test Type Key
D - Disturbed Representative	(C) - Cone SPT
B - Bulk Representative	(S) - Spoon SPT
S - Spot Non-Representative	P - Pocket Penetrometer Reading
W - Water	PID - PID Reading
U - Undisturbed Representative	V - Hand Shear Vane Reading
J - Jar Sample	
ES - Environmental Sample	

Sheet: Sheet 1 of 1

APPENDIX B
Chemical Testing Results

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
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M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 692792-1

Date of Report: 09-Nov-2017

Customer: OPUS International Consultants (UK) Ltd.
1st Floor
Maclaren House
Talbot Road
Manchester
M32 0FP

Customer Contact: Mr Robin Atkinson

Customer Job Reference: J-W0621.00
Customer Purchase Order: MR 21318
Customer Site Reference: Altcar, Formby
Date Job Received at Concept: 26-Oct-2017
Date Analysis Started: 30-Oct-2017
Date Analysis Completed: 09-Nov-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked
and authorised by :
Aneta Dybek-Echtermeyer
Customer Service Advisor

Issued by :
Aneta Dybek-Echtermeyer
Customer Service Advisor

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	**35**	**27**	**47**	**78**	**44**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	**23**	**55**	**87**	**37**	**35**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	**45**	**47**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Salinity	T7	AR		%o	**1.9**	**1.9**	**1.9**	**2.0**	**1.9**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Salinity	T7	AR		%o	**1.9**	**1.9**	**2.1**	**1.8**	**1.9**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
Miscellaneous

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Salinity	T7	AR		%o	**1.9**	**2.3**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
OPUS North West hydrocarbon MCERTS CWG suite

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**16**	**18**	**15**	**9**	**14**
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Barium	T6	A40	1	mg/kg	**59**	**49**	**54**	**40**	**63**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2	<2
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**31**	**42**	**25**	**18**	**25**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**20**	**20**	**24**	**18**	**25**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(free)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Lead	T6	M40	1	mg/kg	**39**	**24**	**51**	**22**	**57**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**24**	**39**	**20**	**35**	**20**
pH	T7	AR			**7.1**	**7.7**	**5.2**	<4.0	**4.9**
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Soil Organic Matter	T287	A40	0.1	%	**22**	**5.0**	**45**	**73**	**50**
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	**0.01**	**0.04**	**0.03**	**0.32**	<0.01
SO4(Total)	T6	A40	0.01	%	**0.29**	**0.12**	**0.51**	**1.2**	**0.56**
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	**0.21**	**0.08**	**0.46**	**1.8**	**0.52**
Vanadium	T6	M40	1	mg/kg	**38**	**53**	**32**	**19**	**33**
Zinc	T6	M40	1	mg/kg	**63**	**95**	**48**	**79**	**50**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
OPUS North West hydrocarbon MCERTS CWG suite

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**6**	**13**	**5**	**17**	**32**
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Barium	T6	A40	1	mg/kg	**19**	**76**	**30**	**74**	**75**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2	<2
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	**2**	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**16**	**25**	**10**	**30**	**48**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**6**	**29**	**9**	**29**	**22**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(free)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Lead	T6	M40	1	mg/kg	**6**	**65**	**15**	**62**	**36**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**14**	**24**	**10**	**24**	**25**
pH	T7	AR			**6.8**	**5.1**	**4.7**	**5.0**	**4.2**
Phenols(Mono)	T546	AR	1	mg/kg	<1	**3**	<1	**2**	<1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Soil Organic Matter	T287	A40	0.1	%	**1.1**	**61**	**71**	**50**	**21**
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	**0.19**	**0.02**	**0.69**	**0.02**	**0.03**
SO4(Total)	T6	A40	0.01	%	**0.17**	**0.60**	**2.5**	**0.53**	**0.68**
Sulphide	T4	AR	10	mg/kg	**26**	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	**0.50**	**0.59**	**2.1**	**0.49**	**0.45**
Vanadium	T6	M40	1	mg/kg	**18**	**29**	**12**	**40**	**71**
Zinc	T6	M40	1	mg/kg	**31**	**55**	**23**	**65**	**64**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
OPUS North West hydrocarbon MCERTS CWG suite

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Arsenic	T6	M40	2	mg/kg	**16**	**22**
Asbestos ID	T27	AR			N.D.	N.D.
Barium	T6	A40	1	mg/kg	**66**	**55**
Beryllium	T6	A40	2	mg/kg	<2	<2
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	<1
Chromium	T6	M40	1	mg/kg	**27**	**45**
Chromium VI	T6	AR	1	mg/kg	<1	<1
Copper	T6	M40	1	mg/kg	**27**	**23**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1
Cyanide(free)	T546	AR	1	mg/kg	<1	<1
Lead	T6	M40	1	mg/kg	**64**	**32**
Mercury	T6	M40	1	mg/kg	<1	<1
Nickel	T6	M40	1	mg/kg	**24**	**33**
pH	T7	AR			**4.3**	<4.0
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1
Selenium	T6	M40	3	mg/kg	<3	<3
Soil Organic Matter	T287	A40	0.1	%	**53**	**19**
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	**0.03**	**0.53**
SO4(Total)	T6	A40	0.01	%	**0.62**	**1.2**
Sulphide	T4	AR	10	mg/kg	<10	<10
Sulphur (total)	T6	A40	0.01	%	**0.53**	**1.4**
Vanadium	T6	M40	1	mg/kg	**36**	**57**
Zinc	T6	M40	1	mg/kg	**52**	**80**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

					Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
					Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
					Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
					Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
					Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(109,100) <10	(100) <1.0	
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	(100,109) <10	(100) <1.0	

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(100,109) <10	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	(109) <1.0	(109) <1.0	(109,100) <10	<0.1

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
TPH (CWG) with MTBE, BTEX

				Concept Reference	**692792 001**	**692792 002**	**692792 003**	**692792 005**	**692792 006**
				Customer Sample Reference	**WS01 ES1**	**WS01**	**WS02**	**WS02**	**WS03**
				Depth	**0.15**	**0.30**	**0.20**	**0.50**	**0.10**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Sandy Soil**	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10	(13) <10	(109,13) <45	(13) <10
Toluene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	(109) <45	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	(109) <0.450	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	(13) <1	(100,13) <10	(100,13) <10
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	(13) <1	**(13) 22**	(100,13) <10
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 2**	**(13) 94**	(13,100) <10
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	(13) <2	(13) <2	**(13) 24**	**(13) 92**	**(13) 50**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	(109) <0.45	**0.13**
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	(13) <2	(13) <2	(13) <2	(13,100) <10	(100,13) <10
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 2**	**(13) 40**	(100,13) <10
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 3**	**(13) 22**	**(13) 10**
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 14**	(13,100) <10	**(13) 16**

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
TPH (CWG) with MTBE, BTEX

				Concept Reference	**692792 008**	**692792 009**	**692792 011**	**692792 012**	**692792 014**
				Customer Sample Reference	**WS03**	**WS04**	**WS04**	**WS05**	**WS05**
				Depth	**1.20**	**0.10**	**0.70**	**0.10**	**1.20**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Clay**	**Topsoil**	**Topsoil**	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	M105	10	µg/kg	(13) <10	(109,13) <22	(109,13) <77	(13) <10	(13) <10
Toluene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	(109) <22	(109) <77	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	(109) <0.220	(109) <0.770	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 4**	(100,13) <10	(13) <1
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1	**(13) 6**	(100,13) <10	(13) <1
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	(13) <1	**(13) 2**	**(13) 21**	**(13) 11**	**(13) 1**
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	**(13) 2**	**(13) 23**	**(13) 95**	**(13) 60**	**(13) 9**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	(109) <0.22	(109) <0.77	<0.10	<0.10
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	(13) <2	(13) <2	**(13) 12**	(100,13) <10	(13) <2
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	(13) <1	**(13) 5**	**(13) 28**	(100,13) <10	(13) <1
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	(13) <1	**(13) 3**	**(13) 27**	(100,13) <10	(13) <1
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	**(13) 1**	**(13) 17**	**(13) 93**	(100,13) <10	(13) <1

Concept Reference: 692792
Project Site: Altcar, Formby
Customer Reference: J-W0621.00

Soil Analysed as Soil
TPH (CWG) with MTBE, BTEX

				Concept Reference	**692792 015**	**692792 016**
				Customer Sample Reference	**WS06**	**WS06**
				Depth	**0.20**	**0.30**
				Date Sampled	**25-OCT-2017**	**25-OCT-2017**
				Matrix Class	**Topsoil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10
Toluene	T209	M105	10	µg/kg	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	(13) <1	(13) <1
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	**(13) 3**	(13) <1
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	**(13) 39**	**(13) 6**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	(13) <2	(13) <2
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	**(13) 3**	(13) <1
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	**(13) 4**	(13) <1
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	**(13) 20**	(13) <1

Index to symbols used in 692792-1

Value	Description
A40	Assisted dried < 40C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
AR	As Received
N.D.	Not Detected
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
109	LOD raised due to high moisture content of the sample.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Salinity was transferred within group to CLS East Kilbride.
Asbestos was subcontracted to REC Asbestos.

Method Index

Value	Description
T27	PLM
T209	GC/MS (Head Space)(MCERTS)
T287	Calc TOC/0.58
T4	Colorimetry
T546	Colorimetry (CF)
T2	Grav
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T7	Probe

T909	GCxGC
T6	ICP/OES
T162	Grav (1 Dec) (105 C)
T207	GC/MS (MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Salinity	T7	AR		%o	N	001-003,005-006,008-009,011-012,014-016
Arsenic	T6	M40	2	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Asbestos ID	T27	AR			SU	001-003,005-006,008-009,011-012,014-016
Barium	T6	A40	1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Beryllium	T6	A40	2	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-003,005-006,008-009,011-012,014-016
Cadmium	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Chromium	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Chromium VI	T6	AR	1	mg/kg	N	001-003,005-006,008-009,011-012,014-016
Copper	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Cyanide(Total)	T546	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Cyanide(free)	T546	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Lead	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Mercury	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Nickel	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
pH	T7	AR			M	001-003,005-006,008-009,011-012,014-016
Phenols(Mono)	T546	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Selenium	T6	M40	3	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Soil Organic Matter	T287	A40	0.1	%	N	001-003,005-006,008-009,011-012,014-016
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	N	001-003,005-006,008-009,011-012,014-016
SO4(Total)	T6	A40	0.01	%	N	001-003,005-006,008-009,011-012,014-016
Sulphide	T4	AR	10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
Sulphur (total)	T6	A40	0.01	%	N	001-003,005-006,008-009,011-012,014-016
Vanadium	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Zinc	T6	M40	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Naphthalene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Acenaphthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Fluorene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Phenanthrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Anthracene	T207	M105	0.1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Chrysene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
PAH(total)	T207	M105	0.1	mg/kg	U	001-003,005-006,008-009,011-012,014-016
Benzene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
Toluene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
EthylBenzene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
M/P Xylene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
O Xylene	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001-003,005-006,008-009,011-012,014-016
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	M	001-003,005-006,008-009,011-012,014-016

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Retained on 10mm sieve	T2	M40	0.1	%	N	001-003,005-006,008-009,011-012,014-016
Moisture @105C	T162	AR	0.1	%	N	001-003,005-006,008-009,011-012,014-016

Certificate of Analysis

Certificate Number 17-15757

17-Nov-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-15757

Client Reference PSL17/5359

Order No (not supplied)

Contract Title Altcar Formby

Description 2 Soil samples.

Date Received 15-Nov-17

Date Started 15-Nov-17

Date Completed 17-Nov-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 17-15757
Client Ref PSL17/5359
Contract Title Altcar Formby

			Lab No	1258592	1258593
			Sample ID	WS04	BH01
			Depth	3.00	6.00
			Other ID	5	19
			Sample Type	D	D
			Sampling Date	n/s	n/s
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Inorganics					
pH	DETSC 2008#			8.6	8.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	84	240
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.06	0.08

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 17-15757
Client Ref PSL17/5359
Contract Altcar Formby

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1258592	WS04 3.00 SOIL		P(other)	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	
1258593	BH01 6.00 SOIL		P(other)	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	

Key: P-Plastic

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Certificate of Analysis

Certificate Number 17-15134-1

21-Nov-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-15134-1

Client Reference PSL17/5359

Order No (not supplied)

Contract Title J-W0621.00 ALTCAR FORMBY

Description One Soil sample.

Date Received 08-Nov-17

Date Started 08-Nov-17

Date Completed 21-Nov-17

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 17-15134. Extra testing.**

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 17-15134-1
Client Ref PSL17/5359
Contract Title J-W0621.00 ALTCAR FORMBY

Lab No	1255151
Sample ID	BH01
Depth	9.00
Other ID	25
Sample Type	D
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
pH	DETSC 2008#			8.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	200
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.09

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 17-15134-1
Client Ref PSL17/5359
Contract J-W0621.00 ALTCAR FORMBY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1255151	BH01 9.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), Total Sulphate ICP (730 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

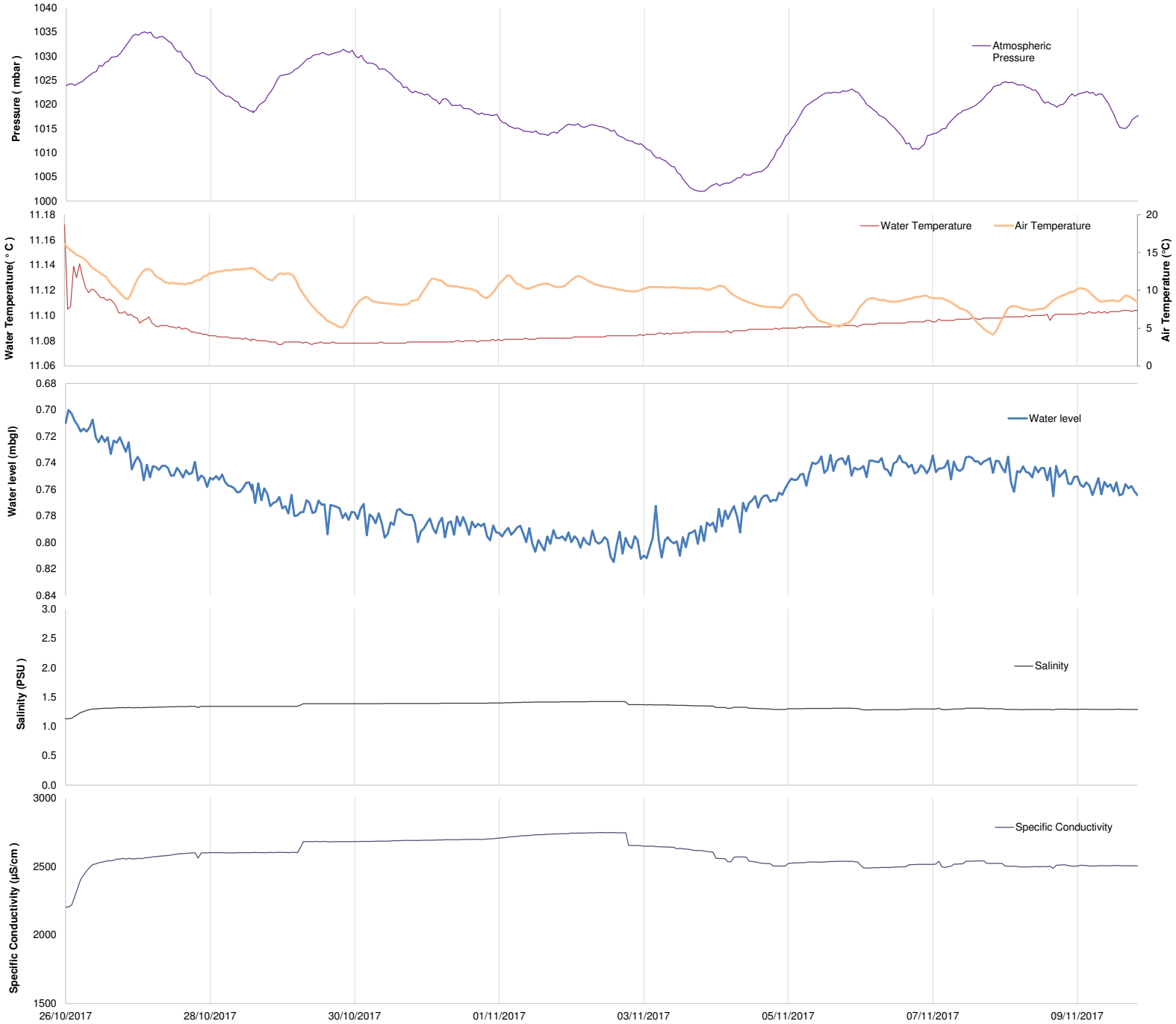
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

APPENDIX C
Groundwater Monitoring Results



Experts in Continuous Monitoring

Title:

MW1, Time Series Graphs, Altcar Moss

Project:

GGS1412

Client:

Opus International Ltd

Minimum / Maximum Table		
Parameter	**Minimum**	**Maximum**
Water level	0.81	0.70
Air Temperature	4.12	16.13
Water Temperature	11.08	11.17
Atmospheric Pressure	1002.0	1035.1
Specific Conductivity	2204	2748
Salinity	1.13	1.42
TDS	1.43	1.79

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GGS Time Series Data

Doc Ref: QMS-TSNW v1.1
Issue Date: 23/02/2017

Experts in Continuous Monitoring

Project Ref:	GGS1412		
Location:	Altcar Moss		
Borehole ref:	MW1		
Logger ID	339609	Days of monitoring:	14
Start Date:	26/10/2017 12:00	Monitoring Frequency (mins):	60
End Date:	10/11/2017 08:00	Total samples taken:	358

Minimum, Maximum and Range Table

	Total Dissolved Solic	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
Minimum	1.43	1.13	2204	1002.0	11.08	4.12	0.81
Maximum	1.79	1.42	2748	1035.1	11.17	16.13	0.70
Range	0.35	0.30	544	33.1	0.10	12.0	0.11

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
26/10/2017 12:00	1.432	1.13	2203.7	1023.9	11.17	16.13	0.71
26/10/2017 13:00	1.433	1.13	2204.9	1024.3	11.11	15.68	0.70
26/10/2017 14:00	1.443	1.14	2219.5	1024.3	11.11	15.27	0.70
26/10/2017 15:00	1.484	1.17	2282.7	1023.9	11.14	15.02	0.71
26/10/2017 16:00	1.523	1.20	2343.0	1024.4	11.13	14.67	0.71
26/10/2017 17:00	1.565	1.24	2407.5	1024.6	11.14	14.51	0.72
26/10/2017 18:00	1.584	1.26	2437.7	1025.2	11.13	14.31	0.71
26/10/2017 19:00	1.605	1.27	2469.2	1025.7	11.12	13.95	0.72
26/10/2017 20:00	1.622	1.29	2495.4	1026.1	11.12	13.60	0.71
26/10/2017 21:00	1.634	1.30	2513.9	1026.6	11.12	13.04	0.71
26/10/2017 22:00	1.638	1.30	2519.3	1026.8	11.12	12.73	0.72
26/10/2017 23:00	1.643	1.30	2528.2	1028.1	11.12	12.52	0.72
27/10/2017 00:00	1.645	1.31	2531.1	1027.9	11.11	12.22	0.72
27/10/2017 01:00	1.649	1.31	2536.3	1028.8	11.11	11.96	0.72
27/10/2017 02:00	1.652	1.31	2541.4	1028.9	11.11	11.70	0.72
27/10/2017 03:00	1.653	1.31	2542.4	1029.8	11.11	11.03	0.73
27/10/2017 04:00	1.655	1.31	2545.5	1029.8	11.11	10.57	0.72
27/10/2017 05:00	1.66	1.32	2553.7	1030.0	11.11	10.26	0.72
27/10/2017 06:00	1.66	1.32	2553.8	1030.7	11.10	9.79	0.72
27/10/2017 07:00	1.663	1.32	2559.0	1031.4	11.10	9.38	0.73
27/10/2017 08:00	1.66	1.32	2553.8	1032.4	11.10	8.96	0.73
27/10/2017 09:00	1.663	1.32	2558.6	1033.2	11.10	8.80	0.72
27/10/2017 10:00	1.661	1.32	2556.0	1034.2	11.10	9.48	0.74
27/10/2017 11:00	1.661	1.32	2555.6	1034.5	11.10	10.47	0.74
27/10/2017 12:00	1.663	1.32	2558.5	1034.3	11.10	11.29	0.74
27/10/2017 13:00	1.662	1.32	2556.5	1034.9	11.09	11.96	0.74
27/10/2017 14:00	1.665	1.32	2561.1	1035.1	11.10	12.47	0.75
27/10/2017 15:00	1.666	1.32	2563.8	1034.8	11.10	12.78	0.74
27/10/2017 16:00	1.667	1.33	2565.2	1035.0	11.10	12.83	0.75
27/10/2017 17:00	1.671	1.33	2570.4	1034.1	11.09	12.58	0.74
27/10/2017 18:00	1.672	1.33	2571.7	1033.7	11.09	12.01	0.74
27/10/2017 19:00	1.673	1.33	2574.0	1034.0	11.09	11.65	0.75
27/10/2017 20:00	1.674	1.33	2575.8	1034.1	11.09	11.50	0.74
27/10/2017 21:00	1.676	1.33	2578.3	1033.6	11.09	11.14	0.74
27/10/2017 22:00	1.677	1.33	2579.9	1033.1	11.09	10.98	0.74
27/10/2017 23:00	1.68	1.34	2583.9	1032.7	11.09	10.93	0.75
28/10/2017 00:00	1.682	1.34	2587.0	1031.6	11.09	10.98	0.75
28/10/2017 01:00	1.684	1.34	2590.0	1031.0	11.09	10.88	0.74
28/10/2017 02:00	1.686	1.34	2593.4	1031.0	11.09	10.88	0.75
28/10/2017 03:00	1.686	1.34	2594.1	1029.9	11.09	10.88	0.75
28/10/2017 04:00	1.687	1.34	2595.5	1029.2	11.09	10.78	0.75
28/10/2017 05:00	1.689	1.34	2598.2	1028.7	11.09	10.93	0.75
28/10/2017 06:00	1.689	1.34	2598.5	1027.5	11.09	10.93	0.75
28/10/2017 07:00	1.69	1.34	2599.8	1026.5	11.09	11.14	0.74
28/10/2017 08:00	1.665	1.32	2561.5	1026.2	11.09	11.34	0.75
28/10/2017 09:00	1.69	1.34	2599.9	1025.9	11.09	11.34	0.75
28/10/2017 10:00	1.69	1.34	2600.0	1025.9	11.09	11.81	0.75
28/10/2017 11:00	1.69	1.34	2599.8	1025.4	11.09	11.91	0.76
28/10/2017 12:00	1.69	1.34	2600.3	1024.9	11.08	12.22	0.75
28/10/2017 13:00	1.69	1.34	2600.6	1024.1	11.08	12.27	0.75
28/10/2017 14:00	1.69	1.34	2600.6	1023.3	11.08	12.37	0.75
28/10/2017 15:00	1.69	1.34	2600.4	1022.6	11.08	12.47	0.75
28/10/2017 16:00	1.691	1.34	2601.1	1022.2	11.08	12.47	0.75
28/10/2017 17:00	1.69	1.34	2599.9	1021.7	11.08	12.63	0.75
28/10/2017 18:00	1.69	1.34	2599.8	1021.7	11.08	12.63	0.76
28/10/2017 19:00	1.689	1.34	2598.6	1021.3	11.08	12.63	0.76
28/10/2017 20:00	1.69	1.34	2599.8	1020.8	11.08	12.73	0.76
28/10/2017 21:00	1.69	1.34	2600.3	1020.6	11.08	12.78	0.76
28/10/2017 22:00	1.69	1.34	2600.6	1019.4	11.08	12.73	0.76
28/10/2017 23:00	1.691	1.34	2601.0	1019.4	11.08	12.78	0.76
29/10/2017 00:00	1.69	1.34	2600.2	1019.0	11.08	12.83	0.75
29/10/2017 01:00	1.691	1.34	2601.4	1018.7	11.08	12.88	0.75
29/10/2017 02:00	1.691	1.34	2600.8	1018.6	11.08	12.98	0.76
29/10/2017 02:00	1.691	1.34	2601.5	1018.3	11.08	12.93	0.76
29/10/2017 03:00	1.691	1.34	2601.7	1018.9	11.08	12.83	0.77
29/10/2017 04:00	1.691	1.34	2601.6	1019.8	11.08	12.47	0.76
29/10/2017 05:00	1.691	1.34	2601.7	1020.3	11.08	12.22	0.77
29/10/2017 06:00	1.691	1.34	2600.9	1020.8	11.08	11.91	0.76
29/10/2017 07:00	1.69	1.34	2600.6	1021.9	11.08	11.60	0.76
29/10/2017 08:00	1.691	1.35	2602.2	1022.7	11.08	11.39	0.77
29/10/2017 09:00	1.691	1.34	2601.7	1023.7	11.08	11.29	0.77
29/10/2017 10:00	1.692	1.35	2602.3	1025.1	11.08	11.75	0.77
29/10/2017 11:00	1.692	1.35	2603.0	1025.9	11.08	12.11	0.77
29/10/2017 12:00	1.692	1.35	2603.3	1026.1	11.08	12.22	0.77
29/10/2017 13:00	1.692	1.35	2602.7	1026.2	11.08	12.11	0.77
29/10/2017 14:00	1.691	1.34	2601.6	1026.4	11.08	12.27	0.78

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
29/10/2017 15:00	1.692	1.35	2602.6	1026.7	11.08	12.11	0.76
29/10/2017 16:00	1.692	1.35	2603.0	1027.3	11.08	11.91	0.78
29/10/2017 17:00	1.691	1.34	2601.6	1027.6	11.08	11.14	0.78
29/10/2017 18:00	1.714	1.36	2636.7	1028.1	11.08	10.26	0.78
29/10/2017 19:00	1.744	1.39	2683.3	1028.7	11.08	9.64	0.78
29/10/2017 20:00	1.743	1.39	2681.3	1029.5	11.08	9.06	0.77
29/10/2017 21:00	1.742	1.39	2680.4	1029.5	11.08	8.49	0.77
29/10/2017 22:00	1.743	1.39	2681.2	1030.2	11.08	8.02	0.78
29/10/2017 23:00	1.744	1.39	2682.4	1030.3	11.08	7.60	0.78
30/10/2017 00:00	1.743	1.39	2681.3	1030.4	11.08	7.13	0.77
30/10/2017 01:00	1.743	1.39	2681.0	1030.8	11.08	6.82	0.77
30/10/2017 02:00	1.743	1.39	2682.1	1030.5	11.08	6.45	0.77
30/10/2017 03:00	1.743	1.39	2681.4	1030.2	11.08	6.03	0.79
30/10/2017 04:00	1.742	1.39	2680.1	1030.4	11.08	5.82	0.77
30/10/2017 05:00	1.742	1.39	2680.5	1030.7	11.08	5.60	0.77
30/10/2017 06:00	1.742	1.39	2680.2	1030.9	11.08	5.39	0.77
30/10/2017 07:00	1.742	1.39	2680.8	1031.0	11.08	5.18	0.77
30/10/2017 08:00	1.742	1.39	2680.6	1031.4	11.08	5.07	0.78
30/10/2017 09:00	1.742	1.39	2680.7	1031.1	11.08	5.34	0.78
30/10/2017 10:00	1.743	1.39	2681.1	1030.8	11.08	6.08	0.78
30/10/2017 11:00	1.742	1.39	2680.5	1031.3	11.08	6.92	0.78
30/10/2017 12:00	1.744	1.39	2682.8	1030.1	11.08	7.66	0.78
30/10/2017 13:00	1.743	1.39	2681.1	1029.7	11.08	8.18	0.78
30/10/2017 14:00	1.743	1.39	2682.1	1030.2	11.08	8.65	0.77
30/10/2017 15:00	1.744	1.39	2682.7	1029.1	11.08	8.91	0.77
30/10/2017 16:00	1.744	1.39	2682.4	1028.6	11.08	9.17	0.79
30/10/2017 17:00	1.744	1.39	2682.4	1028.6	11.08	8.96	0.78
30/10/2017 18:00	1.744	1.39	2683.1	1028.5	11.08	8.54	0.78
30/10/2017 19:00	1.745	1.39	2684.2	1028.1	11.08	8.49	0.79
30/10/2017 20:00	1.745	1.39	2684.5	1027.3	11.08	8.39	0.78
30/10/2017 21:00	1.745	1.39	2684.4	1027.4	11.08	8.34	0.79
30/10/2017 22:00	1.745	1.39	2685.2	1027.3	11.08	8.34	0.80
30/10/2017 23:00	1.745	1.39	2685.1	1026.7	11.08	8.23	0.79
31/10/2017 00:00	1.746	1.39	2686.6	1026.2	11.08	8.23	0.78
31/10/2017 01:00	1.747	1.39	2687.5	1025.5	11.08	8.18	0.79
31/10/2017 02:00	1.747	1.39	2687.9	1024.9	11.08	8.18	0.78
31/10/2017 03:00	1.748	1.39	2688.5	1024.6	11.08	8.07	0.77
31/10/2017 04:00	1.748	1.39	2689.4	1023.5	11.08	8.07	0.78
31/10/2017 05:00	1.748	1.39	2689.0	1023.6	11.08	8.13	0.78
31/10/2017 06:00	1.748	1.39	2689.4	1022.9	11.08	8.18	0.78
31/10/2017 07:00	1.748	1.39	2689.4	1022.4	11.08	8.54	0.78
31/10/2017 08:00	1.748	1.39	2689.8	1022.8	11.08	8.65	0.78
31/10/2017 09:00	1.748	1.39	2689.9	1022.4	11.08	8.70	0.80
31/10/2017 10:00	1.749	1.39	2690.4	1022.3	11.08	9.22	0.79
31/10/2017 11:00	1.75	1.39	2691.7	1022.0	11.08	9.90	0.79
31/10/2017 12:00	1.749	1.39	2691.2	1022.2	11.08	10.47	0.79
31/10/2017 13:00	1.75	1.39	2691.9	1021.6	11.08	11.14	0.78
31/10/2017 14:00	1.75	1.39	2692.0	1021.1	11.08	11.55	0.79
31/10/2017 15:00	1.75	1.39	2692.8	1020.8	11.08	11.50	0.79
31/10/2017 16:00	1.75	1.39	2692.4	1020.1	11.08	11.34	0.79
31/10/2017 17:00	1.751	1.40	2694.0	1021.1	11.08	11.29	0.78
31/10/2017 18:00	1.751	1.40	2694.1	1021.2	11.08	10.93	0.80
31/10/2017 19:00	1.752	1.40	2694.7	1020.7	11.08	10.62	0.79
31/10/2017 20:00	1.752	1.40	2695.1	1019.8	11.08	10.57	0.78
31/10/2017 21:00	1.751	1.40	2694.6	1019.8	11.08	10.52	0.79
31/10/2017 22:00	1.751	1.40	2694.5	1019.8	11.08	10.52	0.78
31/10/2017 23:00	1.752	1.40	2694.8	1019.9	11.08	10.41	0.79
01/11/2017 00:00	1.753	1.40	2696.5	1019.2	11.08	10.36	0.78
01/11/2017 01:00	1.753	1.40	2696.3	1019.1	11.08	10.26	0.79
01/11/2017 02:00	1.753	1.40	2696.4	1019.1	11.08	10.21	0.79
01/11/2017 03:00	1.754	1.40	2697.9	1018.7	11.08	10.15	0.78
01/11/2017 04:00	1.753	1.40	2697.5	1018.3	11.08	10.00	0.79
01/11/2017 05:00	1.753	1.40	2697.6	1018.0	11.08	9.90	0.79
01/11/2017 06:00	1.753	1.40	2696.7	1018.3	11.08	9.38	0.79
01/11/2017 07:00	1.754	1.40	2698.9	1017.9	11.08	9.12	0.79
01/11/2017 08:00	1.755	1.40	2700.0	1018.0	11.08	8.96	0.80
01/11/2017 09:00	1.756	1.40	2701.9	1017.8	11.08	9.22	0.80
01/11/2017 10:00	1.756	1.40	2701.9	1017.7	11.08	9.58	0.79
01/11/2017 11:00	1.758	1.40	2705.2	1017.9	11.08	10.15	0.79
01/11/2017 12:00	1.759	1.40	2706.3	1016.9	11.08	10.72	0.79
01/11/2017 13:00	1.76	1.40	2708.2	1016.2	11.08	11.19	0.80
01/11/2017 14:00	1.762	1.40	2710.2	1016.1	11.08	11.60	0.79
01/11/2017 15:00	1.764	1.41	2713.4	1015.5	11.08	12.01	0.79
01/11/2017 16:00	1.765	1.41	2715.8	1015.3	11.08	11.86	0.79
01/11/2017 17:00	1.767	1.41	2718.1	1015.0	11.08	11.34	0.79
01/11/2017 18:00	1.768	1.41	2720.0	1015.1	11.08	10.88	0.79
01/11/2017 19:00	1.769	1.41	2722.0	1014.8	11.08	10.78	0.79
01/11/2017 20:00	1.771	1.41	2723.9	1014.5	11.08	10.47	0.79
01/11/2017 21:00	1.771	1.41	2724.6	1014.5	11.08	10.26	0.80
01/11/2017 22:00	1.773	1.41	2727.0	1014.3	11.08	10.21	0.79
01/11/2017 23:00	1.773	1.41	2728.1	1014.2	11.08	10.36	0.80
02/11/2017 00:00	1.775	1.42	2731.0	1014.6	11.08	10.52	0.81
02/11/2017 01:00	1.775	1.42	2731.4	1013.9	11.08	10.67	0.80
02/11/2017 02:00	1.775	1.42	2731.3	1013.9	11.08	10.78	0.80
02/11/2017 03:00	1.776	1.42	2732.6	1013.8	11.08	10.88	0.81
02/11/2017 04:00	1.778	1.42	2734.7	1013.6	11.08	10.88	0.80
02/11/2017 05:00	1.778	1.42	2734.9	1014.1	11.08	10.78	0.80
02/11/2017 06:00	1.779	1.42	2736.3	1014.3	11.08	10.57	0.79
02/11/2017 07:00	1.779	1.42	2737.6	1014.0	11.08	10.47	0.80
02/11/2017 08:00	1.78	1.42	2737.7	1014.7	11.08	10.41	0.80
02/11/2017 09:00	1.78	1.42	2738.5	1015.1	11.08	10.47	0.80
02/11/2017 10:00	1.781	1.42	2739.3	1015.7	11.08	10.62	0.80
02/11/2017 11:00	1.782	1.42	2740.8	1015.9	11.08	10.93	0.79
02/11/2017 12:00	1.783	1.42	2742.9	1015.8	11.08	11.29	0.80
02/11/2017 13:00	1.782	1.42	2741.6	1015.7	11.08	11.60	0.80
02/11/2017 14:00	1.783	1.42	2742.9	1016.0	11.08	11.86	0.80

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
02/11/2017 15:00	1.784	1.42	2744.0	1015.4	11.08	11.86	0.80
02/11/2017 16:00	1.784	1.42	2744.5	1015.3	11.08	11.65	0.80
02/11/2017 17:00	1.784	1.42	2743.9	1015.5	11.08	11.45	0.80
02/11/2017 18:00	1.784	1.42	2745.3	1015.8	11.08	11.19	0.80
02/11/2017 19:00	1.785	1.42	2745.5	1015.8	11.08	10.98	0.79
02/11/2017 20:00	1.785	1.42	2745.8	1015.7	11.08	10.78	0.80
02/11/2017 21:00	1.786	1.42	2747.3	1015.4	11.08	10.67	0.80
02/11/2017 22:00	1.785	1.42	2746.9	1015.4	11.08	10.57	0.80
02/11/2017 23:00	1.786	1.42	2747.5	1015.1	11.08	10.47	0.80
03/11/2017 00:00	1.785	1.42	2745.9	1014.9	11.08	10.41	0.80
03/11/2017 01:00	1.786	1.42	2746.9	1014.4	11.08	10.36	0.81
03/11/2017 02:00	1.786	1.42	2747.7	1014.7	11.08	10.31	0.81
03/11/2017 03:00	1.785	1.42	2746.2	1013.7	11.08	10.15	0.80
03/11/2017 04:00	1.785	1.42	2745.9	1013.4	11.08	10.10	0.79
03/11/2017 05:00	1.785	1.42	2746.1	1013.2	11.08	10.00	0.81
03/11/2017 06:00	1.784	1.42	2744.9	1012.6	11.08	9.95	0.80
03/11/2017 07:00	1.724	1.37	2652.9	1012.5	11.08	9.90	0.80
03/11/2017 08:00	1.724	1.37	2652.5	1012.4	11.08	9.84	0.80
03/11/2017 09:00	1.724	1.37	2652.9	1012.0	11.08	9.84	0.80
03/11/2017 10:00	1.724	1.37	2652.5	1011.7	11.08	9.90	0.80
03/11/2017 11:00	1.723	1.37	2651.5	1011.8	11.09	10.00	0.81
03/11/2017 12:00	1.721	1.37	2648.0	1011.2	11.08	10.15	0.81
03/11/2017 13:00	1.721	1.37	2647.8	1010.7	11.09	10.31	0.81
03/11/2017 14:00	1.721	1.37	2648.4	1010.5	11.09	10.41	0.80
03/11/2017 15:00	1.721	1.37	2647.7	1009.5	11.09	10.41	0.80
03/11/2017 16:00	1.719	1.37	2644.7	1008.9	11.09	10.41	0.77
03/11/2017 17:00	1.719	1.37	2644.2	1009.0	11.09	10.41	0.80
03/11/2017 18:00	1.718	1.37	2643.4	1008.6	11.09	10.41	0.81
03/11/2017 19:00	1.718	1.37	2642.8	1008.4	11.09	10.41	0.80
03/11/2017 20:00	1.717	1.37	2641.7	1007.7	11.09	10.36	0.80
03/11/2017 21:00	1.716	1.37	2640.5	1007.2	11.09	10.36	0.80
03/11/2017 22:00	1.716	1.37	2639.6	1007.0	11.09	10.41	0.80
03/11/2017 23:00	1.709	1.36	2629.5	1005.9	11.09	10.36	0.80
04/11/2017 00:00	1.711	1.36	2632.3	1005.4	11.09	10.36	0.81
04/11/2017 01:00	1.709	1.36	2628.5	1004.3	11.09	10.31	0.80
04/11/2017 02:00	1.707	1.36	2626.4	1003.7	11.09	10.31	0.80
04/11/2017 03:00	1.707	1.36	2625.6	1002.8	11.09	10.31	0.79
04/11/2017 04:00	1.703	1.36	2620.7	1002.5	11.09	10.26	0.79
04/11/2017 05:00	1.701	1.35	2616.6	1002.2	11.09	10.26	0.79
04/11/2017 06:00	1.701	1.35	2616.5	1002.1	11.09	10.26	0.80
04/11/2017 07:00	1.7	1.35	2616.0	1002.0	11.09	10.31	0.79
04/11/2017 08:00	1.699	1.35	2613.5	1002.1	11.09	10.15	0.80
04/11/2017 09:00	1.696	1.35	2609.8	1002.5	11.09	10.10	0.78
04/11/2017 10:00	1.694	1.35	2605.5	1003.1	11.09	10.05	0.79
04/11/2017 11:00	1.693	1.35	2604.2	1003.4	11.09	10.26	0.78
04/11/2017 12:00	1.664	1.32	2559.9	1003.6	11.09	10.36	0.79
04/11/2017 13:00	1.663	1.32	2558.0	1003.1	11.09	10.57	0.77
04/11/2017 14:00	1.663	1.32	2558.1	1003.5	11.09	10.57	0.79
04/11/2017 15:00	1.663	1.32	2558.0	1003.7	11.09	10.47	0.78
04/11/2017 16:00	1.646	1.31	2532.5	1003.7	11.09	10.05	0.78
04/11/2017 17:00	1.649	1.31	2536.3	1003.9	11.09	9.64	0.78
04/11/2017 18:00	1.669	1.33	2567.5	1004.4	11.09	9.38	0.77
04/11/2017 19:00	1.67	1.33	2569.5	1004.8	11.09	9.12	0.78
04/11/2017 20:00	1.67	1.33	2569.3	1004.8	11.09	8.91	0.79
04/11/2017 21:00	1.67	1.33	2568.7	1005.6	11.09	8.70	0.77
04/11/2017 22:00	1.669	1.33	2567.0	1005.3	11.09	8.54	0.78
04/11/2017 23:00	1.65	1.31	2537.9	1005.3	11.09	8.39	0.77
05/11/2017 00:00	1.648	1.31	2535.8	1005.8	11.09	8.28	0.77
05/11/2017 01:00	1.646	1.31	2532.8	1005.9	11.09	8.13	0.76
05/11/2017 02:00	1.644	1.31	2528.9	1006.0	11.09	8.02	0.77
05/11/2017 03:00	1.641	1.30	2524.3	1006.1	11.09	7.92	0.77
05/11/2017 04:00	1.64	1.30	2522.6	1006.7	11.09	7.86	0.76
05/11/2017 05:00	1.639	1.30	2520.9	1007.1	11.09	7.81	0.76
05/11/2017 06:00	1.638	1.30	2520.4	1008.2	11.09	7.81	0.77
05/11/2017 07:00	1.628	1.29	2503.9	1008.9	11.09	7.76	0.77
05/11/2017 08:00	1.627	1.29	2503.0	1010.5	11.09	7.76	0.77
05/11/2017 09:00	1.627	1.29	2502.8	1011.1	11.09	7.71	0.76
05/11/2017 10:00	1.627	1.29	2503.8	1012.1	11.09	7.71	0.76
05/11/2017 11:00	1.627	1.29	2503.0	1013.6	11.09	8.18	0.76
05/11/2017 12:00	1.639	1.30	2521.8	1014.0	11.09	8.75	0.76
05/11/2017 13:00	1.641	1.30	2524.3	1015.1	11.09	9.22	0.75
05/11/2017 14:00	1.641	1.30	2525.1	1015.9	11.09	9.43	0.75
05/11/2017 15:00	1.642	1.30	2525.8	1017.0	11.09	9.43	0.75
05/11/2017 16:00	1.643	1.30	2527.2	1018.1	11.09	9.17	0.75
05/11/2017 17:00	1.643	1.30	2528.0	1019.2	11.09	8.65	0.75
05/11/2017 18:00	1.645	1.31	2530.1	1019.8	11.09	7.92	0.76
05/11/2017 19:00	1.646	1.31	2532.1	1020.3	11.09	7.34	0.75
05/11/2017 20:00	1.646	1.31	2532.7	1020.7	11.09	6.87	0.74
05/11/2017 21:00	1.646	1.31	2532.4	1021.1	11.09	6.50	0.74
05/11/2017 22:00	1.645	1.31	2530.5	1021.5	11.09	6.03	0.74
05/11/2017 23:00	1.645	1.31	2531.1	1022.0	11.09	5.87	0.74
06/11/2017 00:00	1.646	1.31	2532.5	1022.3	11.09	5.76	0.75
06/11/2017 01:00	1.648	1.31	2535.5	1022.5	11.09	5.66	0.74
06/11/2017 02:00	1.648	1.31	2535.7	1022.4	11.09	5.45	0.73
06/11/2017 03:00	1.649	1.31	2537.1	1022.6	11.09	5.34	0.75
06/11/2017 04:00	1.649	1.31	2537.1	1022.4	11.09	5.34	0.74
06/11/2017 05:00	1.649	1.31	2537.5	1022.4	11.09	5.18	0.74
06/11/2017 06:00	1.65	1.31	2537.7	1022.8	11.09	5.39	0.74
06/11/2017 07:00	1.649	1.31	2537.6	1022.7	11.09	5.60	0.74
06/11/2017 08:00	1.648	1.31	2536.0	1022.9	11.09	5.66	0.73
06/11/2017 09:00	1.65	1.31	2538.0	1023.2	11.09	6.03	0.75
06/11/2017 10:00	1.647	1.31	2534.3	1022.7	11.09	6.50	0.74
06/11/2017 11:00	1.646	1.31	2532.9	1022.5	11.09	7.24	0.74
06/11/2017 12:00	1.631	1.29	2509.4	1021.6	11.09	7.86	0.74
06/11/2017 13:00	1.618	1.28	2488.6	1020.9	11.09	8.28	0.74
06/11/2017 14:00	1.618	1.28	2488.5	1019.9	11.09	8.70	0.75

Date and Time	TDS	Salinity	Specific Conductivity	Atmospheric Pressure	Water Temperature	Air Temperature	Water level
	ppt	PSU	µS/cm	mbar	°C	°C	mbgl
06/11/2017 15:00	1.617	1.28	2488.1	1019.5	11.09	8.91	0.74
06/11/2017 16:00	1.619	1.28	2490.7	1018.9	11.09	8.96	0.74
06/11/2017 17:00	1.619	1.28	2490.6	1018.5	11.09	8.91	0.74
06/11/2017 18:00	1.619	1.28	2491.5	1017.8	11.09	8.75	0.74
06/11/2017 19:00	1.62	1.29	2492.2	1017.5	11.09	8.70	0.74
06/11/2017 20:00	1.62	1.29	2492.3	1017.1	11.09	8.70	0.74
06/11/2017 21:00	1.621	1.29	2493.3	1016.4	11.09	8.54	0.75
06/11/2017 22:00	1.621	1.29	2493.3	1015.8	11.09	8.49	0.75
06/11/2017 23:00	1.621	1.29	2494.5	1015.2	11.09	8.49	0.74
07/11/2017 00:00	1.622	1.29	2495.8	1014.5	11.09	8.49	0.74
07/11/2017 01:00	1.623	1.29	2496.5	1013.8	11.09	8.54	0.73
07/11/2017 02:00	1.623	1.29	2497.5	1013.0	11.09	8.65	0.74
07/11/2017 03:00	1.623	1.29	2497.4	1011.8	11.09	8.75	0.74
07/11/2017 04:00	1.632	1.30	2511.3	1012.0	11.10	8.86	0.74
07/11/2017 05:00	1.634	1.30	2514.0	1010.7	11.10	8.91	0.74
07/11/2017 06:00	1.634	1.30	2514.4	1010.9	11.10	9.06	0.75
07/11/2017 07:00	1.635	1.30	2514.7	1010.7	11.10	9.12	0.75
07/11/2017 08:00	1.635	1.30	2515.0	1011.2	11.10	9.17	0.74
07/11/2017 09:00	1.635	1.30	2515.2	1011.7	11.10	9.27	0.74
07/11/2017 10:00	1.635	1.30	2515.6	1013.6	11.10	9.27	0.75
07/11/2017 11:00	1.635	1.30	2514.6	1013.7	11.10	9.06	0.74
07/11/2017 12:00	1.635	1.30	2516.1	1013.9	11.10	8.96	0.73
07/11/2017 13:00	1.636	1.30	2517.2	1014.1	11.10	8.91	0.75
07/11/2017 14:00	1.65	1.31	2538.8	1014.4	11.10	8.96	0.74
07/11/2017 15:00	1.623	1.29	2497.3	1015.0	11.10	8.96	0.74
07/11/2017 16:00	1.621	1.29	2493.7	1015.0	11.10	8.80	0.74
07/11/2017 17:00	1.624	1.29	2498.9	1016.0	11.10	8.65	0.74
07/11/2017 18:00	1.626	1.29	2501.8	1016.7	11.10	8.44	0.75
07/11/2017 19:00	1.636	1.30	2517.1	1017.3	11.10	8.18	0.74
07/11/2017 20:00	1.636	1.30	2517.4	1017.9	11.10	7.97	0.74
07/11/2017 21:00	1.637	1.30	2518.5	1018.3	11.10	7.60	0.75
07/11/2017 22:00	1.638	1.30	2519.5	1018.8	11.10	7.50	0.74
07/11/2017 23:00	1.649	1.31	2537.4	1018.9	11.10	7.34	0.74
08/11/2017 00:00	1.65	1.31	2538.4	1019.2	11.10	7.08	0.74
08/11/2017 01:00	1.649	1.31	2537.6	1019.5	11.10	6.66	0.74
08/11/2017 02:00	1.65	1.31	2539.2	1019.8	11.10	6.08	0.74
08/11/2017 03:00	1.651	1.31	2540.7	1020.3	11.10	5.66	0.74
08/11/2017 04:00	1.652	1.31	2541.2	1020.9	11.10	5.29	0.74
08/11/2017 05:00	1.651	1.31	2539.8	1021.5	11.10	4.92	0.74
08/11/2017 06:00	1.64	1.30	2522.8	1022.3	11.10	4.60	0.74
08/11/2017 07:00	1.64	1.30	2523.1	1022.7	11.10	4.38	0.74
08/11/2017 08:00	1.64	1.30	2522.5	1023.7	11.10	4.12	0.75
08/11/2017 09:00	1.64	1.30	2522.8	1023.9	11.10	4.54	0.74
08/11/2017 10:00	1.639	1.30	2521.8	1024.0	11.10	5.39	0.74
08/11/2017 11:00	1.639	1.30	2521.7	1024.6	11.10	6.13	0.74
08/11/2017 12:00	1.627	1.29	2502.6	1024.7	11.10	6.92	0.75
08/11/2017 13:00	1.626	1.29	2501.4	1024.5	11.10	7.60	0.74
08/11/2017 14:00	1.626	1.29	2501.6	1024.7	11.10	7.86	0.75
08/11/2017 15:00	1.626	1.29	2500.8	1024.4	11.10	7.92	0.76
08/11/2017 16:00	1.624	1.29	2499.0	1024.1	11.10	7.86	0.75
08/11/2017 17:00	1.622	1.29	2495.5	1024.1	11.10	7.71	0.75
08/11/2017 18:00	1.623	1.29	2496.6	1024.1	11.10	7.55	0.74
08/11/2017 19:00	1.623	1.29	2497.2	1023.5	11.10	7.50	0.75
08/11/2017 20:00	1.623	1.29	2497.5	1023.4	11.10	7.39	0.75
08/11/2017 21:00	1.624	1.29	2498.5	1022.9	11.10	7.34	0.75
08/11/2017 22:00	1.624	1.29	2499.0	1023.0	11.10	7.45	0.74
08/11/2017 23:00	1.624	1.29	2498.8	1022.2	11.10	7.50	0.75
09/11/2017 00:00	1.623	1.29	2497.7	1021.0	11.10	7.55	0.74
09/11/2017 01:00	1.624	1.29	2499.2	1020.3	11.10	7.60	0.74
09/11/2017 02:00	1.624	1.29	2498.1	1020.6	11.10	7.92	0.75
09/11/2017 03:00	1.626	1.29	2502.1	1020.1	11.10	8.28	0.74
09/11/2017 04:00	1.616	1.28	2486.6	1019.9	11.10	8.65	0.77
09/11/2017 05:00	1.631	1.29	2508.9	1019.4	11.10	8.91	0.74
09/11/2017 06:00	1.631	1.29	2509.6	1019.9	11.10	9.12	0.75
09/11/2017 07:00	1.633	1.30	2512.4	1020.0	11.10	9.27	0.75
09/11/2017 08:00	1.633	1.30	2511.6	1020.6	11.10	9.43	0.75
09/11/2017 09:00	1.63	1.29	2507.0	1021.6	11.10	9.64	0.76
09/11/2017 10:00	1.627	1.29	2503.5	1022.2	11.10	9.79	0.76
09/11/2017 11:00	1.626	1.29	2502.2	1021.7	11.10	9.84	0.75
09/11/2017 12:00	1.628	1.29	2503.9	1022.2	11.10	10.15	0.75
09/11/2017 13:00	1.63	1.29	2508.2	1022.3	11.10	10.31	0.76
09/11/2017 14:00	1.631	1.29	2509.1	1022.5	11.10	10.21	0.76
09/11/2017 15:00	1.629	1.29	2506.6	1022.7	11.10	10.10	0.75
09/11/2017 16:00	1.627	1.29	2502.7	1022.3	11.10	9.79	0.76
09/11/2017 17:00	1.627	1.29	2502.6	1022.5	11.10	9.38	0.76
09/11/2017 18:00	1.627	1.29	2503.2	1021.9	11.10	9.01	0.76
09/11/2017 19:00	1.628	1.29	2504.6	1022.2	11.10	8.65	0.75
09/11/2017 20:00	1.629	1.29	2506.0	1022.1	11.10	8.49	0.76
09/11/2017 21:00	1.629	1.29	2505.6	1021.2	11.10	8.54	0.75
09/11/2017 22:00	1.628	1.29	2505.3	1020.4	11.10	8.60	0.76
09/11/2017 23:00	1.629	1.29	2505.4	1019.1	11.10	8.65	0.76
10/11/2017 00:00	1.629	1.29	2506.1	1017.8	11.10	8.65	0.76
10/11/2017 01:00	1.629	1.29	2506.3	1016.2	11.10	8.54	0.75
10/11/2017 02:00	1.629	1.29	2506.6	1015.2	11.10	8.60	0.76
10/11/2017 03:00	1.628	1.29	2505.3	1015.1	11.10	8.96	0.76
10/11/2017 04:00	1.628	1.29	2504.9	1015.1	11.10	9.32	0.76
10/11/2017 05:00	1.628	1.29	2505.0	1015.7	11.10	9.22	0.76
10/11/2017 06:00	1.628	1.29	2504.8	1016.9	11.10	9.01	0.76
10/11/2017 07:00	1.628	1.29	2504.4	1017.3	11.10	8.70	0.76
10/11/2017 08:00	1.628	1.29	2504.3	1017.7	11.10	8.39	0.76

APPENDIX D
Geotechnical Testing Results

LABORATORY REPORT

4043

Contract Number: PSL17/5359

Report Date: 15 November 2017

Client's Reference: J-W0621.00

Client Name: Opus International
1-2 Aire House
Sidings Court
Richmond Business Park
Doncaster
DN4 5NL

For the attention of: Libby Brunskill

Contract Title: Altcar, Formby

Date Received: 3/11/2017
Date Commenced: 3/11/2017
Date Completed: 15/11/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	A Fry (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS01	3	D	0.40		Brown mottled grey slightly sandy CLAY.
WS02	3	D	0.30		Brown mottled grey CLAY with some organic material.
WS04	4	D	1.50		Grey sandy very silty CLAY.
WS06	3	D	0.40		Grey slightly gravelly organic CLAY.
BH01	15	D	4.00		Brown slightly gravelly sandy very clayey SILT.
BH01	23	D	8.00		Reddish brown slightly gravelly very sandy CLAY.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Altcar, Former	Contract No:
	PSL17/5359
	Client Ref:
	J-W0621.00

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS01	3	D	0.40		38			69	27	42	100	High plasticity CH.
WS02	3	D	0.30		45			77	32	45	100	Very high plasticity CV.
WS04	4	D	1.50		33			41	22	19	100	Intermediate plasticity CI.
WS06	3	D	0.40		109			105	41	64	98	Extremely high plasticity CE.
BH01	15	D	4.00		34			36	26	10	98	Intermediate plasticity MI.
BH01	23	D	8.00		17			35	16	19	92	Intermediate plasticity CI.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Altcar, Former

Contract No:

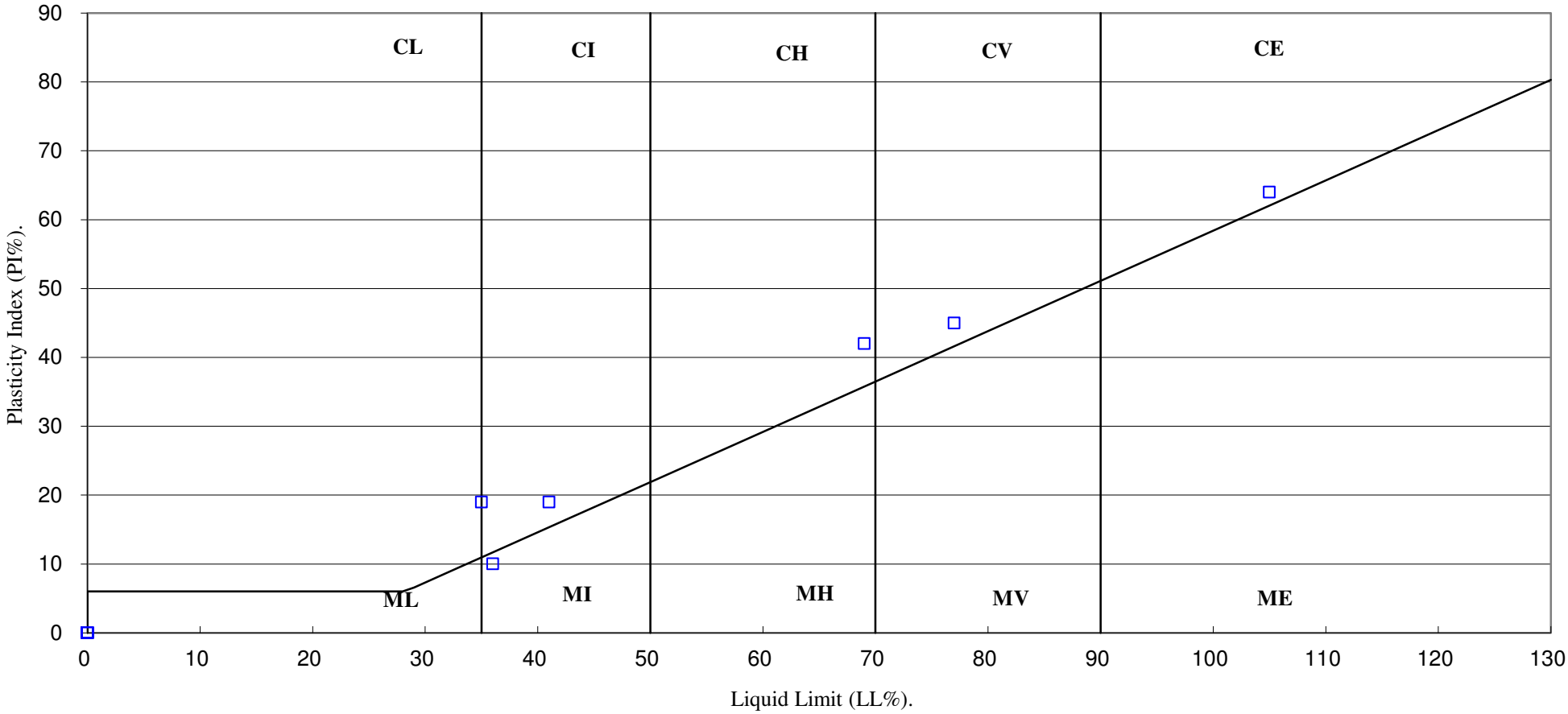
PSL17/5359

Client Ref:

J-W0621.00

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Altcar, Former**	**Contract No:** PSL17/5359 **Client Ref:** J-W0621.00

APPENDIX E
CBR Testing Results

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP01
Depth at Start of Test: 0.19m begl
Date of Test: 25/10/2017

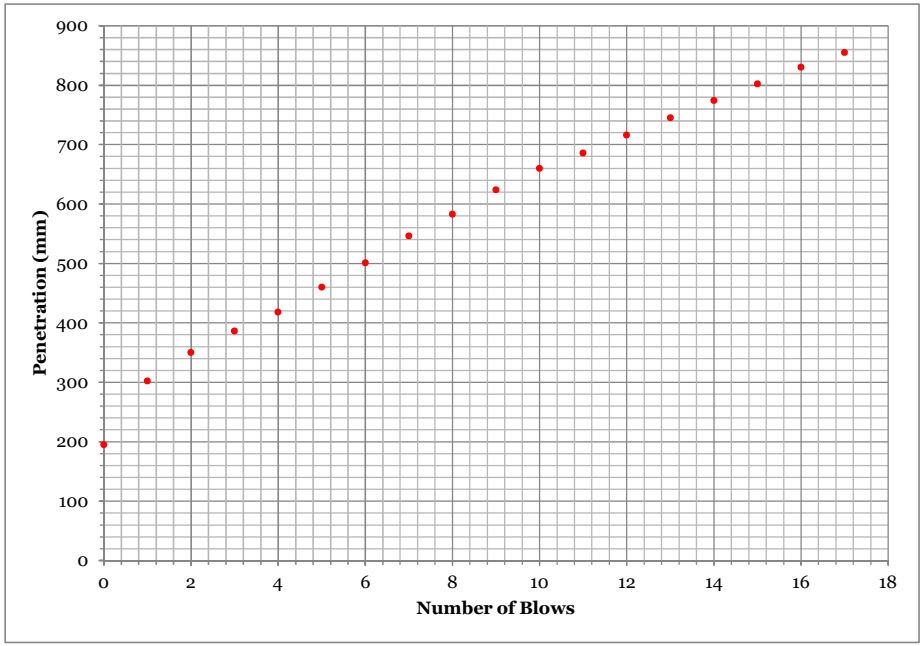
No. of Blows	*Reading (mm)*
0	195
1	302
2	350
3	386
4	418
5	460
6	501
7	546
8	583
9	624
10	660
11	686
12	716
13	745
14	774
15	802
16	830
17	855

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP01
Depth at Start of Test: 0.19m begl
Date of Test: 25/10/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
195	302	1	2.16	Sandy CLAY
302	855	16	7.14	Sandy peaty SILT

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP07
Depth at Start of Test: 0.12m begl
Date of Test: 05/12/2017

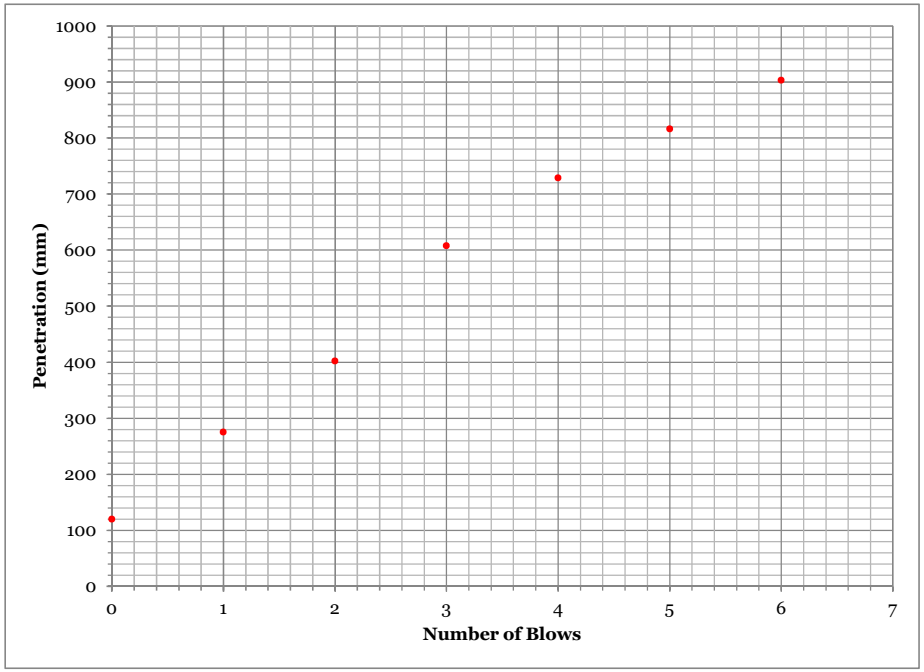
No. of Blows	*Reading (mm)*
0	120
1	275
2	402
3	608
4	729
5	816
6	903

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP07
Depth at Start of Test: 0.12m begl
Date of Test: 05/12/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
120	402	2	1.62	Silty sandy CLAY
402	608	1	1.08	
608	903	3	2.36	Silty sandy CLAY / PEAT

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP08
Depth at Start of Test: 0.64m begl
Date of Test: 05/12/2017

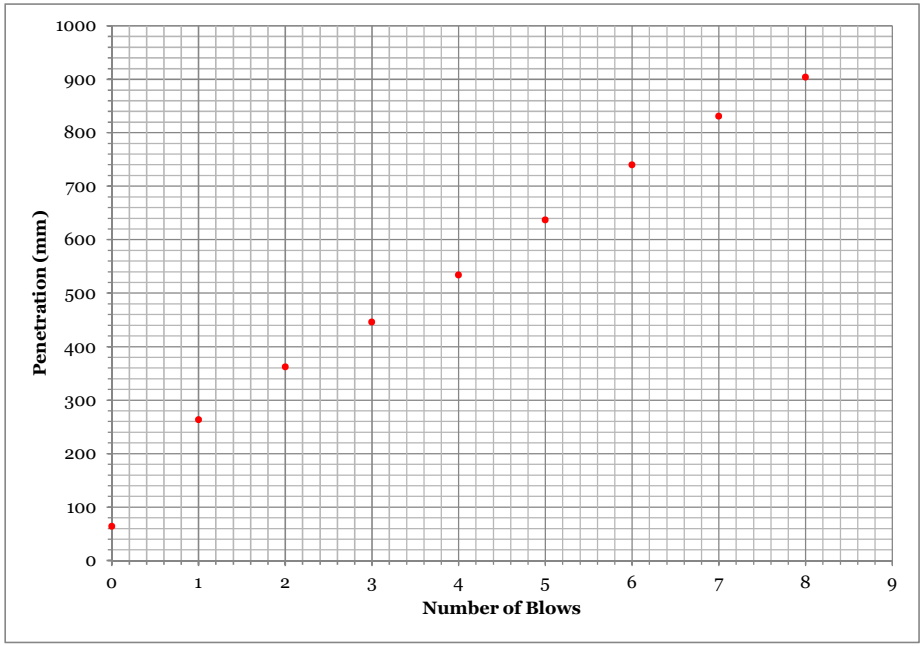
No. of Blows	*Reading (mm)*
0	64
1	263
2	362
3	446
4	534
5	637
6	740
7	831
8	904

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP08
Depth at Start of Test: 0.64m begl
Date of Test: 05/12/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
64	263	1	1.12	Sandy CLAY
263	904	7	2.55	

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP09
Depth at Start of Test: 0.70m begl
Date of Test: 05/12/2017

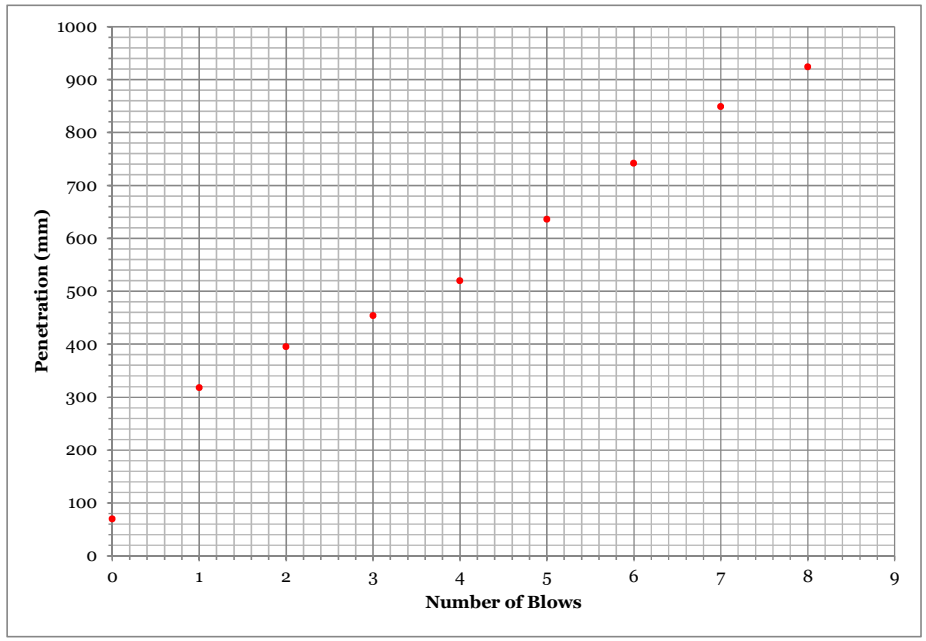
No. of Blows	*Reading (mm)*
0	70
1	318
2	395
3	454
4	520
5	636
6	742
7	849
8	924

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP09
Depth at Start of Test: 0.70m begl
Date of Test: 05/12/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
70	318	1	0.89	TOPSOIL
318	520	3	3.53	SAND
520	924	4	2.30	Sandy CLAY

Notes

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP10
Depth at Start of Test: 0.77m begl
Date of Test: 05/12/2017

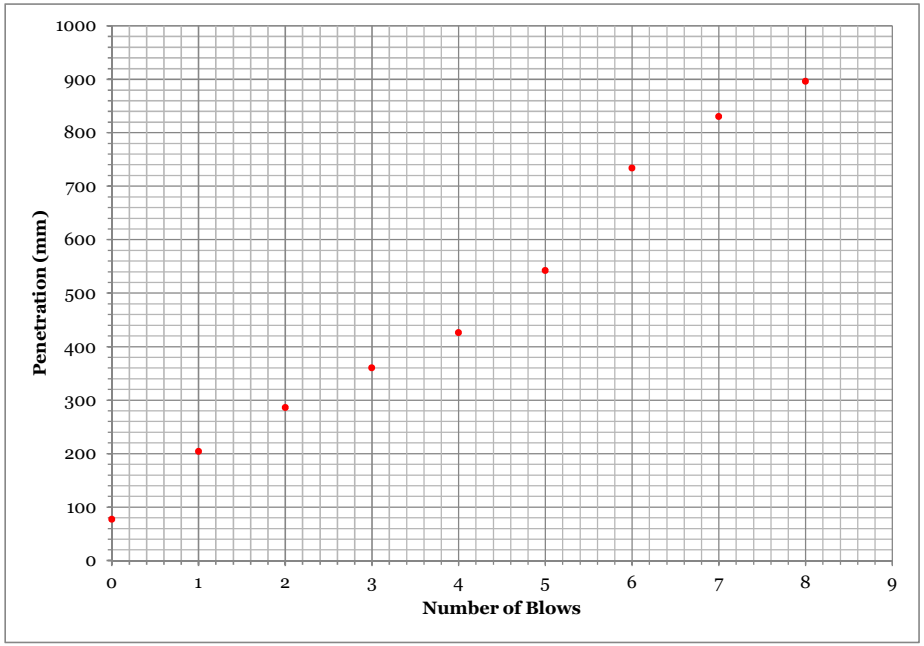
No. of Blows	*Reading (mm)*
0	77
1	204
2	286
3	360
4	426
5	542
6	734
7	830
8	896

No. of Blows	*Reading (mm)*

No. of Blows	*Reading (mm)*

Dynamic Cone Penetrometer Test Results
Project Number: J-M0621.00
Project Name: Altcar, Formby
Client: Zetland Group
Test Location: DCP10
Depth at Start of Test: 0.77m begl
Date of Test: 05/12/2017

Blows vs Penetration Graph



Range Top	*Range Bottom*	*Blow count*	*CBR(%)*	*Stratum*
77	542	5	2.51	TOPSOIL / SAND
542	734	1	1.17	Sandy CLAY
734	896	2	2.90	

Notes

APPENDIX F
Opus Tier I Screening Methodology

Opus Methodology for the Screening of Soils in Terms of the Risk to Human Health

Legislative Background for England

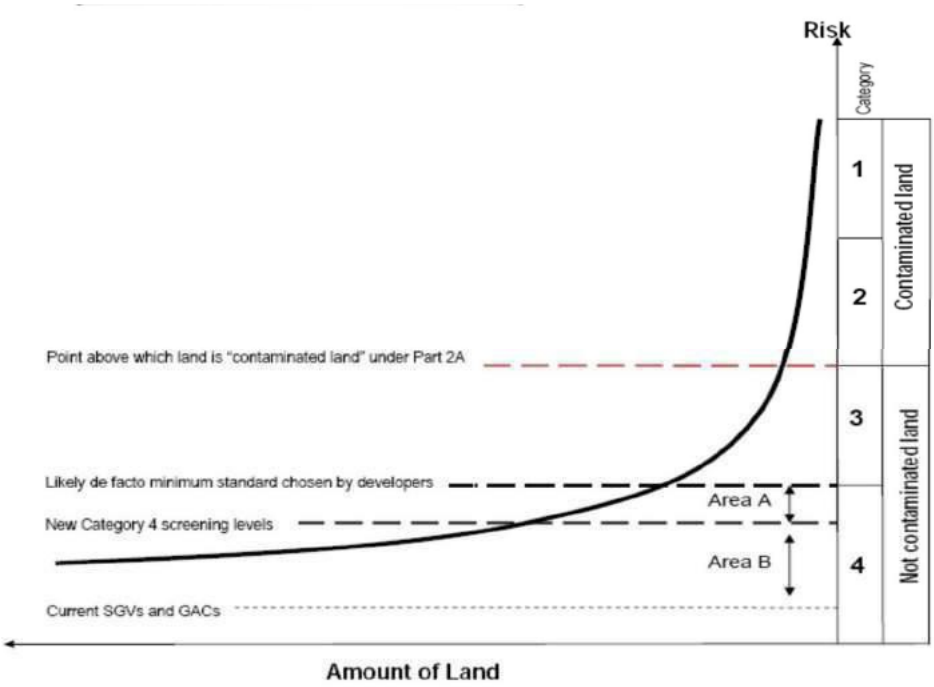
The legislative framework for the regulation of contaminated land is contained in Part 2A of the Environmental Protection Act 1990, which was implemented in the Contaminated Land (England) Regulations 2000 (and subsequent amendments). This legislation allows for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment. The basis of the UK contaminated land policy is the 'Suitable for Use' approach, which states that land should be suitable for its current use and made suitable for any new use as official permission (through the planning process) is given for that use.

Under Part 2A of the Environmental Protection Act 1990, contaminated land is defined as land where 'significant harm' is being caused or there is a 'significant possibility of such harm' being caused or where 'significant pollution of controlled waters' is being caused, or there is a 'significant possibility of such pollution' being caused. For contaminated land to occur under Part 2A, a **contaminant linkage** must exist i.e. there must be a **contaminant,** a relevant **receptor** and a plausible **migration pathway** by which the contaminant can impact the receptor.

In 2012, the Part 2A Statutory Guidance was revised and this introduced four categories of land to assist in defining risk to human health from contaminated land. With respect to contaminants that pose a risk to human health, statutory contaminated land comprises Category 1 (where significant harm is being caused) and Category 2 (where significant possibility of such harm (SPOSH) is being caused). Category 3 is land not capable of being determined as SPOSH and Category 4 is uncontaminated.

Under the National Planning Policy Framework (NPPF) introduced in England in 2012, land should be suitable for its new use taking the effects of ground contamination into consideration. To this end, adequate site investigation should be undertaken and prepared by competent persons. After remediation, as a minimum, land should be incapable of being determined as Part 2A contaminated land. Where a site is affected by contamination, responsibility for securing safe development rests with the developer and/or landowner.

The Defra impact assessment report accompanying the revised Part 2A Statutory Guidance indicated that most developers will want to ensure that under the planning regime their land is safely within Category 4 and this is the approach adopted by Opus in the preparation of this report (see below):



Published Human Health Generic Assessment Criteria

To assist with the implementation of Part 2A and contamination assessments under the planning process, Defra commissioned a research project to derive new Category 4 Screening Levels (C4SLs). In 2014, Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead for six categories of land use, namely:

- Residential with home-grown produce;
- Residential without home-grown produce;
- Allotments;
- Commercial;
- Public open space 1 (public land near residential properties i.e. grassed area outside residential housing); and
- Public open space 2 (public land away from residential properties i.e. public parks).

The C4SLs differ from the earlier Soil Guideline Values (SGVs) in that they are considered by Defra to be more pragmatic (albeit still strongly precautionary) and indicate the concentration of a contaminant in soil that would potentially pose a *'low risk'* to human health, whereas the SGVs are considered indicative of *'minimal risk'*.

In 2015, Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) published additional generic assessment criteria (GAC), referred to as Suitable 4 Use Values (S4ULs). These S4ULs replaced the earlier LQM/CIEH human health GAC (2nd Edition) that were published in 2009.

The C4SLs and S4ULs both utilise updated exposure parameters from those used in version 1.06 of the Environment Agency's Contaminated Land Exposure Assessment (CLEA) model. CLEA version 1.06 was also used to derive the following other human health GAC:

- Environment Agency SGVs (*either withdrawn or superseded by the C4SLs and S4ULs*);
- EIC/AGS/CL:AIRE publication 'Soil Generic Assessment Criteria for Human Health Risk Assessment', dated January 2010; and
- Atkins ATRISK^{soil} Soil Screening Values dated January 2015.

Whilst the C4SLs and S4ULs both use updated exposure parameters, they differ in that C4SLs have utilised Low Levels of Toxicological Concern (LLTC) in their derivation, whereas S4ULs use Health Criteria Values (HCVs). As a consequence of using LLTC the C4SLs are indicative of a '*low risk'* to human health, whereas the S4ULs, SGVs, EIC/AGS/CL:AIRE and Atkins ATRISK^{soil} GAC (which use HCVs), are all considered indicative of *'minimal risk'* to human health.

With respect to the consumption of home produce grown in contaminated soil, the C4SLs have adopted the 90th percentile consumption rates for the 'top two' produce types, but mean consumption rates for the remaining four produce types, in contrast with the S4ULs, SGVs, EIC/AGS/CL:AIRE and Atkins ATRISK^{soil} approach, which applies the 90th percentile consumption rates to all produce types.

Despite the differences in approach (e.g. *low risk* / *minimal risk* and produce consumption rates), all the above referenced GAC lie comfortably within Category 4 of the Part 2A Statutory Guidance, indicating that for the contaminant of concern, the land is uncontaminated and incapable of being determined under Part 2A.

Opus Tier 1 Soil Screening Values

The Tier 1 human health risk assessment methodology employed by Opus in this report is as follows:

Firstly, reference has been made to the published C4SLs. However, for compounds where there are no C4SLs available, reference has also been made to following other published GAC in the following descending order of preference:

- LQM/CIEH S4ULs for Human Health Risk Assessment dated 2015 *[Copyright Land Quality Management Limited reproduced with permission; Publication No. S4UL3028. All rights reserved];*
- EIC/AGS/CL:AIRE GAC; and
- Atkins ATRISK^{soil} Soil Screening Values.

Utilising the above referenced sources, Opus has compiled a database of published human health GAC, referred to as Opus Tier 1 Soil Screening Values (SSVs) and is currently using Version 2016.1 dated 21 November 2016. This database comprises GAC for 131 individual contaminants, of which 19 are inorganic and 112 organic substances.

Using Version 1.071 of the CLEA model, Opus has replicated the published GAC for organic contaminants at 1.0%, 2.5% and 6% soil organic matter (SOM) contents. In order to assess natural soils which can have a much lower SOM content than 1%, Opus has also derived Tier 1 SSVs at 0.25% SOM content for selected commonly occurring contaminants, so as to provide a sufficiently conservative output.

These GAC relate solely to the protection of human health from chronic exposure to contaminants in soil. The risks to other receptors (e.g. controlled waters, ecology and property) needs to be considered separately.

The GAC are based on a sandy loam soil type, except the ATRISK^{soil} values at 1% SOM which are based on a sand soil type (as defined in Environment Agency Science Report SC050021/SR3 dated 2009). For all substances it has been assumed that 100% of the intake would reach the systemic circulation (i.e. is 100% bioavailable).

The GAC for organic contaminants assume that non-aqueous phase liquid (NAPL) / free phase contamination is not present. Where the GAC exceeds the aqueous solubility or the saturated vapour concentration, the lower of these saturation limits is also presented in brackets. The soil saturation concentration is the theoretical concentration at which soil vapour and/or pore water have become fully saturated. This can indicate that NAPL is likely to be present. However, for contaminants that are strongly sorbed to soils (i.e. have high Koc) and that have a low aqueous solubility and vapour pressure, exceedance of the soil saturation concentration does not necessarily imply that NAPL is present. The presence of NAPL therefore needs to be considered qualitatively before applying these GAC.

In addition, the Tier 1 SSVs do not consider the additive or synergistic effects of any compounds.

Depending upon the conceptual site model for a given piece of land, exceedance of an Opus Tier 1 SSV may indicate that a **potential contaminant linkage** exists. In such circumstance this would indicate a requirement for further assessment, such as supplementary investigation and/or detailed quantitative risk assessment (DQRA). In the absence of further assessment, a **significant contaminant linkage** may be deemed to exist requiring remediation of the contamination on human health protection grounds.

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Company Reg. No: 2847568
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Great Park Road, Bristol, BS32 4QW

APPENDIX C
RISK ASSESSMENT METHODOLOGY

Introduction

A qualitative risk evaluation can be made, as discussed in CLR 11 [Ref.6] and CIRIA C552 [Ref.7], to determine whether an unacceptable contamination risk is likely to exist. CLR 11 defines risk estimation as predicting the magnitude (or consequence) and probability of the risk occurring that may arise as a result of that hazard.

This is also identified in CIRIA C552 in which the risk assessment methodology uses qualitative descriptors of consequence, probability and thus risk. A similar approach is adopted for this risk assessment.

For each potential pollutant linkage identified in the conceptual model, the potential risk is evaluated qualitatively, based on the methodology criteria presented in the tables below and the following:

Overall contamination risk = Likelihood of event occurring x Preliminary Significance of event occurring;

where:

Preliminary Significance of event occurring = Receptor sensitivity x Magnitude of Impact

Receptor Sensitivity

The sensitivity of water resource receptors is based on their status and considered resource value, as described in Table 1.

Table 1 Receptor Sensitivity

Receptor Sensitivity	Description	Examples
Very High	Receptor with an importance and rarity at an international level with limited potential for substitution	• SSSI, SAC or SPA under the EC Habitats Directive • A water body achieving a status of 'High status or potential' under the WFD • Principal aquifer providing potable water to a large population • Public Water Supply • Human • Atmosphere in built-up area
High	Receptor with a high quality and rarity at a national or regional level and limited potential for substitution.	• A water resource designated or directly linked to a SSSI • Principal aquifer providing potable water to a small population • A water abstraction
Medium	Receptor with a high quality and rarity at a local scale; or Receptor with a medium quality and rarity at a regional or national scale.	• Secondary aquifer providing potable water to a small population • An aquifer providing abstraction water for agricultural and industrial use • Atmosphere in rural area
Low	Receptor with a low quality and rarity at a local scale.	• A non 'main' river or stream or other water body without significant ecological habitat • A source of water with low water resource potential

Magnitude of Impact

The magnitude of a potential impact on a receptor depends on the nature and extent of the Proposed Development, and is independent of the sensitivity of the receptor, as described in Table 2.

Table 2 Magnitude of Impact

Receptor Sensitivity	Description	Examples
High	Receptor with a high quality and rarity at a national or regional level and limited potential for substitution.	• Significant or complete loss/damage • Significant economic loss • Permanent or prolonged impact
Medium	Receptor with a high quality and rarity at a local scale; or Receptor with a medium quality and rarity at a regional or national scale.	• Reversible and/or temporary loss/damage/impact • Contribution / reduction of a significant proportion of • Reduction / increase in the economic value of the feature
Low	Receptor with a low quality and rarity at a local scale.	• Measurable changes in attribute, but of limited size, proportion and/or short-lived
Very Low	Receptor with a low quality and rarity at a local scale.	• Possible discernible impact, but not a significant reduction/ increase in quality, productivity or biodiversity • No significant impact on the economic value of the feature • No increase in risk

Preliminary Significance of Effect

The preliminary significance of the potential effect is derived by combining the assessments of both the sensitivity of the receptor and the magnitude of the impact in a simple matrix, as presented in Table 3. Effects which are assessed to be major or moderate are considered to be significant, whilst those that are minor or negligible are not significant.

Table 3 Preliminary Significance of Effect

Receptor Sensitivity	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
Very High	Major	Major	Moderate	Moderate
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible

Qualitative Likelihood

The qualitative likelihood of occurrence of a potential impact on a receptor is defined as described in Table 4.

Table 4 Qualitative Likelihood of Occurrence

Qualitative Likelihood of Occurrence	Description	Examples
Highly Likely	High probability of occurrence	• Accidental release at poorly maintained and operated facility • Uncontrolled activity • Uncontrolled known discharge
Likely	On balance could occur	• Controlled but un-mitigated activity • Complex process where failure of a part is likely to lead to release • Large area where 100% sealing cannot reasonably be expected
Moderate	Equally likely/unlikely	• Unmitigated, low risk • Controllable activity • Partially contained site
Unlikely	On balance wouldn't occur	• Mitigated higher risk • Simple, controllable activity • Existing contained site
Very Unlikely	Very low probability of occurrence	• Essentially no risk • Extreme set of circumstances required to generate low probability • Fully mitigated low or medium risk

Qualitative Risk Analysis

The residual qualitative risk is derived by combining the likelihood of occurrence and the preliminary significance of effect of a potential impact on a receptor in a simple matrix, as presented in Table 5. Risks which are assessed to be very high, high or medium are considered to be significant, whilst those that are low, very low or none are not significant.

Table 5 Qualitative Risk Analysis

Qualitative Likelihood of Occurrence	Preliminary Significance of Effect			
	Major	**Moderate**	**Minor**	**Negligible**
Highly Likely	Very High	High	Medium	Low
Likely	High	Medium	Low	Very Low
Moderate	Medium	Low	Very Low	None
Unlikely	Low	Very Low	None	None
Very Unlikely	Very Low	None	None	None