CampbellReith
consulting engineers

Ennor Farm, Old Town, St Mary's, Isles of Scilly

Land Quality Statement

For

Council of the ISLES OF SCILLY

Project Number: 13394

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SUMMARY OF ACTIONS

HUMAN HEALTH	Soil contamination has not been identified at the site when considering the proposed residential end use and remedial action is therefore not required. However, foundation, construction and enabling works will include excavation and should unforeseen contamination be encountered, this may require risk assessment, remediation and validation.
CONTROLLED WATERS	Groundwater testing detected marginally elevated dissolved cadmium in relation to Freshwater EQS criteria protective of ecosystems but cadmium was not above Drinking Water Standards for human consumption. However, as no onsite or offsite sources of groundwater contamination have been confirmed, the elevated cadmium is considered to be indicative of marginally poor background water quality. Specific groundwater remediation is therefore not considered necessary as part of this development.
BUILDINGS AND STRUCTURES/ SERVICES	BRE mapping indicates that full radon protection measures are considered to be required in new dwellings. Soakaway and or other in ground infiltration measures proposed will need to minimise risk to groundwater on site as far as practicable. Whilst hydrocarbon contamination has not been identified, the infrastructure designer should assess the requirements for pipework with respect to constituents identified in soil and consult statutory utility companies and relevant guidance as necessary. With respect to ground gas the site is unlikely to be classified above a CIRIA Characteristic Situation 1, however gas monitoring from the installed monitoring well on site may need required to confirm such assessments.
SITE WORK CONTROLS	A standard watching brief should be maintained throughout intrusive ground works by the Contractor such that any unforeseen contamination or asbestos containing materials (ACM) can be identified and referred to an experienced Environmental Consultant for evaluation. Should asbestos be identified, the groundworks should be undertaken by a suitably qualified Contractor in accordance with the Control of Asbestos Regulations 2012, associated Approved Code of Practice (ACoP) and guidance prepared by CL:AIRE and the Joint Industry Working Group (JIWG), and CIRIA.
REGULATORY APPROVAL	This report should be submitted to the Regulators (Contaminated Land Officer) for comment via the planning process.
WASTE	This LQS does not address the classification of waste soils. The soil results, and those of soil analysis, can however be utilised as a basis for such assessments, although additional testing may be required. It is noted that such assessments are required to accord with the Environmental Permitting and Planning Legislation and also to control costs during development.
GEOTECHNICAL ACTIONS	Further investigation will be required to fully characterise the site once the scheme and development layout are known. The scope of the additional investigation should include: • Additional exploratory holes to characterise the shallow Head soils for use in earthworks associated with re-levelling of site slopes, the design of any retaining structures or the design of ground improvement such as vibro-stone columns, if adopted. • Additional monitoring wells and monitoring visits to identify the groundwater profile across the site. • Investigation to confirm the depth of bedrock and its geotechnical properties across the site should a shallow foundation or piled foundation solution resting on bedrock be adopted.
OTHER	None.
DOCUMENTATION	The works outlined herein will require detailing within an enabling Groundworks/Remediation Specification for combined agreement within accordance to any scheme specific land quality planning conditions. A Plan of Work to consider risk associated with the low level of cadmium in shallow

	groundwater may be required and practical measures to minimise potential impact of works on adjacent sensitive site (Lower Moors SSSI) are recommended during redevelopment. A construction Foundation Work Risk Assessment updated in line with specific foundation type employed at the site to be submitted for agreement. A Materials Management Plan (MMP), approved by a Qualified Person (QP), will be required to facilitate the reuse of appropriately validated soils at the site. A Hazardous Properties Assessment will be required for any Made Ground soils removed as waste. A Validation Report (with verification of remedial actions) is likely to be required upon completion of works.

EXECUTIVE SUMMARY

SITE LOCATION	The site comprises an agricultural field located off Old Town Lane, North of Ennor Farm, Old Town, St Marys, Isles of Scilly with an approximate post code of TR21 0NL. The site is centred at approximate National Grid Reference 91440E and 10460N. It is proposed to redevelop the site with between 10 and 16 semi-detached and detached dwellings, a courtyard or access road off Old Town Lane, allotments and an orchard / landscaping. The concept drawing also includes an area of orchard, reed beds and allotments. The proposed development is considered to have a **High** end user sensitivity in relation to contamination.
ENVIRONMENTAL SETTING	Geological mapping indicates the site to be underlain by Granite bedrock, which may be weathered at the surface and include superficial Head deposits above. The environmental sensitivity of the site is considered to be **High** based on the following classifications: 1. Hydrogeology: **Moderate-High** 2. Hydrology: **Low** 3. Sensitive Land Uses (Ecological): **High**. It is noted that the Lower Moor SSSI is located adjacent the NW corner of the site.
CURRENT USE AND HISTORY	Map records show the site has been used for agricultural grazing since 1890 with open land to the north, west and east and the village of Old Town to the south. Current and historic agricultural uses and a potential soakaway / cess pit in the SE corner of the site represent potential minor sources of onsite contamination. Offsite sources include small fuel tanks (c. 100m SW) a quarry (c.70m NE) and modifications to the Lower Moors wetland's drainage, which may include unrecorded infilled ground (c.50m NW).
GEOTECHNICAL HAZARDS	The following geotechnical risks have been identified at the site: • Shallow groundwater level; • Soft or loose ground to depths up to 2.0m; • Running sands; • Sloping ground.
CONTAMINATION ISSUES	Ground investigation at the site has not revealed any significant contamination in the soils which predominantly comprise natural ground and topsoil. Risk Summary: • End Users: A **Very Low** risk has been identified associated with the conditions revealed in the site investigation. • Groundworkers: A **Very Low** risk has been identified based on the assumption that basic health and safety provisions are in place. • Groundwater: A **Low** risk has been identified due to absence of elevated contamination in relation to Drinking Water Standards. • Surface Waters and Ecology: A **Low**-**Moderate** risk has been identified associated with the presence of marginally elevated cadmium identified in groundwater beneath the site. However, in the absence of an identified source of the contamination being identified on site, it is not anticipated that the cause of this cadmium is form the site and so no remediation measures are considered necessary as part of the proposed development. • Buildings: Ground gas monitoring has not been undertaken. However, no potential sources of hazardous ground gas (CH_4, CO_2, CO etc.) relating to organic sources have been identified. Notwithstanding this, a **High** risk has been identified in relation to Radon Gas. • Services: A **Low** risk is anticipated. Some potential contaminants may represent a hazard to engineered structures and the specification and construction of elements/materials used will need to be reviewed.

GEOTECHNICAL RECOMMENDATIONS	Shallow foundations should be seated at a minimum depth of 1.50m below ground level with an associated allowable bearing capacity of 40kPa within Head deposits. If required, ground treatment using vibro-stone columns may be employed to improve the allowable bearing pressure for shallow foundations. Alternatively, a piled foundation using bored piles socketing in the Granite bedrock may also be considered. A design sulphate class of DS-1 and an ACEC Class of AC-1 are recommended for any concrete structures within the Head deposits. Further investigation and assessment will be required once proposals are fully developed, so that a detailed Geotechnical Design Report can be prepared.
ENVIRONMENTAL RECOMMENDATIONS	Remedial works are not considered to be a requirement for controlled waters or human health and no further investigations are recommended to characterise the site. However, a number of actions will be required to address contamination issues at the site: A Groundworks including; a watching brief during works (in case of unforeseen ground conditions occurring), details of the use and management of materials, waste management, a plan for Verification Control Documents. Risk assessments and method statements in light of revealed conditions (relating to Health and Safety and buried services) as well as to take account the recommendations of Foundation Works Risk Assessment (if required).

1.0 INTRODUCTION

1.1. Appointment and Scope

1.1.1. This report has been produced by Campbell Reith Hill LLP (CampbellReith) on behalf of the Council of the Isles of Scilly ('the Client') to summarise environmental and geotechnical information relating to allocated site H3 'Ennor Farm', Old Town, St Marys (hereafter referred to as 'the Site'). The references and limitations associated with this report follow the main text. Figures showing the location of the site and the development proposals are presented in Appendix A.

1.1.2. The report has been produced in general accordance with the procedures for ground investigation, interpretation and reporting set out in DEFRA Land contamination: risk management, 2019, (formerly Contaminated Land Report (CLR) 11), BS 5930:2015, BS 10175:2011 (+A2:2017) and BS EN 1997 (Eurocode 7). The objective of the report is to collate and interpret Phase 1 Desk Study information (Preliminary Risk Assessment) and Ground Investigation data in order to provide:

- a revised Conceptual Site Model for the site ground conditions (soil, water and gas);
- a Phase 2 Generic Quantitative Risk assessment (human health and controlled waters receptors);
- outline recommendations for land contamination issues;
- a geotechnical evaluation; and,
- geotechnical design recommendations.

1.1.3. The contamination appraisal is intended to identify remedial requirements necessary to permit the redevelopment of the site with a scheme that will provide between 10 and 16 new residential units on the site. The scheme will also include gardens, roads and some soft landscaping.

1.1.4. This assessment considers the objectives of the National Planning Policy Framework which requires information to demonstrate that a site is suitable for its new use (taking account of ground conditions and land instability) and not capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990 (after remediation). The NPPF requires adequate site investigation information, prepared by a competent person, with the minimum requirement comprising a desk study and site reconnaissance.

1.1.5. The geotechnical appraisal has been carried out in accordance with Eurocode 7. Sections 2.0, 5.0 and 7.0 together with Appendix C, comprise the Ground Investigation Report. Preliminary geotechnical recommendations are presented in Section 9.0 and these should be verified in a Geotechnical Design Report once structural details of the proposed development are confirmed.

1.1.6. It should be recognised that further appraisals, investigations, specification and validation may be required to accord with the recommendations stated herein. It is noted that these appraisals do not consider wider development issues, with cost implications, such as waste classification.

1.1.7. The report is based on a recent site investigation commissioned for this project and a review of readily available information as referenced. The desk study information is presented in Appendix B. The site investigation report is contained in Appendix C.

2.0 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1. Site Location

2.1.1. The site location is presented in Figure 1. The site is located just north of Ennor Farm, Old Town, St Marys, Isles of Scilly with an approximate post code of TR21 0NL. The site is centred at approximate National Grid Reference 91440E and 10460N.

2.2. Site Layout

2.2.1. A site visit and inspection was undertaken by a representative of CampbellReith on 19th December 2019. Photos from the site walkover are provided in Appendix A. Specific relevant photos are referenced below. A site layout plan is presented in Figure 2, in Appendix A.

2.2.2. The site is broadly trapezoidal with an area of approximately 0.5ha. The site comprises a grass field that is used for grazing livestock. An access to the field from Old Town Lane is located in the south-eastern corner of the site [Photo 6] and the access track continues along the southern boundary of the site [Photo 1] providing access to a residential property in a converted barn (Ennor Castle Barn [Photo 9]). Low stone hedges (drystone) mark the boundaries of the site. The northern and western boundaries have semi-mature trees growing on them [Photos 3, 4 and 11].

2.2.3. The site is at an elevation of between c. 3.3m to c. 8.5m AOD and slope from the east, south east and south towards the northwestern corner. The north-western corner is low lying (c.3.3m AOD) and at the time of the site visit had some localised standing water / flooding [Photo 12]. The site is at a slightly higher level than the field and land to the north (c.2.9m OD). No permanent surface water features were observed on the site.

2.2.4. An overhead power cable follows the southern part of the western boundary and then at the halfway point along the western boundary [Photo 3] passes diagonally across the field to the middle part of the northern boundary.

2.2.5. A small pile of stones and a manhole are located in the south-eastern corner of the site [Photo 5] and are reportedly part of a drainage feature (manhole to soakaway or septic tank) for the dwellings to the east of the site. The route of the overhead cable and drainage feature is shown in Figure 2 (Appendix A).

2.3. Invasive Plant Species

2.3.1. While no suspected invasive plant species were observed during the site visit, the potential presence of invasive plant species, such as Japanese Knotweed, whilst not considered likely, has not been assessed in this study.

2.4. Surrounding Land Use

2.4.1. Land to the west and north are also given to agricultural use. Old Town Inn, a public house with garden [Photo 7], is located on the southern boundary of the site. Old Town Lane (A3112) lies immediately adjacent and runs along the eastern boundary of the site. Two residential dwellings [Photos 5 and 6] lie approximately 25m to the east and southeast of the site (on the eastern side of Old Town Lane: Ennor, Orchard Cottage and The Old Chapel).

2.4.2. A significant area of natural wetland was observed c.30m NW of the site [Photos 12 and 13]. A pumping station and potential well (Castle Rocks Well) are located c.25m WSW of the site [Photos 14 and 15].

2.5. Development Proposals

2.5.1. The proposed development is for residential use and an initial concept layout is shown in Figure 3. It is acknowledged that this layout has not been finalised at this time but illustrates capacity for circa fourteen semi-detached and detached dwellings arranged around a courtyard with access from Old Town Lane in the southeast. The concept also includes a proposed area of an orchard or a reed bed in the northwest corner with a strip of allotments along the western boundary. It is understood that the site is intended to be developed by self-builders (eligible islanders) and will not include any holiday accommodation.

2.5.2. It is likely that the dwellings will be of traditional construction.

2.5.3. As the proposals include new residential uses with private domestic gardens and allotments, the overall end user sensitivity to any potential contamination that may be present on the site is considered to be High.

2.6. Geology

2.6.1. This section reviews available information regarding the geology of the site. The associated references are listed at the rear of the report. Information has also been taken from the available Groundsure Insight Report [1] enclosed in Appendix B.

2.6.2. BGS mapping [2, 3] shows the site positioned on bedrock geology of the coarse grained Outer Granite from the Isles Of Scilly Intrusion and potentially the presence of superficial (drift) weathered Head material (Clay, Silt, Sand And Gravel – down slope detrital weathering). An area of Alluvium is indicated to the north / west of the site.

2.6.3. No areas of infilled ground are indicated on the geological extracts on the site.

2.6.4. A BGS borehole record is available [2] for a well adjacent the northwest corner of the site as well as two others within 250m of the site:

- SV91SW35 - Castle Well is located adjacent to the northwest corner of the site. The borehole is indicated to be 9 foot deep (approximately 2.74m) however details of the strata were not available. The logs record that the well yielded 4,000 to 5,000 gallons in 9hr to 10hrs and was constant all year. It was noted that pumping 1,500 gallons almost emptied the well. In the summer it filled up within 3hrs to 4 hrs and was used by the RAF during the second world war. Reportedly ¼ million gallons were abstracted in 4 years.
- SV91/SW20 - A well site located c.250m southeast of site. The log records 40ft (c. 12.20m) of Sand and Clay, followed by 80ft (c. 24.40m) of "Brown Rock" (assumed to be Granite). Resting water was 20ft below the top of the well, which was installed in 1965.
- SV91/SW18 - A well site but no data is held in this entry.
- SV91/SW38 - A well site located c. 300m northeast of the site. The log records 2'6" of Soil over 7ft (c. 2.1m) Brown clay, over 72ft (c. 22m) of Granite. Resting water was 30ft (c. 9.1m) below the top of the well, which was installed in 1950.

TABLE 2.1: Summary of Anticipated Geology

Strata	Depth to Base (m bgl)	Depth to base (m OD)	Thickness (m)	Typical Description
Made Ground/Topsoil	0.50	5.50	0.50	A heterogeneous mix of man-made soils, with granular and cohesive layers
Drift Deposits - Head	3.00	3.00	2.50	Sand and Clay
Solid Deposits – Isles of Scilly Intrusion (Granite)	Unknown	Unknown	-	Granite extending to depth

2.7. Geological Hazards

2.7.1. Potential geotechnical hazards are summarised in Table 2.2

TABLE 2.2: Summary of Geotechnical Hazards

Hazard	Description
Shrink/Swell Clay	Based on the anticipated composition of the Head deposits, shallow soils may be susceptible to movement due to seasonal water demands of trees.
Shallow Groundwater	May be present and effect foundations and excavations.
Buried Concrete	May effect the buried concrete elements of the development.
Existing Slopes on Site	May require additional design to accommodate slopes.

2.8. Seismicity

2.8.1. The national forward to BS EN 1998-1:2004+A1:2013 'Eurocode 8: Design of Structures for Earthquake Resistance – Part 1' states there are no requirements in the UK to consider seismic loading, and the whole of the UK may be considered an area of very low seismicity in which the provisions of EN 1998 need not apply.

2.9. Hydrogeology

2.9.1. The site hydrogeology is summarised in Table 4.3 and the associated references listed at the rear of the report.

TABLE 4.3: Summary of Hydrogeology

Type	Description	Reference
Superficial/Drift Deposits (Head)	Superficial deposits are a Secondary Aquifer A. It is likely that Head material is present across the site with a greater thickness in lower lying areas. It is likely that it may have low and variable vertical permeability to aquifer units below, yet with potential for lateral run off and localised ponding.	[1]
Soil/Bedrock Deposits (Granite)	Bedrock to the site is a Secondary Aquifer A. The aquifer is likely to be dominated by fracture flow and also more highly weathered near surface with flow likely through the line of weathered joints. It is likely that groundwater storage is low and there is also possibility given proximity to the sea for saline intrusion	[1]

	– especially with periods of high drawdown and low recharge.	
Soil Leaching Potential	The soils are of High Leaching Potential as it is an urban area ("U") with a worst case vulnerability classification ("H").	[1]
Source Protection Zone	The site is located adjacent to a Zone II Source Protection Zones (Outer Zone).	[1, 12]
Groundwater Abstractions	Available mapping indicates a number of groundwater abstractions lie immediately adjacent the northern edge of the site including St Mary's Joane's Well and Castle Rocks Well and pumping station (c 30m NW). Historic maps also indicate the position of wells to the NE of the site (c.20m).	[1]

2.9.2. The Environment Agency delineates Source Protection Zones (SPZs) to protect groundwater in the catchments of potable groundwater abstractions from pollution by potentially contaminative activities. The Isles of Scilly are formed of fractured granite, with overlying blown sand and alluvium in some areas. The surface of the granite has been very highly weathered. Groundwater flow through the fractured granite is very rapid. The Isles of Scilly are dependent upon groundwater for water supply. Source Protection Zones have been delineated for the groundwater abstractions operated by the Council of the Isles of Scilly, the Duchy of Cornwall and Tresco Estate. These sources supply a large proportion of the population.

2.9.3. On the island of St Mary's, the Council of the Isles of Scilly abstraction boreholes are located in the Higher Moors and Lower Moors areas.

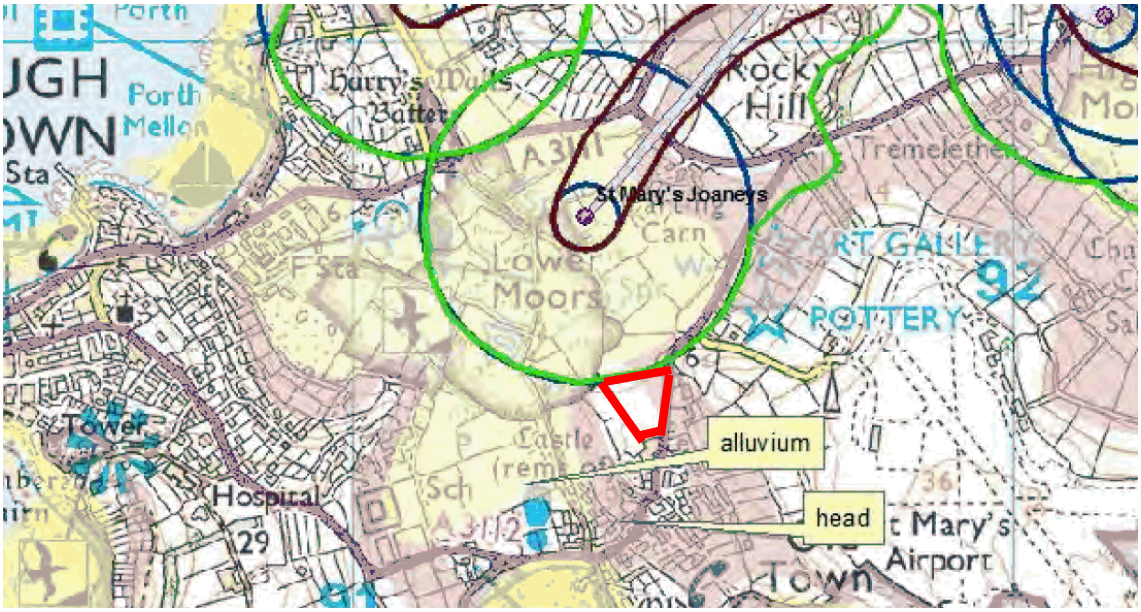

FIGURE 2.1 Proximity of site to a Zone II Outer Drinking Water Source Protection Zone

2.9.4. The site is considered to have a Moderate-High sensitivity with respect to hydrogeology. The sensitivity is based upon the definitions provided in NHBC R&D66[1], as amended to include the requirements of the Water Framework Directive and the Environment Agency's River Basin Management Plans. This considers that underlying aquifers are both classified as secondary

[1] Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH)

aquifer A, the site is close to an Outer Source Protection Zone (Zone II), but not within one although there is likely to be very good hydraulic connectivity (via shallow groundwater) to the adjacent sensitive watercourse, which form part of a SSSI.

2.10. Hydrology

2.10.1. The site hydrology is summarised in Table 2.4 and the associated references listed at the rear of the report.

TABLE 2.4: Summary of Hydrology

Type	Distance	Description	Reference
Surface Waters	c. 30m NW	Springs and drains emanating from the area of Castle Rock Well flow northwards and contribute to the Lower Moors SSSI which includes a number of ponds and drainage ditches.	[1]
Surface Water Abstractions	n/a	No records of surface water abstractions are available.	[1]
Flooding	>500m S	The Groundsure report [1] indicates the northern part of the Site is located in an area where there may be a potential risk from groundwater flooding to occur at the surface as well as a potential for groundwater flooding of properties below ground level. Environment Agency data [6] shows the site is not located in flood zone 1, suggesting there is limited potential for flooding from rivers or sea. However, a review by the Council of the Isles of Scilly [4] highlights the potential for coastal storm surges to affect areas of the Lower Moors which may back up or surges from the direction of Old Town beach.	[1,4,6]

2.10.2. Information from the Environment Agency's Catchment Data Explorer [5] indicates that the Site is not located in proximity to any 'Main Rivers'. The site is therefore considered to have a Low sensitivity with respect to hydrology.

2.11. Radon

2.11.1. Reference to the Radon Atlas for England and Wales (set out in [1]), indicates that the radon risk is uniform and High across the site. The site falls within a High radon probability with over 30% of homes estimated at or above the action level. As such, a High risk is determined in relation to radon and full radon protective measures are necessary in the construction of new dwellings or extensions.

2.11.2. This is further confirmed by Map 1 West Cornwall from BRE211 Radon Guidance on Protective Measures for New Buildings, 2015, which indicates that buildings will require full protection measures.

2.12. Sensitive Land Uses

2.12.1. A review has been made of Designated Ecological and Heritage sites and these are summarised below:

TABLE 2.5: Summary of Designated Sites

Type	Description	Reference
Ecological	St Marys Island is designated as an Area of Outstanding Natural Beauty (ANOB). The Lower Moor Site of Special Scientific Interest (SSSI) reference SV912106 is located c.30m to the NW of the site. The site is located in a SSSI Impact Risk Zone and the LPA would need to consult with Natural England on likely risks from all types of planning applications (including residential) except specific householder applications.	[1]
Heritage	The entire island of St Marys is designated as a conservation area and as heritage coast. There are no listed buildings in proximity to this site (<100m).	[1, 11]
Archaeological	ENNOR CASTLE, OLD TOWN, ST MARY'S is a Scheduled Monument, c.50m SW of the site. The site has been the subject of an Archaeological Desktop Study [6] and follow on Geophysical (non-intrusive) Investigation [7]. The site has been identified as having a potential for buried archaeology in these reports associated with activity relating to Old Town Castle and other activity and proposes mitigation including evaluation trenching and a watching brief during construction.	[1, 7, 8]

2.12.2. Otherwise the available data [4, 9] indicates that the site is not within 2km of any of the following sensitive land uses:

- Ancient Woodland
- Areas of Adopted Green Belt
- Areas of Unadopted Green Belt
- Forest Parks
- Local Nature Reserves
- County Wildlife Sites
- Marine Nature Reserves
- National Nature Reserves
- National Parks
- Nitrate Sensitive Areas
- Nitrate Vulnerable Zones
- Ramsar Sites
- Special Protection Areas
- World Heritage Sites

2.12.3. The site is considered to have a High sensitivity with respect to Sensitive Land Uses as the site is located within close proximity (less than 30m) of a SSSI.

3.0 SITE HISTORY AND INDUSTRIAL SETTING

3.1. Site History

3.1.1. Information relating to the site history has been obtained by reference to the historic mapping provided with the Groundsure Report [1] and is summarised for the site and its surroundings in Table 3.1.

TABLE 3.1: History of Site and Adjacent Area

Date	Site	Adjacent Land Area (within 250m of site)
1890	The layout of the site is similar to present time – an agricultural pastoral grazing field.	Lower Moor, an area of wetland, includes drains, springs and marshy land c.30m SW of the site. Site surrounded by fields on all sides, Old Town Lane in current alignment running along eastern side of site. Small buildings and enclosed / wooded area to immediate NW of site. Castle Rocks Well shown c.30m WNW of site. Number of other wells shown 200m NWN and 250m N. Nearest building is Methodist Chapel c10m E Old Town lies to the south of the site with Old Town Castle (remains) c.70m SWS. Fields to E of Old Town Lane reflect historic strip boundaries.
1908	No significant change other than the field subdivided in to two with a broadly N-S fence line down the middle.	Little significant change other than a new building appearing 20m W A Windpump shown adjacent NW corner of site Glasshouses c25mSW of site behind Chapel. Some areas of Lower Moor to the north have been drained and now shown as fields. Some modification to water ways in the Lower Moor area.
1978	No significant change. Fence down middle of site removed.	Little significant change other than area of new buildings 100m NE of site about the junction of Old Town Lane and High Cross Lane. Small area of excavation / quarrying shown 70m NE of site. Buildings about remains of Castle Farm have a tank structure c.85m SWS of site. Another tank shown c.120m SW of the site. Castle Rocks Well now has a pump house erected next to it c.30m WSW of the site. Further changes to Lower Moor wet land with some ponds shifted and some new created (c.120m SW).
1980	No significant change	No significant change
1995	No significant change	Buildings to immediate S of site described as Old Town Stores. Area of excavation / quarrying still shown 70m NE of site. No other significant changes
2003	No significant change.	Boundary to south part of field formed and is boundary with buildings now named Old Town Inn (formerly Old Town Stores). No other significant changes.

3.1.2. Available historical map records show that the site has been used as a field since 1890 with open land to north, west and east and the village of Old Town to the south. There are very few if any

potentially contaminative uses at the site or in the in the surrounding area identified in historic mapping other than:

- General agricultural uses (mainly grazing) including use of some horticultural glasshouses;
- Small tank structures c.85m SWS and c.120m SW of the site, most likely for agricultural uses (e.g. storing fuel, water, feed);
- Area of excavation / quarrying (not infilled) 70m NE of site; and
- Modification to drainage and ponds within Lower Moors wetland area that might have included infilling.

3.2. Regulatory Consultation

3.2.1. No specific regulatory consultation has been undertaken as part of this study.

3.3. Unexploded Ordnance (UXO)

3.3.1. A preliminary review has been made of the UXO risk presented by the site based upon CIRIA C681 ('Unexploded Ordnance (UXO) – A guide for the construction industry') and the assessment matrices presented in Tables 5.1 to 5.3 therein. A review of the Zetica UXO mapping available for the site [10] indicates a low risk area for UXOs. However the site is close to a historic Luftwaffe target at the location of the current St Marys Airport and there has been little to no development on site which may preserve buried UXOs. The archaeological survey [7, 8] did not identify any significant risks.

3.3.2. The potential for unexploded ordnance to be present beneath the site is therefore considered to be Low.

3.4. Current Industrial Setting

3.4.1. Table 3.2 summarises identified industrial features which may present a potential source of contamination to the site based upon the Groundsure Report [1] or other sources as referenced. These sources should be consulted for further details. Unless otherwise stated, only those features that are within the stated review distances have been included.

TABLE 3.2: Industrial Setting

Type	Distance Reviewed	Distance from Site	Description
Contaminated land register entries and notices	<500m	-	None [11]
Landfills	<250m	-	The site of the former Lower Moors Landfill is >250m West of the site [1]
Waste Transfer/Treatment Stations	<100m	-	None (nearest c.400m west: Porthmellon Waste Management Site, Porth Mellon, St. Mary's, TR21 0JY) [11]
Potentially Infilled Land	<250m	70m NE	Area of excavation / quarrying (not infilled) 70m NE of site identified on available mapping [1]
Pollution Incidents	<50m	-	No information available
Discharge Consents	<100m	-	No information available
Environmental Permits	<150m	-	No information available

Type	Distance Reviewed	Distance from Site	Description
Abstractions	<250m	-	No information available
Fuel Stations	<200m	-	No information available
Contemporary trade directory entries- non active	<100m	-	No information available
Control of Major Accident Hazards (COMAH) Sites	<500m	-	None

4.0 PRELIMINARY CONCEPTUAL SITE MODEL

4.1. Introduction

4.1.1. Current practice for land contamination evaluation involves classification of risk for each of the identified contaminant source-pathway-receptor pollutant linkages. These are summarised below, considering the desk study information obtained. This information has been utilised to design the site investigation considering the proposed end use.

4.2. Classification of Risk

4.2.1. Risk is defined by the combination of two factors: i) the probability of an occurrence (expressed as a likelihood); and ii) the consequence of it happening (expressed as a severity). The procedure for classifying risk is summarised in Table 4.1. The categories of risk have been based upon those defined in the Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH). The categories are defined in the Environmental Risk Assessment Supporting Information section to the rear of this report, together with definitions of the classifications of probability and consequence.

TABLE 4.1: Classification of Risk

Probability (Likelihood)		Consequence			
		Severe	Medium	Mild	Minor
	High likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

4.3. Potential Sources of Contamination

4.3.1. Table 4.2 summarises the potential contamination sources that have been identified on or near the site. The potential contaminant types associated with these is then given based upon a review of CLR 11, industry profiles and anecdotal information:

TABLE 4.2: Potential Sources of Contamination

Feature on or near site	Potential Contaminant
Onsite: Agricultural pasture grazing land.	Possibly Pest
Onsite: Potentially a soakaway or cesspit in SE corner of site	GG, biological hazards, H, M, Phosphate
Offsite: Small tank structures c.85m SWS and c.120m SW of the site, most likely for agricultural uses (e.g. storing fuel, water, feed).	H, VOC, Pest
Offsite: Area of excavation / quarrying (not infilled) 70m NE of site.	GG
Offsite: Modification to drainage and ponds within Lower Moors wetland area that might have included infilling.	GG

Feature on or near site	Potential Contaminant
Notes: M – Metals. H – Hydrocarbons. VOC – Volatile Organic Compounds. ACM – Asbestos containing Materials. PCB – Polychlorinated biphenyls. GG – Ground Gases, Pest – Pesticides (insecticides, fungicides and herbicides)	

4.4. Receptors and Exposure Pathways

4.4.1. Potential risks have been identified based on the proposed site use, the receptors and potential pathways by which the receptor/s may be exposed to the contaminant source/s. These are presented in Table 4.3 and have been used to inform the site investigation.

TABLE 4.3: Receptors and Exposure Pathways

Receptor	Pathway	Risk
End Users Neighbours Construction Workers	Ingestion of soil/dust	Low. Limited potential for presence of pesticides associated with current use (onsite source). Potential for migration of contamination from offsite sources is also very low. Use of part of site for soakaway or cesspit requires confirmation.
End Users Neighbours Construction Workers	Inhalation of soil/dust	Low. Limited potential for presence of pesticides associated from current use (onsite source). Potential for migration of contamination from offsite sources is also very low. Use of part of site for soakaway or cesspit requires confirmation.
End Users Neighbours Construction Workers	Dermal contact with soil/dust/water	Low. Limited potential for presence of pesticides associated from current use (onsite source). Potential for migration of contamination from offsite sources is also very low. Use of part of site for soakaway or cesspit requires confirmation.
End Users Neighbours Construction Workers	Inhalation of vapour from soil/dust	Very Low. Absence of organic vapour source associated from current use (onsite source). Potential for migration of contamination from offsite sources to also low as ground conditions unlikely to provide suitable pathway.
End Users	Consumption of vegetables/plants	Low. Limited potential for presence of pesticides associated from current use (onsite source). Potential for migration of contamination from offsite sources is also very low. Use of part of site for soakaway or cesspit requires confirmation.
End Users Construction Workers Building	Migration of soil gases to confined spaces/structures	Very Low. Use of part of site for soakaway or cesspit requires confirmation.
End Users Neighbours Construction Workers	Inhalation of vapour from groundwater	Very Low. Absence of organic vapour source present. Potential for migration of contamination from offsite sources to also low as ground conditions unlikely to provide suitable pathway.
Surface Waters	Migration of water borne contaminants from on site.	Very Low. No onsite source identified. Use of part of site for soakaway or cesspit requires confirmation.

Receptor	Pathway	Risk
Groundwater Aquifer	Migration of contamination from surface and/or subsurface to groundwater	Low. Use of part of site for soakaway or cesspit requires confirmation but highly unlikely to pose a significant source of contamination.
Groundwater Aquifer	Migration of water borne contamination from off-site.	Low. Groundwater contamination is unlikely to reside on site. Potential for migration of contamination from offsite sources is low as ground conditions unlikely to provide suitable pathway.
Building / structures	Movement of contaminants to engineered structures (water pipes).	Low. No soil contamination is anticipated to be present that would present a significant risk to potable water supply pipes. Use of part of site for soakaway or cesspit requires confirmation.
Sensitive Land Use (SSSI etc.) – trees adjacent boundary of site.	Uptake by flora/fauna associated with sensitive land use	Low. The potential for the proposed use to impact the adjacent SSSI requires consideration but as the proposed is not polluting, this is not anticipated to present a significant risk. Use of part of site for soakaway or cesspit requires confirmation.

* Assumes basic PPE

4.4.2. Based on a preliminary conceptual site model, generally a Low risk has been identified from potential contamination. Use of part of site for soakaway or cesspit requires confirmation.

4.4.3. Considering the past and current uses of the site, a ground investigation was recommended (see Phase 1 Geoenvironmental and Geotechnical Desk Study, CampbellReith, P01, January 2020) in order to appraise the potential issues of land contamination (previous use as agricultural land and soakaway/cesspit), as well as geotechnical matters.

4.4.4. The findings from the intrusive investigation, of the potential contaminant sources and pathways are reported herein. This has informed the Generic Quantitative Risk Assessment presented in Section 6.0 and the subsequent discussion of risk in Section 10.0.

5.0 SITE INVESTIGATION

5.1. Scope of Works

5.1.1. The exploratory locations are shown on Figure 3.1 within the Wheal Jane Consultancy factual report presented in Appendix C. The scheduled site work comprised:

- 5 no. Windowless Sampler (WS) holes; and,
- 3 no. In-situ CBR tests using the Dynamic Cone Penetrometer (DCP) method.

5.1.2. It is acknowledged that the scope of works for the investigation was determined by the availability of site investigation drilling equipment being available at the time and further site investigation may be necessary in future.

5.1.3. All five of the dynamic continuous sampler holes terminated at depths between 2.05m below ground level (bgl) and 3.75m bgl due to refusal on shallow bedrock.

5.1.4. One of the windowless sampler holes was installed with a slotted standpipe to allow future monitoring of groundwater and gas. The ground conditions encountered with respect to the monitoring installation are summarised in Table 5.1.

TABLE 5.1: Standpipe Summary

Exploratory Hole	Response Zone (m bgl)	Response Zone Strata (m bgl)	
WS03	0.60 to 2.60	0.60 – 0.80	Clayey sand (topsoil)
		0.80 – 1.60	Gravelly sandy SILT
		1.60 – 2.60	Clayey sandy GRAVEL

5.2. Groundwater Observations

5.2.1. Groundwater strikes observed during the site works are summarised in Table 5.2 below. At the time of writing this report no return visits have been made to record groundwater or ground gas levels.

TABLE 5.2: Groundwater Observations

Exploratory Hole	Water Strikes			
	Struck		Rose to	
	m bgl	m AOD	m bgl	m AOD
WS01	3.20	3.70	Recorded as damp	
WS02	2.50	2.70	-	-
WS03	0.70	3.00	-	-
WS04	1.60	3.00	-	-
WS05	Not Encountered			

5.2.2. Typically groundwater was encountered at 3.00m AOD.

5.3. Geotechnical Testing

5.3.1. In-situ testing was undertaken for geotechnical purposes and samples were obtained for appropriate laboratory analysis. Site based geotechnical testing is summarised in Table 5.3. Any limitations to the testing that require consideration during the evaluation of the data are described in the following paragraphs.

TABLE 5.3: Summary of In Situ Tests

Test type and Reference	Number
Standard penetration test (BS EN ISO 22476-3:2005+A1:2011)	15
Dynamic cone penetrometer (DCP Method)	3

5.3.2. Although a standardised test, uncorrected Standard Penetration Test (SPT) 'N' values display a considerable amount of scatter. Calibrated SPT hammers were used by the ground investigation contractor and in our appraisal (given in Section 9.0) the results have been normalised to 'N60' in accordance with Eurocode 7.

5.3.3. The grossly elevated SPT N values encountered at the base of each of the WS holes were influenced by bedrock. As such, these results are not considered representative of the stratum as a whole and have been discounted from subsequent analysis.

5.3.4. Dynamic cone penetrometer (DCP) has been used to provide estimates of in situ CBR. Dynamic cone penetrometer testing provides an estimate of CBR rather than a direct measurement of this parameter. The DCP apparatus is better suited to coarser, stronger materials and so the accuracy of the results may be limited in soft and/or cohesive soils. In addition, as a hand held probe, it can be deflected or return anomalous readings due to obstructions or large particles. In situ estimates of CBR value may also be influenced by the conditions that prevail at the time of testing, which may be different to those that prevail at the time of construction or over the life time of the pavement.

5.3.5. The above factors have been considered in the appraisal of geotechnical results given in Section 9.0.

5.3.6. Geotechnical laboratory testing is summarised in Table 5.4.

TABLE 5.4: Laboratory Tests (Geotechnical)

Test type and reference (BS 1377: 1990 unless stated)	Number
Water (Moisture) Content (Part 2:3.2)	6
Liquid and plastic limits and plasticity index (Part 2:4.3, 5.3 and 5.4)	6
Particle size distribution - wet sieving (Part 2:9.2)	4
Particle size distribution - sedimentation by pipette method (Part 2:9.4)	3
Water soluble sulphate content 2:1 aqueous extract (BRE SD1 2005)	7
Soil pH (BRE SD1 2005)	7

5.3.7. As with in situ testing, it is necessary to consider the limitations associated with any laboratory testing and to review any potentially anomalous results. In all geotechnical tests it should be noted the specimen is selected from a much larger volume of material which may have an inherent degree of variability.

5.3.8. Water content determinations on disturbed samples may not be wholly representative due to disturbance arising from the sampling process. In addition, moisture content results can be influenced by climatic factors and it cannot be guaranteed that the values determined at the time of investigation will be the same as those that prevail at the time of construction.

5.3.9. The above factors have been considered in the appraisal of geotechnical results given in Section 9.0.

5.4. Contamination Observations and Testing

5.4.1. Olfactory and visual evidence of potential contamination was not encountered in any of the exploratory holes. Table 5.5 summarises the chemical suites that were analysed based upon the preliminary conceptual model and observed site conditions.

TABLE 5.5: Laboratory Tests (Environmental)

Test type	Number
SOIL	
As, Ba, Cd, CrIII, CrVI, Cu, Hg, Mn, Ni, Pb, Se, V, Zn, Organic Matter, Cyanide, Total Phenols, Speciated PAH, Total TPH pH, Sulphate	7
SVOCs	1
Asbestos ID	2
WATER	
As, Ba, Cd, CrIII, CrVI, Cu, Hg, Mn, Ni, Pb, Se, V, Zn, Organic Matter, Cyanide, Total Phenols, Speciated PAH, Total TPH pH, Sulphate	1
SVOCs	1

6.0 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1. Assessment Framework

6.1.1. Subsequent to the identification and quantification of contaminant species in soils, waters and gases, it is necessary to select a method for assessing their significance in view of the current and proposed future use of the land. The initial assessment comprises comparison of identified contaminant levels to generic screening values that have been prepared to assess the risk to human, controlled water and gas risk receptors. The guidance used to provide this initial screening is listed in Table 6.1.

6.1.2. With respect to Human Health Risk Assessment the screening values for a residential use with plant uptake end use as defined in Environment Agency Guidance SR3[2] have been selected based upon the proposed development as self-build dwellings. The assessment assumes a Soil Organic Matter (SOM) content of 3% based on average site derived SOM data from the soil samples (range 0.2 to 3.3%, mean = 1.77, n=7).

6.1.3. Controlled Water Risk Assessment has been undertaken using as available Environmental Quality Standards (EQS) for the protection of aquatic life and the Drinking Water Standards (DWS) due to the site's location adjacent the Lower Moor SSSI and potential proximity to a drinking water supply (Castle Well). The specific legislation and/or guidance that dictate the water quality standards adopted are contaminant specific and these are referenced in the Summary of Water Analysis table. The water quality standards have been chosen in accordance with section 4.2 of the EA's Remedial Targets Methodology as informed by the EA's Groundwater Protection Guides (2017), and documents listed in Table 6.1[3].

6.1.4. Monitoring for ground gas was not undertaken.

6.1.5. For further detailed information on the current Regulations and selection of appropriate threshold values, please refer to the rear of this report text.

TABLE 6.1 Generic Quantitative Screening Values (Soils and Water only)

	Key Guidance
Soil	LQM/CIEH S4ULs for Human Health Risk Assessment.*
	Defra Development of Category 4 Screening Levels Main Report and associated documents
	Environment Agency CLEA Version 1.06 software. Environment Agency Science Reports SC050021 SR2/SR3
	Generic Assessment Criteria based upon Environment Agency CLEA UK Beta Version 1.0.
Water	EA Groundwater Protection Guides, March 2017.
	The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
	Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2015
	EC and UK Drinking Water Standards.

[2] Updated Technical Background to the CLEA Model, Science Report SC050021/SR3
[3] https://www.gov.uk/government/collections/groundwater-protection

	Key Guidance
	WHO Drinking Water Standards.
	Background Water Quality.

6.2. Soil

6.2.1. The results have been reviewed for evidence of potential zoning across the site and/or between the various soil strata. As a consequence, the statistical assessment has treated the site as a single averaging area and screened in its entirety. The assessment has included the upper 1.0m depth of ground which in most cases related to topsoil or natural ground and is the depth of ground that might be reasonably be expected to be disturbed during construction and as a result of the proposed development use.

6.2.2. The statistics associated with soil analysis are summarised in Table 6.2. The Mean Value (95%ile) and Maximum Value Tests were undertaken on the sample population/s for those parameters exceeding the screening levels. Where the 95%ile exceeds the screening values, these results are highlighted and discussed. The remainder are not considered indicative of significant contamination for the proposed end use.

TABLE 6.2: Summary of Soil Analysis

Contaminant	Units	Exceeding	Max	95th%ile	GAC
Metals and Inorganics					
Arsenic	mg/kg	0/7	32.00	31.7	79 [A]
Boron	mg/kg	0/7	1.00	0.97	21000 [A]
Cadmium	mg/kg	0/7	0.30	0.3	120 [A]
Chromium (Hex)	mg/kg	0/7	<LOD	<LOD	1500 [A]
Chromium	mg/kg	0/7	24.00	22.2	1500 [A]
Copper	mg/kg	0/7	43.00	38.2	12000 [A]
Lead	mg/kg	0/7	74.00	68.9	630 [A]
Mercury	mg/kg	0/7	<LOD	<LOD	120 [A]
Nickel	mg/kg	0/7	12.00	12	230 [A]
Selenium	mg/kg	0/7	<LOD	<LOD	1100 [A]
Zinc	mg/kg	0/7	69.00	64.2	81000 [A]
Cyanide	mg/kg	0/7	<LOD	<LOD	22 [C]
Total Petroleum Hydrocarbons					
TPH C10-40	mg/kg	0/7	180.00	180	3800 [A^^^^]
Polycyclic Aromatic Hydrocarbons					
Naphthalene	mg/kg	0/7	<LOD	<LOD	4900 [A]
Acenaphthylene	mg/kg	0/7	<LOD	<LOD	15000 [A]
Acenaphthene	mg/kg	0/7	<LOD	<LOD	15000 [A]
Fluorene	mg/kg	0/7	<LOD	<LOD	9900 [A]
Phenanthrene	mg/kg	0/7	0.64	0.64	3100 [A]
Anthracene	mg/kg	0/7	<LOD	<LOD	74000 [A]
Fluoranthene	mg/kg	0/7	1.70	1.7	3100 [A]
Pyrene	mg/kg	0/7	1.80	1.8	7400 [A]
Benzo (a) anthracene	mg/kg	0/7	0.93	0.93	29 [A]
Chrysene	mg/kg	0/7	0.89	0.89	57 [A]
Benzo (b) fluoranthene	mg/kg	0/7	1.00	1	7.1 [A]
Benzo (k) fluoranthene	mg/kg	0/7	0.50	0.5	190 [A]
Benzo (a) pyrene	mg/kg	0/7	0.86	0.86	5.7 [A]
Indeno (1,2,3 - cd) pyrene	mg/kg	0/7	0.44	0.44	82 [A]

Contaminant	Units	Exceeding	Max	95th%ile	GAC
Dibenzo (ah) anthracene	mg/kg	0/7	<LOD	<LOD	0.57 [A]
Benzo (ghi) perylene	mg/kg	0/7	0.57	0.57	640 [A]
PAH USEPA 16 (Total)	mg/kg	0/7	9.32	9.32	10 [B]
Phenols					
Phenol (Monohydric)	mg/kg	0/7	<LOD	<LOD	690 [A]
Asbestos					
Asbestos in Soils	Type	0/2	ND	ND	-
SVOCs					
SVOCs	mg/kg	0/1	<LOD	<LOD	Various

Residential use (with plant up take) assuming 3.0 % SOM
[A] LQM/CIEH Suitable for use Levels (S4UL). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL 3036. All rights reserved
[B] Defra Category 4 Screening Levels (C4SLs)
[C] SGV/GAC based on CLEA UK Beta Version at 1%, 2.5% and 5%
^^^^ Based on Aromatics (>C21-35)

6.2.3. There were no elevated concentrations of contaminants tested in the soil samples considering a residential with private gardens end use scenario and therefore the land is considered suitable for the proposed end use.

6.3. Asbestos

6.3.1. It is noted that there are no UK generic quantitative assessment criteria for asbestos in soils. A summary of the results for asbestos is presented in the above table (Table 6.1). Additional guidance on this topic is presented in CIRIA C733[4]. There was no visual indication of potential asbestos materials identified in the investigation and of the 2 no. soil samples tested no asbestos was identified.

6.4. Groundwater

6.4.1. One groundwater sample was obtained from the installation in WS03. No PAH, SVOCs, Phenol, or TPHs was identified above the detection limits of the analysis undertaken and therefore below the adopted screening levels used in this assessment. Some inorganic substances were identified but were all below both the standards for Drinking Water (DWS) or the Environmental Quality Standard (EQS) for Freshwater.

Cadmium

6.4.2. The only exception was cadmium with a concentration of 0.2µg/l identified in the water sample. This was above the annual average (AA) level Freshwater EQS (0.08 µg/l) but below the maximum allowable concentration (MAC) (0.45 µg/l).

6.4.3. The recorded cadmium level in the groundwater sample was also well below the Drinking Water Standard (DWS 5 µg/l) indicating that there is not a risk to drinking water resources.

6.4.4. The standard applied is derived from the Water Framework Directive which identifies cadmium as a priority substance (see Part 3, Table 1). This notes that for cadmium the quality standard varies based on the hardness of the water, whether the standard is applied to inland or other surface waters and if the exposure is on the basis of an annual average (AA-EQS) or maximum admissible concentration (MAC-EQS):

[4] CIRIA - Asbestos in soil and made ground: a guide to understanding and managing risks, March 2014

- The AA-EQS is a long-term standard and derived by analysing data from chronic (long term) toxicity tests. The AA long-term value also covers long-term or continuous exposure and is relevant in the context of the majority of risk assessment in this Land Quality Statement which considers the potential toxicity of chemicals to surface waters from an on-site source over a long time scale. The AA-EQS for cadmium varies from 0.08 to 0.25 µg/l in inland surface waters of different hardness, and 0.2 µg/l for other inland waters.
- The MAC-EQS is a short-term standard and based on the analysis of data on acute (short-term) toxicity. It is used to compare to protect against intermittent or short-lived periods of exposure. They are often used in the assessments associated with particular contaminative incidents such as a spill or discharge to a surface water body. The AA-EQS for cadmium varies from 0.45 to 1.5 µg/l in inland surface waters of different hardness.

6.4.5. Taking the range of potentially applicable standards in the context of the one elevated value it can be seen to be both below a number of the more conservative AA thresholds and below the short term MAC-EQS standard.

6.4.6. The risk therefore that the groundwater poses to the adjacent sensitive water body that includes the Lower Moor SSSI is considered low, given the following in relation to a plausible source of cadmium contamination onsite or in the vicinity:

- Cadmium is an element that occurs naturally in rocks, soils, plants and animals. It occurs especially in shales and clays, and sulphide mineralisation. However, the Isles of Scilly are not covered by the BGS Geochemical Atlas for SW England (https://www.bgs.ac.uk/gbase/gbaseSW.html) which may have confirmed if there are any natural potential sources of Cadmium in the soils in proximity to the site;
- Soil samples analysed from the site in the site investigation (see Section 7.4) were not found to contain very elevated levels of cadmium (in respect to the proposed residential garden use), which might have been indicative of a source from an agricultural use;
- Cadmium is associated with a number of sources including[5]; mining (particularly relating to zinc minerals), use in batteries, within fungicides (cadmium compounds such as cadmium chloride as well a trace by-product within phosphate fertilizers), pigments, stabilisers for plastics, corrosion-resistant coating for steel/metals, in photographic dyes, mirrors, and some lubricants;
- The water sample does not indicate any other markers representative of effluent from leaks from septic tanks (e.g. typically septic tanks may produce elevated Boron which may be c.840 µg/l – only 74 µg/l recorded at site - and for cadmium <2 µg/l[6])
- Fungicides typically used in Daffodil floriculture included[7] "Bordeaux mixture" a traditional copper sulphate / lime mix, later Tank-mix zineb (a polymeric complex of zinc with dithiocarbamate) later replaced by Benlate (from 1968, chemical name Methyl [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]carbamate). More recent treatment programmes use carbendazim (Methyl 1H-benzimidazol-2-ylcarbamate), Dithane, chlorothalonil, Rovral or strobilurin. None of these fungicides contain metals such as

[5] http://randd.defra.gov.uk/Document.aspx?Document=12349_SP1010AppendixF-Cadmium.pdf
[6] https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/septic-tank-and-package-treatment-plants-liquid-effluent-pollutants-and-typical-concentrations - research relates to
[7] Page 38 A Thompsett (2006), in Golden Harvest: The Story of Daffodil Growing in Cornwall and the Isles of Scilly, published Alison Hodge.

Cadmium. In any case, no elevated levels of SVOCs characteristic of some common pesticides / fungicides were identified in the soils or groundwater samples.

- There are no known zinc mineral rich deposits on this site, which could have leached into the groundwater; and,
- Another potential source of may have been metal particles as a primary emission of waste incinerators. It is understood that the Porthmellon Incinerator was replaced and upgraded in c.2015 but given strict compliance conditions associated with these types of facilities, it is unlikely to represent a source of contamination. It is noted that the soils at the site were not impacted with elevated Cadmium or any other heavy metals ruling out the incinerator as a source historic contamination.

6.4.7. As there is a lot of uncertainty regarding the potential source of cadmium in the groundwater beneath the site, with no obvious or plausible cause for it, it is considered to be potentially indicative of background water quality.

6.5. Waste Acceptance Criteria

6.5.1. A formal Hazardous Properties Assessment has not been carried out but the results of the investigation can be used to inform the likely classification of waste soils for disposal. A separate assessment is required for this purpose based upon technical guidance on classification of hazardous waste (Environment Agency: Guidance on the Classification and Assessment of Waste Technical Guidance WM3 Version 1.1, May 2018).

6.5.2. The logs indicate that the limited Made Ground soils are generally free of 'metals, asbestos, plastics, chemicals, etc. to an extent which might increase the risk' and hence may be suitable for disposal as inert waste – if they are not reused elsewhere on site - provided the WAC results indicate suitability. However, it will be necessary for the contractor to inspect soils proposed for inert disposal and confirm this position with the landfill.

6.5.3. Landfill WAC analysis (specifically leaching test results) must not be used for waste classification and hazardous waste assessment purposes. This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

7.0 GEOTECHNICAL EVALUATION

7.1. Ground Conditions

7.1.1. The ground conditions encountered during the site investigation generally consisted of superficial Head deposits over Granite bedrock. The general distribution of each stratum is shown in Table 7.1.

TABLE 7.1: Soil Profile

Stratum	From		To		Typical Thickness (m)
	(m bgl)	(m OD)	(m bgl)	(m OD)	
Topsoil	GL	6.80	1.10	2.80	0.70
Superficial - Head	0.50	6.12	3.75	0.25	3.00
Bedrock - Granite	2.05	3.84	Not proven		Not proven

7.1.2. The ground model as described in Table 7.1 broadly agrees with the conditions anticipated.

7.1.3. Groundwater was encountered in all exploratory holes apart from WS05, and was generally encountered at a level of 3.00m OD.

7.2. Head

7.2.1. Below a covering of topsoil, Head was encountered in all exploratory hole locations. The composition of this stratum comprised varying mixtures of clay, silt, sand and gravel, with the gravel component comprising granite.

7.2.2. A greater thickness of Head was encountered on the north and west sides of the site, and the soil horizons at the base of this unit generally contained a higher gravel component than the overlying horizons. The higher proportion of gravel is considered to be due to the incorporation of weathered material from the underlying granite bedrock.

TABLE 7.2: Summary of Soil Parameters for the Head Deposits

Soil Parameters	Number of tests	Range of results	Characteristic value
Liquid Limit (%)	6	26 – 27	26
Plastic Limit (%)	6	3no. tests returned 17 3no. tests returned Non Plastic	17
Plasticity Index (%)	3	9 – 10	9
Modified Plasticity Index (%)	3	3.6 – 5.4	4
Plasticity	6	Non Plastic to Low Plasticity	Low
Volume Change Potential (NHBC)	6	Negligible	Negligible
Moisture Content (%)	6	13 - 22	18
Particle Size Distribution	4	Gravel: 25 – 43% Sand: 44 – 35% Silt: 21 – 33%	-

Soil Parameters	Number of tests	Range of results	Characteristic value
		Clay: 5 – 7%	
SPT 'N_{60}' Values	10	2.5 - 21	8
California Bearing Ratio (%)	3	2.8 - 18	3

7.2.3. The results of the particle size distribution gradings correlate well with the observations made during the site investigation, that the lower horizons of the Head contain a higher proportion of granular (sand and gravel) size particles.

7.3. Granite

7.3.1. Although not directly sampled or recovered from any of the boreholes, Granite is interpreted to be present below the Head in all exploratory hole locations. This is based on very high SPT N60 values of between 61 and 101, which prevented further progress of the exploratory holes.

7.3.2. Due to the drilling techniques used for this preliminary investigation it is not possible to estimate strength parameters for this unit.

7.4. Buried Concrete

7.4.1. 7 no. soil samples taken from the Head were subjected to pH and water soluble sulphate determinations. With reference to BRE Digest SD1 (2005 Ed), the results indicate a Design Sulphate Class of DS-1 is applicable.

7.4.2. 1 no. sample of groundwater obtained during the fieldwork, was subjected to sulphate and pH determinations. The recorded sulphate value was 22.2 mg/l and the pH of 6.2, which suggests, with reference to the BRE Digest a DS-1 classification.

7.5. Groundwater Conditions

7.5.1. Groundwater observations during the field and the subsequent monitoring are described in Section 5.0 and are summarised in Table 5.2.

8.0 REVISED CONCEPTUAL SITE MODEL AND QUALITATIVE RISK ASSESSMENT

8.1.1. Guidance for contaminated land advocates the assessment of risk by determining the presence of pollutant linkages and weighting the likelihood of harm occurring with the potential severity of that harm. The framework is set out in various publications by the DETR, Environment Agency, Institute for Environment and Health, NHBC and CIRIA.

8.1.2. Tables 4.2 - 4.3 indicate the potential contaminants, pollutant linkages and receptors that have been considered at the site. Following the investigation of these and Generic Quantitative Risk Assessment (for soil, groundwater and gas media) a qualitative risk assessment for each receptor is presented below in Tables 8.1 - 8.6. For the purpose of this assessment, the descriptions of risk presented in Table 6.1 have been used which take into account the magnitude of the source contamination identified, likelihood of exposure via a pathway and significance of harm likely to result on the given receptor:

TABLE 8.1: Groundworkers (Assuming Basic PPE)*

Pathway	Risk	Comment
Ingestion of soil/dust	Very Low	Redevelopment or maintainance of the site may involve ground workers coming into contact with the underlying soils and water. Soil contamination has not been identified at the site. Normal Health and Safety precautions associated with a site where potential contamination may exist (of the levels identified), will mitigate the general risk. There is a potential risk if previously unforseen contamination is later found to be present.
Inhalation of soil/dust	Very Low	
Dermal contact with soil/dust/water	Very Low	
Inhalation of vapour from soil/dust	Very Low	
Inhalation of vapour from groundwater	Very Low	
Migration of soil gases to confined spaces	Very Low	

* Separate assessments are required in relation to asbestos risk.

TABLE 8.2: End Users during Occupation

Pathway	Risk	Comment
Inhalation of dust	Very Low	Soil contamination has not been identified at the site considering the proposed residential enduse. Best practice guidance recommends a watching brief maintained throughout groundworks as there is a potential risk if previously unforeseen contamination is later found to be present. Radon gas is noted as a risk and buildings will need to include measures to minmise the risk.
Ingestion of soil/dust	Very Low	
Dermal contact with soil/dust/water	Very Low	
Consumption of vegetables/plants	Very Low	
Inhalation of vapour from soil/dust	Very Low	
Inhalation of vapour from groundwater	Very Low	
Migration of soil gases to confined spaces/structure	Very Low	
Movement of contaminants to engineered structures (e.g. water pipes)	Very Low	

Pathway	Risk	Comment
Uptake by flora/fauna	Very Low	

TABLE 8.3: Controlled Waters (Groundwaters and Surface Waters)

Pathway	Risk	Comment
Migration of water borne contaminants from site to surface waters	Low-Moderate	No elevated contamination identified in relation to Drinking Water. A groundwater sample was identified to have an elevated level of cadmium in respect of conservative environmental quality thresholds (AA-EQS) in relation to freshwater ecosystems. However in the absence of an identified soil source, the site is not considered to be impacting upon groundwater and mitigation measures are therefore not considered to be required as part of the development.
Migration of water borne contamination from off site	Low	
Migration of contamination from surface and/or subsurface to groundwater and drinking water supplies in the Source Protection Zone	Low	

TABLE 8.4: Sensitive Receptors (Ecological Designation e.g. SSSI)

Pathway	Risk	Comment
Migration of water borne contaminants to Lower Moors SSSI	Low-Moderate	A source of potential soil contamination has not been identified at the site. A groundwater sample was identified to have an elevated level of cadmium in respect of conservative environmental quality thresholds (AA-EQS). However in the absence of an identified soil source, the site is not considered to be impacting upon groundwater and mitigation measures are therefore not considered to be required as part of the development.

Table 8.5: Buildings / Services*

Pathway	Risk	Comment
Movement of contaminants to engineered structures (e.g. water pipes)	Low	Consideration will be required with respect to potable supply pipework due to the presence of a small area of Made Ground. While this has not been shown to include any potential contaminants (e.g. such as hydrocarbons) liaison with the water supply provider will be required to confirm appropriate water supply pipe material.
Migration and accumulation of flammable gases beneath the building footprint.	Low	No source identified.

*Excludes Radon Gas Risk

TABLE 8.6: Adjacent Receptors

Pathway	Risk	Comment
Dermal contact with soil/dust/water	Very Low	A source of potential soil contamination has not been identified at the site. There are few sensitive (residential) receptors in close proximity to the site.
Inhalation/ingestion of dust	Very Low	
Inhalation of vapour from soil/dust	Very Low	
Inhalation of vapour from groundwater	Very Low	
Migration of soil gases to confined spaces/structure	Very Low	
Movement of contaminants to engineered structures (e.g. water pipes)	Very Low	

9.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

9.1. Introduction

9.1.1. It is proposed to develop the site for residential purposes, with current concept proposals comprising low-rise semi-detached and detached houses. An area on the west side of the site is indicated as allotments with an orchard or reed bed proposed for the land north of this. A plan showing the current proposal is presented in Appendix A.

9.1.2. Details of the structure and anticipated loadings were under development at the time of the writing of this report.

9.1.3. The site investigation carried out is considered a preliminary investigation to provide a basic characterisation of the site. Further investigation and assessment will be required once proposals are fully developed, so that a detailed Geotechnical Design Report can be prepared.

9.1.4. The primary purpose of this report is to identify risk, allow design development and inform cost estimates.

9.2. Key Considerations

9.2.1. The ground investigation has identified a number of geotechnical risks at the site. These are summarised below and discussed in more detail in the following sections:

- Shallow groundwater level;
- Soft or loose ground to depths up to 2.0m;
- Running sands;
- Sloping ground.

9.3. Site Levels

9.3.1. Based on a topographic survey of the site carried out in 2017, site levels fall from 8.50m AOD in the south western corner, to 3.50m AOD on the north western edge of the site. This is a fall of 5m over a distance of 65m, giving a slope of 4.4°. Depending on the layout of the final scheme, a degree of re-levelling, earthworks or retaining walls may be required to accommodate this slope.

9.4. Foundations

9.4.1. As described in Section 7, the site is underlain by Head deposits to a depth of approximately 3.50m bgl, after which Granite bedrock is present. Based on the ground conditions encountered, the Head deposits will provide a bearing stratum of low bearing capacity for traditional pad or strip foundations.

9.4.2. Based on the available preliminary ground investigation data, an allowable bearing capacity of 40kN/m^2 may be adopted for shallow foundations between 0.60m and 1.50m wide, placed at a minimum depth of 1.50m bgl. Should a higher bearing capacity be required, then alternative solutions such as ground improvement or piling may be adopted as discussed in the sections below.

9.4.3. For pad or strip foundations extended to bear onto the Granite bedrock, significantly higher bearing capacities may be achieved. In borehole WS5, in the southwest of the site, Granite bedrock was encountered at a much shallower depth of 1.60m bgl. Further investigation in this area is recommended to identify the depth to bedrock.

9.4.4. Preliminary laboratory testing suggests that Head soils are of low plasticity to non-plastic. In addition, high groundwater levels were encountered in boreholes WS3 and WS4 on the northern side of the site. It is unlikely that the site will be susceptible to shrink/swell movement associated with the water demand of trees.

9.5. Ground Improvement

9.5.1. Should a higher bearing capacity in excess of 40kN/m^2 be required for shallow foundations, then the site is considered likely to be amenable to ground treatment with vibro-stone columns (VSC). Should VSC be implemented then shallow footings or a 'semi-raft' foundation could be adopted, depending on the nature and degree of treatment. Following VSC treatment, an allowable bearing capacity in the region of 100kN/m^2 is anticipated, subject to additional ground investigation and design by a specialist contractor.

9.5.2. It is likely that the VSCs will penetrate the groundwater encountered at around 3m AOD, therefore the potential for downward migration of any mobile contaminants would need to be considered. Consequently, a foundations works risk assessment would be required to determine the risk posed. In relation to such matters reference should be made to Environment Agency guidance document 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination' (2001).

9.5.3. The advice of reputable specialist contractors in VSCs and experienced in the ground conditions considered here should be sought. They should be responsible for the selection of appropriate equipment and the final design of the treatment.

9.6. Piles

9.6.1. Consideration may be given to adopting a bored pile foundation solution, with piles socketing into the Granite bedrock. If a piled foundation is pursued, further ground investigation, including rotary boreholes with sampling and testing of the Granite bedrock, will be required to confirm the available bearing capacity.

9.6.2. The advice of reputable piling specialists, experienced in the ground conditions considered here, should be sought. They should be responsible for the selection of appropriate piling equipment and the final design of the piles.

9.7. Floor slabs

9.7.1. Due to the presence of thick Topsoil and loose sandy Head deposits, suspended floor slabs are recommended.

9.8. Road Pavements

9.8.1. Pavement surfaces should be constructed on Head deposits below any Topsoil. Based on the limited CBR test data from the site investigation, an equilibrium CBR value of 3% is recommended for preliminary design.

9.8.2. The formation level should be rolled and inspected for any soft, loose, or organic material. These materials should be removed and replaced with granular fill, placed and compacted in accordance with a suitable specification.

9.8.3. Laboratory test results were indicative of frost susceptibility of the shallow soils.

9.9. Buried Concrete

9.9.1. In the consideration of sulphate attack on buried concrete, reference has been made to BRE Special Digest 1 which classifies the site as a greenfield site with mobile groundwater conditions. The results of the concrete classification tests received have indicated a design sulphate class of DS-1 and an ACEC Class of AC-1 for the Head deposits. No information are available for the Granite bedrock.

9.10. Drainage

9.10.1. The granular horizons encountered at depth within the Head deposits may provide a suitable stratum for soakaway drainage, especially towards the southern parts of the site where lower groundwater levels or dry conditions were encountered. Further testing will be required to confirm whether the infiltration rates achievable at the site will be suitable. This testing should be included as part of any future detailed site investigation required once development proposals are known.

9.11. Excavations

9.11.1. Excavations may be readily completed using conventional excavation plant. Shallow excavations are not likely to remain stable unsupported during construction, due to the presence of loose sandy Head deposits and the local presence of groundwater near the ground surface. Any open excavations will deteriorate rapidly in the presence of water, therefore all excavations should be protected from rain and surface run-off.

9.11.2. Stability of excavation faces in Head deposits cannot be relied on and allowance should be made for battering faces back to a safe angle of repose, or providing shuttering. Support or battering of the excavation faces to a safe angle of repose will also be required for all excavations where man entry is necessary, the nature and extent of which will need to be evaluated under CDM regulations.

9.11.3. Pumping of groundwater for any shallow excavations should be allowed during construction especially towards the northernmost areas of the site. The loss of fines should be prevented as may lead to running sand conditions.

9.12. General Construction Advice

9.12.1. For any load bearing formations, careful inspection should be undertaken to ensure placement in competent natural strata. Any soft spots identified should be excavated and replaced with compacted granular fill or lean mix concrete. Concrete should be placed as soon as possible following any excavation to avoid softening of the ground. A similar recommendation is also made for road pavement formations, although compacted granular fill could be used instead of concrete.

9.13. Recommendations for Further Work

9.13.1. As discussed, the site investigation undertaken to date is preliminary in nature and further investigation will be required to fully characterise the site once the scheme and development layout are known.

9.13.2. Further investigation should comprise:

- Additional exploratory holes to characterise the shallow Head soils for use in earthworks associated with re-levelling of site slopes, the design of any retaining structures, or the design of ground improvement such as vibro-stone columns.
- Additional monitoring wells and monitoring visits to identify the groundwater profile across the site.
- Investigation to confirm the depth of bedrock and its geotechnical properties across the site should a shallow foundation or piled foundation solution resting on bedrock be adopted.

10.0 ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

10.1. Summary of Risk

10.1.1. The site investigation commissioned by CampbellReith incorporated contamination testing of soil and groundwater across the site. In addition, available Desk Study information has been consulted.

10.1.2. The site is considered to lie in area of Moderate-High environmental sensitivity with respect to Hydrogeology and a Low environmental sensitivity with respect to Hydrology, although a High environmental sensitivity is considered in relation to the nearby SSSI and ecological conservation.

10.1.3. The proposed residential development is considered to be of High end user sensitivity.

10.2. Summary of Contamination

10.2.1. The site has been developed within a rural part of the Isles of Scilly and is mostly surrounded by fields being located on the edge of the village of Old Town. The current use of the site as pasture grazing, an activity that is not considered to be a potential source of contamination. Desk study and subsequent site investigation and chemical analysis has identified the following key contamination issues at the site:

- Soils: No elevated soil contamination identified in relation to human health risk;
- Groundwater: Marginally elevated cadmium concentrations present in relation to Environmental Quality Standards protective of freshwater ecosystems. No exceedences in relation to Drinking Water Standards;
- Surface Water: Not present.
- Grounds Gas: Not monitored. No ground gas sources identified. Radon gas indicated by mapping.

10.3. Summary of Risk Assessment

- Construction / Groundworkers: The qualitative assessment identified a **Very Low** risk to groundworkers who may come into contact with contaminated soils;
- End Users: No contamination identified, therefore a **Very Low** risk to Future End Users;
- Controlled Waters: No elevated contaminants above the GAC that indicate a potential risk to the Drinking Waters and the Source Protection Zone. **Low** risk;
- Offsite Sensitive Uses/Ecology: The qualitative assessment identified a potentially **Low-Moderate** risk to adjacent ecological conservation areas and surface waters due to marginally elevated levels of cadmium dissolved within groundwater recorded beneath the site. The source of this cadmium is unknown and there is no evidence of any source being present on site. As such, considering the above information, remedial measures are not considered necessary as part of the development; and,
- Buildings/Services: No sources of hazardous ground gas identified or elevated contamination that may pose a risk to potable water supplies and so a **Low** risk is anticipated. However, a **High** risk from radon gas indicates that full protection measures are required within dwellings.

- Adjacent Receptors: **Very Low** risk.

10.3.1. Overall, the site is considered to present a **LOW** risk in relation to contamination.

10.4. General recommendations

10.4.1. No specific further actions are required to address land contamination issues although some general outline recommendations are made:

- Watching brief
- Waste Management

10.4.2. A watching brief should be maintained throughout the groundworks in order to identify any previously undetected areas of contamination; such as asbestos containing materials and/or stained/odorous soils. These should be assessed by an Environmental Consultant if identified.

10.4.3. Any excavations should be backfilled with soils which are suitable for use and in accordance with the appropriate Remediation and/or Groundworks Specification compiled by the Engineer.

10.4.4. Imported materials e.g. topsoil/subsoil for private gardens and soft landscaped areas will require provision for chemical testing in compliance with an agreed set of Limiting Values or GACs (as used in Table 6.2). Records should be maintained to certify the source, chemical suitability and appropriate placement of imported soils.

10.4.5. The qualitative assessment identified a potentially Low risk to groundworkers who may come into contact with contaminated soils.

10.4.6. The Contractor should prepare risk assessments and method statements in view of the identified and foreseeable ground conditions and include these within the Health and Safety Plan: for example, these should consider worker protection from skin contact, ingestion and inhalation of contaminants, asbestos in soils and ground gas. In order to achieve satisfactory control, CampbellReith recommend that Health and Safety provisions in accordance with HSE Publication HS(G) 66 and CIRIA Report 132 are considered. The Contractor must also control matters such as any contracted CDM responsibilities.

10.4.7. Whilst the presence of asbestos in soils is not anticipated, the Contractor should formulate their working arrangements in view of the requirements of the Control of Asbestos Regulations (2012) and the associated ACoP (L143). Additional interpretation on the application of these regulations is presented in publications prepared by CL:AIRE and the Joint Industry Working Group (CAR-SOILTM Control of Asbestos Regulations 2012, Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials, 2016; and the associated JIWG decision support tool, 2017). Additional guidance is provided in CIRIA C765, Asbestos in Soil and Made Ground Good Practice Site Guide, 2017.

10.4.8. Following on from the recommendations made herein, in order to control the environmental works on site and facilitate the collection of records required for the Verification Report, a Remediation/ Groundworks Specification will be required. The Specification should detail necessary requirement for inspections/ record keeping/ actions for unforeseen contamination/ detail the requirements for the control of imported material and waste management.

10.4.9. The Specification will require submission to the Local Authority for review and approval as part of the planning process, to fulfil the requirements of the anticipated land quality planning

condition. Failure to submit the required documentation could result in refusal to discharge associated Land Quality Planning Conditions, and discussions should be held with the relevant Officer at an early stage to ensure all necessary information is obtained and collated for their review and approval. Additional discussions may be required with the NHBC and/or Building Control, such matters are not detailed herein. Once approved it will be the Contractor's obligation to fulfil the agreed requirements of the Specification.

10.4.10. Should the groundworks encounter fuel tanks, removal of any such features is required in accordance with an appropriate tank removal specification and Contractor's method statements which meet the requirements of the appropriate Environment Agency Pollution Prevention Guidelines (PPG).

10.4.11. A hazardous properties assessment of waste soils has not been undertaken as part of this report and is recommended. The soil results can, however, be used by the Contractor as a basis for waste soil classification and disposal purposes; however, additional testing may be required, particularly if non- representative soils are uncovered such as those that are stained, odorous or containing asbestos.

10.4.12. All waste related activities must be undertaken in accordance with the Waste Management and Landfill Regulations. Any proposed reuse of materials must be in accordance with the Waste (England and Wales) Regulations 2011 (as amended). With respect to waste soils disposal, as a minimum, the following information should be collected and retained by the Contractor for subsequent validation:

- source and origin of the waste;
- information on the process producing the waste;
- European Waste Catalogue code and characteristics of material;
- for hazardous waste, definition of the relevant properties according to the Hazardous Waste Directive (Annex III 91/689/EC);
- confirmation that waste is not prohibited waste;
- appearance of the waste;
- landfill class; and,
- Duty of Care records including full and completed chain of custody documentation.

10.4.13. The final waste classification is the responsibility of the Contractor and should be determined in conjunction with the receiving landfill and in liaison with the Environment Agency (and their technical guidance). It is noted that, depending on the landfill selected, additional soils testing information and independent verification of the materials of the materials being received by the landfill may be required.

10.4.14. As the correct classification of waste is likely to have a significant impact on the redevelopment budget, the waste classification should be reviewed independently by a consultant at an early stage in the project management stage. In addition, contractors should be asked to confirm that their tenders consider the full requirements of the Landfill Directive and associated waste legislation. This is to ensure waste is correctly classified and costed at the inception of the project.

10.4.15. The Landfill Directive states that all hazardous and non-hazardous waste requires treatment prior to disposal to landfill. Treatment must provide a 'three – point step'. As such, provision for

treating (including physical separation) should be made for all arisings that are likely to be classified as hazardous or non-hazardous so that each of the above three requirements are met.

10.4.16. A separate assessment should be made for the rate of Landfill Tax (where applicable) in accordance with HMRC Excise Notice LFT1.

11.0 TECHNICAL REFERENCES

Reference	Reference Title	Type
[1]	Groundsure Insight Report (Maps). Report Ref: GS-6582079. See Appendix B.	Website / Map
[2]	BGS Geology of Britain viewer (Publicly available record) (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) Accessed 28th January 2020	Website / Map
[3]	BGS 1:50,000 scale map of England and Wales: Isles of Scilly (sheet 357 & 360 – published 1975) Solid and Drift geology (Publicly available record) (http://www.largeimages.bgs.ac.uk/iip/mapsportal.html?id=1001759) Accessed 28th January 2020	Website / Map
[4]	Council of Isles of Scilly (2017) Isles of Scilly Local Flood Risk Management Strategy, March 2017, Final.	
[5]	Environment Agency Catchment Data (Publicly available record) (http://environment.data.gov.uk/catchment-planning/) Accessed 28th January 2020	Website / Map
[6]	Environment Agency Flood Map for Planning (Publicly available record) (https://flood-map-for-planning.service.gov.uk/) Accessed 28th January 2020	Website / Map
[7]	Parkes, C, 2018. Land north of Ennor Castle, St Mary's, Isles of Scilly; Heritage Impact Assessment Cornwall Archaeological Unit, Cornwall Council: Truro (CAU report no. 2018RR046)	Report
[8]	Parkes, C, 2019. Land north of Ennor Castle, Old Town, St Mary's, Isles of Scilly; geophysical survey statement, Cornwall Archaeological Unit, Cornwall Council: Truro (CAU reference: 2019R040)	Report
[9]	MAGiC Website - Natural England (Publicly available record) (http://magic.gov.uk/MagicMap.aspx) Accessed 28th August 2018	Website / Map
[10]	Zetic UXO Bomb Risk Map (https://zeticauxo.com/downloads-and-resources/risk-maps/) accessed 28th January 2020.	Website / Map
[11]	www.scilly.gov.uk	Website
[12]	Environment Agency Isles of Scilly Source Protection Zone Delineation Project ENVRESW001361 December 2016	Report

ENVIRONMENTAL RISK ASSESSMENT SUPPORTING INFORMATION

Soil Screening Values

The Environment Agency has published non statutory technical guidance for Regulators and their advisors to assess the chronic risk posed to human health from land contamination, known as the Contaminated Land Exposure Assessment (CLEA) Framework.

The CLEA Framework documents and associated risk assessment model are subject to ongoing technical review. In July 2008 guidance documents CLR7 to 10, which previously underpinned the CLEA Framework, were withdrawn. In January 2009 the Environment Agency published CLEA V1.04 risk assessment software and associated guidance documents[8] as a replacement to the previous CLEA UK Beta Version and documents CLR 7 to 10. Further revisions were made in September 2009 to CLEA V1.05 and October 2009 to CLEA 1.06 risk assessment software.

Soil Guideline Values (SGVs) were produced by Defra/EA and Generic Assessment Criteria (GACs) were produced by CampbellReith and others. These were based on the CLEA model and supporting guidance (SR2 and SR3) and where based on a minimal/tolerable level of risk.

In December 2014 DEFRA released final versions of the C4SLs (Category 4 Screening Levels) for 6 No. contaminants (As, benzene, BaP, Cd, Cr VI and Pb) together with a Policy Companion Document and an Erratum. These represent contaminant soil concentrations which present an acceptable (Low) level of risk, within the context of Part 2A, i.e. they are representative of Category 4 sites. In the Contaminated Land Statutory Guidance (April 2012), sites under Part 2A assessments are categorised 1 - 4, with Category 1 being definitely Part 2A and Category 4 definitely not Part 2A ('where there is no risk or the level of risk posed is low').

The C4SLs were produced using the CLEA model and follow the general approach of SR3, although, changes were made to exposure parameters and to the toxicological basis of the assessments. The C4SLs are based on a low level of toxicological concern (LLTC) and are, by definition, less conservative than Health Criteria Values (HCVs) which are the basis for assessments defined in SR2 and used in the generation of SGVs and GACs. They are, therefore, indicative of a low level of risk.

Since their release, DEFRA have confirmed that C4SLs can be used in the planning regime and DCLG (Department for Communities and Local Government) amended Planning Practice Guidance (PPG) on Land Affected by Contamination (12 June 2014)[9] which stated that C4SLs provide a simple test for deciding when land is suitable for use and definitely not contaminated land'. On 03 September 2014 the Secretary for the Environment, Lord de Mauley, issued a letter (attached) to all Local Authorities which references DCLG's PPG and confirms that C4SLs could be used in planning and provide a simple test for establishing when sites are suitable for use.

LQM/CIEH issued S4ULs in December 2014 for 89 contaminants (metals, BTEX, banded TPH, speciated PAH, chlorinated solvents, phenols, chlorophenols, chlorobenzenes, pesticides and a number of miscellaneous others). The S4ULs have generally adopted the revisions to the exposure modelling that were developed in the production of the C4SLs. Critically, however, they are based on HCVs to produce concentrations which are indicative of a minimal/tolerable level of risk.

S4ULs are therefore used as the preliminary stage of soil assessments since they are indicative of minimal/tolerable level of risk. If these are exceeded then the C4SLs are used (if available) to determine if the risk could be described as low.

Where CLEA compliant S4ULs or C4SLs are not available reference is made to Generic Assessment Criteria (GAC) derived using the CLEA UK model (beta version). These are currently used for cyanide. Where referred to, the non-compliant standing of these values is considered.

[8] Environment Agency Report Ref: SC050021/SR2 - *Human Health Toxicological Assessment of Contaminants in Soil.* January 2009. Environment Agency Report Ref: SC050021/SR3 – *Updated background to the CLEA model.* January 2009.

[9] http://planningguidance.planningportal.gov.uk/blog/guidance/land-affected-by-contamination/land-affected-by-contamination-guidance/

Selection of Appropriate [Tier 2] Soil Screening Values

The CLEA model is based upon defined exposure scenarios and six generic land uses have been established for the C4SLs and S4ULs. These set out a discrete set of circumstances where exposure may occur, including a source, the pathways, and the exposed population.

The three generic land use scenarios used in the development of SGVs are:

- **commercial/Industrial;**
- **allotments; and,**
- **residential with plant uptake,**
- **residential without plant uptake,**
- **public open space (residential)**
- **public open space (parks)**

It is noted that the CLEA screening values are generic and not always applicable. Where the CLEA conceptual model is not appropriate it will be necessary to develop site specific Detailed Quantitative Risk Assessment screening values as a further stage of assessment.

It is noted that the CLEA model does not consider risks from contaminated waters beneath the site to human health and the model also assumes that no free product is present. Should such conditions exist at the subject site the requirement for application of an alternative risk assessment model should be assessed. Alternatively, construction workers are potentially exposed to acute risk and therefore require separate consideration.

Statistical Analysis of Soil Analytical Results

Statistical analysis of soil based analytical results has been undertaken in accordance with CL:AIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration (May 2008). The use of the Mean Value Test and Maximum Value Test is still considered appropriate for site assessments. Although the guidance advocates use of the one - sample t test, this is a variation of the mean value test and establishes the confidence level at which the assessor can determine whether a particular screening level has/has not been succeeded. The mean value test used herein is set at the 95th percentile confidence limit in order to be risk conservative.

The Maximum Value Test is a statistical tool that is used to identify outlier values from a numerical distribution of results for a given determinant. These outlier values can be excluded and considered separately, and the remaining values are then used to calculate upper bound 95th percentile values ($95^{\%ile}$) (Mean Value Test) for comparison with the screening values.

The results are reviewed prior to any statistical analysis in order to determine if zoning of the soils is apparent and hence whether the site requires to be divided into averaging areas. Additional tables are presented where appropriate to reflect distinct ground characteristics relevant to the conceptual model.

Water Screening Values

This assessment considers potential risks to controlled waters (groundwater and surface waters) in relation to risks from any historical contamination. The most stringent test is that defined for Contaminated Land under Part 2A of the Environmental Protection Act, 1990. However, it should be recognised that a wider evaluation of risk is considered within the planning regime and CLR 11.

The Environment Agency has a wider policy agenda for the protection of controlled waters that will impinge upon judgements in relation to land contamination issues. This includes those for the Water Framework Directive and Groundwater Directive and wider legislation for both groundwater, surface water and associated elements (such as fisheries)[10].

The results of water analysis have been compared to screening values selected to assess the potential risk to the identified controlled water receptors in the Conceptual Model. The specific standards utilised for this purpose are considered in the assessment table footnotes and typically comprise: Environmental Quality Standards for the protection of aquatic life; Surface Water Standards; EC, UK and WHO Drinking Water Standards; or Background water quality (where no applicable standard exists).

The initial assessment considers the sensitivity of the receptor in the selection of the screening value. Advice for this purpose has been obtained principally from Environment Agency Technical Advice to Third Parties on Pollution of Controlled Waters for Part 2A of the Environmental Protection Act 1990, No 07/02, EA, 2002 (INFO-RA2-3e), as informed by the EA's GP3.

Where a viable pollutant linkage is considered to be present and the screening criteria exceeded, a Qualitative Risk Assessment is presented with associated recommendations. Depending on the specific objectives, policy and practice of the Environment Agency, discussion of water screening values may be subsequently required.

Definitions of Consequence, Probability and Risk

The following classification has been taken from Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH.

The key to the classification is that the designation of risk is based upon the consideration of both:

a) **the magnitude of the potential consequence (i.e. severity).**

[takes into account both the potential severity of the hazard and the sensitivity of the receptor]

b) **the magnitude of probability (i.e. likelihood).**
[takes into account both the presence of the hazard and receptor and the integrity of the pathway]

[10] Refer to Environment Agency Publications for Groundwater Protection Policy and Practice (GP3)

Classification of Consequence

Classification	Definition	Examples
Severe	Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA **Category 1** pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in circular 01.2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of List I and II substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to **EA Category 2** pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.
Mild	Exposure to human health **unlikely** to lead to "significant harm". Equivalent to **EA Category 3** pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.

Classification	Definition	Examples
	Minor damage to crops, buildings or property.	
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.

Classification of Probability

Classification	Definition	Examples
High likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.	*a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden.* *b) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.*
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	*a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space.* *b) Ground/groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.*
Low likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.	*a) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space.* *b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.*
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	*a) Elevated concentrations of toxic contaminants are present below hardstanding.* *b) Light industrial units <10 yrs old containing a double-skinned UST with*

Classification	Definition	Examples
		annual integrity testing results available.

Note: A pollution linkage must first be established before probability is classified. If there is no pollution linkage then there is no potential risk. If there is no pollution linkage then there is no need to apply tests for probability and consequence.

For example if there is surface contamination and a principal aquifer is present at depth, but this principal aquifer is overlain by an aquiclude of significant thickness then there is no pollution linkage and the risks to the principal aquifer are not assessed. The report should identify both the source and the receptor but state that because there is no linkage there are no potential risks.

Description of the classified risks

Very high risk
There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.

High risk
Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.

Moderate risk
It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.

Low risk
It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.

Very low risk
It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that the harm if realised would normally be mild or minor.

No potential risk
There is no potential risk if no pollution linkage has been established.

LIMITATIONS

Environmental & Geotechnical Interpretative Reports

1. This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the client.
2. Where any data or information supplied by the client or other external source, including that from previous studies, has been used, it has been assumed that the information is correct. No responsibility can be accepted by CampbellReith for inaccuracies within this data or information. In relation to historic maps the accuracy of maps cannot be guaranteed and it should be recognized that different conditions on site may have existed between and subsequent to the various map surveys.
3. This report is limited to those aspects of historical land use and enquiries related to environmental matters reported on and no liability is accepted for any other aspects. The opinions expressed cannot be absolute due to the limit of time and resources implicit within the agreed brief and the possibility of unrecorded previous uses of the site and adjacent land.
4. The material encountered and samples obtained during on-site investigations represent only a small proportion of the materials present on the site. There may be other conditions prevailing at the site which have not been revealed and which have therefore not been taken into account in this report. These risks can be minimised and reduced by additional investigations. If significant variations become evident, additional specialist advice should be sought to assess the implications of these few findings.
5. The generalised soil conditions described in the text are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and have been developed on interpretations of the exploration locations and samples collected.
6. Water level and gas readings have been taken at times and under conditions stated on the exploration logs. It must be noted that fluctuations in the level of groundwater or gas may occur due to a variety of factors which may differ from those prevailing at the time the measurements were taken.
7. Please note that CampbellReith cannot accept any liability for observations or opinions expressed regarding the absence or presence of asbestos or on any product or waste that may contain asbestos. We recommend that an asbestos specialist, with appropriate professional indemnity insurance, is employed directly by the client in every case where asbestos may be present on the site or within the buildings or installations. Any comments made in this report with respect to asbestos, or asbestos containing materials, are only included to assist the client with the initial appraisal of the project and should not be relied upon in any way.
8. The findings and opinions expressed are relevant to those dates of the reported site work and should not be relied upon to represent conditions at substantially later dates.
9. This report is produced solely for the benefit of the client, and no liability is accepted for any reliance placed upon it by any other party unless specifically agreed in writing.

APPENDIX A: FIGURES

Figure 1: Site Location

Figure 2: Annotated Site Layout

Figure 3: Proposed Development

Figure 4: Constraints

Images from site walkover undertaken on 19th December 2019.

Ennor Farm, St Mary's

Client: Council of Isle of Scilly

Figure 1:
Site Location Plan

Scale: 1:10000@A4

Job Number: 13394
Drawn by - Checked by: RP/RLF - AD/TT
Drg No - Status/Revision: 13394-CRH-XX-XX-FG-G-7000 - P2
File location: \\red-data1\gis-data\13250 - 13499\13394 B - Ennor Farm St Marys\Project_Workspaces\DTS (pdf in Outputs)
Date (Revision History): 08/01/2021 (P1, First Issue, 24/01/20, RP; P2, Site Boundary, 08/01/21, RLF)

CampbellReith
consulting engineers
LONDON 020 7340 1700 ☐ ☐ MANCHESTER 0161 819 3060
REDHILL 01737 784 500 ☒ ☐ BIRMINGHAM 01675 467 484
BRISTOL 0117 916 1066 ☐ ☐ DUBAI 00 971 4453 4735
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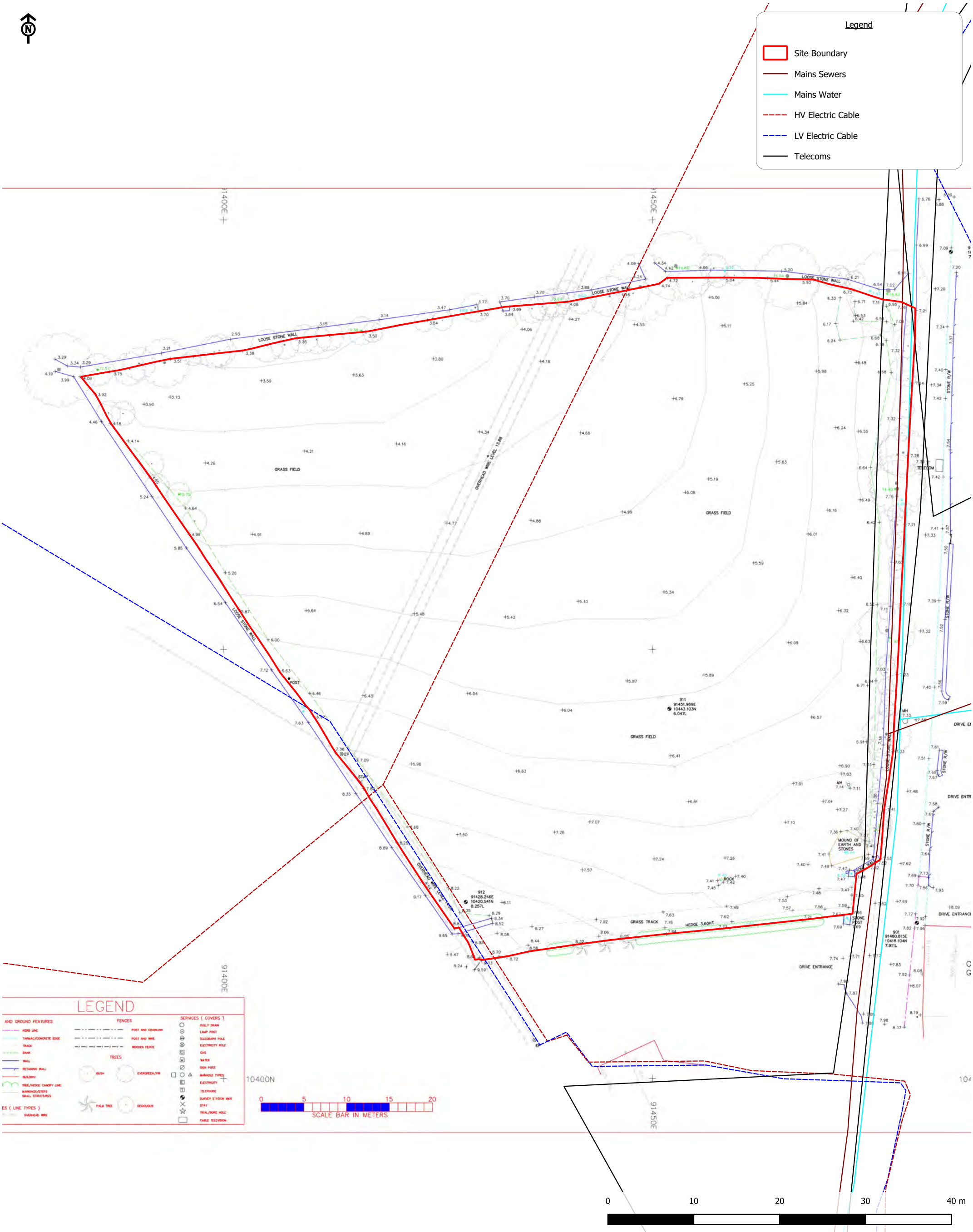

Ennor Farm, St Mary's

Client: Council of Isle of Scilly

Figure 2:
Site Layout Plan

Scale: 1:400@A3

Nationwide Surveys Topographic Survey, drg no DOC1701A (Apr 2017)

Job Number: 13394

Drawn by - Checked by: RP/RLF - AD/TT

Drg No - Status/Revision: 13394-CRH-XX-XX-FG-G-7001 - P2

File location: \\red-data1\gis-data\13250 - 13499\13394 B - Ennor Farm St Marys\Project_Workspaces\DTS (pdf in Outputs)

Date (Revision History): 08/01/2021 (P1, First Issue, 24/01/20, RP; P2, Site Boundary, 08/01/21, RLF)

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Legend

Site Boundary

PLOT	ILLUSTRATIVE HOUSETYPE	NUMBER OF BEDS	*SEMI/ DETACHED
01	TYPE A/B	2B4P	DETACHED
02	TYPE A/B	2B4P	DETACHED
03	TYPE E	2B4P	DETACHED
04	TYPE A/B	2B4P	DETACHED
05	TYPE E	2B4P	DETACHED
06	TYPE E	2B4P	DETACHED
07	TYPE A/B	2B4P	DETACHED
08	TYPE E	2B4P	DETACHED
09	TYPE A/B	2B4P	DETACHED
10	TYPE C	2B4P/ 4B6P	SEMI DETACHED
11	TYPE C	2B4P/ 4B6P	SEMI DETACHED
12	TYPE D	2B4P	SEMI DETACHED
13	TYPE D	2B4P	SEMI DETACHED

*SEMI/ DETACHED - Plots are to be detached or semi detached in accordance with the site plan and plot table above.

Scale, materiality and form are to be informed the the Design Code.

0 10 20 30 40 m

Ennor Farm, St Mary's

Client: Council of Isle of Scilly

Figure 3:
Proposed Development Plan

Scale: 1:500@A3

KTA Architects - Site Plan As Proposed: SC-KT-XX-XX-DR-A-2002-S0-SK100 - P5 (Jan 2021)
Job Number: 13394
Drawn by - Checked by: RP/RLF - AD/TT
Drg No - Status/Revision: 13394-CRH-XX-XX-FG-G-7002 - P2
File location: \\red-data1\gis-data\13250 - 13499\13394 B - Ennor Farm St Marys\Project_Workspaces\DTS (pdf in Outputs)
Date (Revision History): 08/01/2021 (P1, First Issue, 24/01/20, RP; P2, Proposed Development Updates, 08/01/21, RLF)

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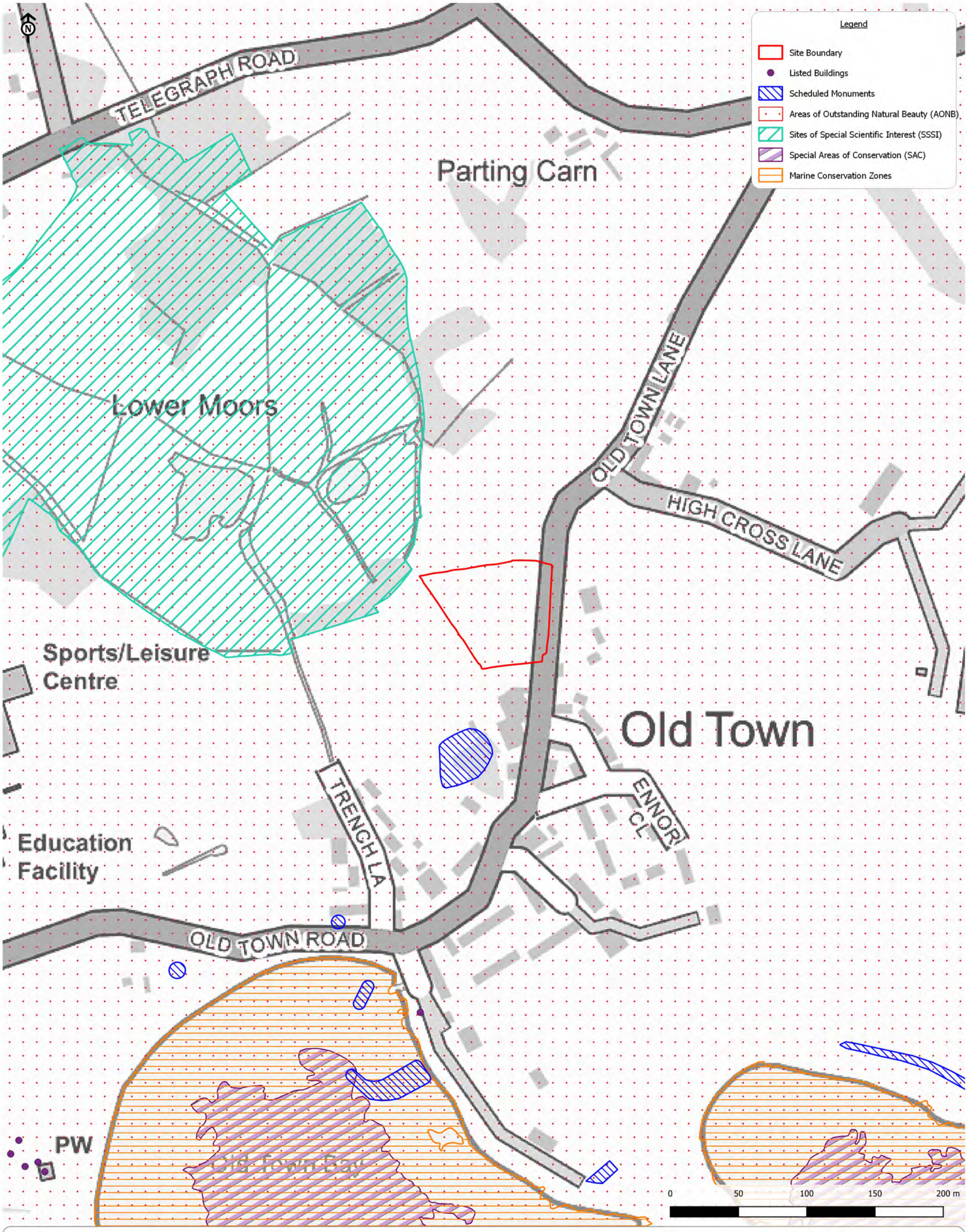

Ennor Farm, St Mary's

Client: Council of Isle of Scilly

Figure 4:
Constraints Plan

Scale:	1:2500@A3
CampbellReith OS Copyright:	© Crown copyright. All rights reserved. Licence number 100020027
Contains Ordnance Survey data	© Crown copyright and database right 2021. Contains public sector information licensed under the Open Government Licence v3.0.
Job Number:	13394
Drawn by - Checked by:	RP/RLF - AD/TT
Drg No - Status/Revision:	13394-CRH-XX-XX-FG-G-7003 - P2
File location:	\\red-data1\gis-data\13250 - 13499\13394 B - Ennor Farm St Marys\Project_Workspaces\DTS (pdf in Outputs)
Date (Revision History):	08/01/2021 (P1, First Issue, 24/01/20, RP; P2, Site Boundary, 08/01/21, RLF)

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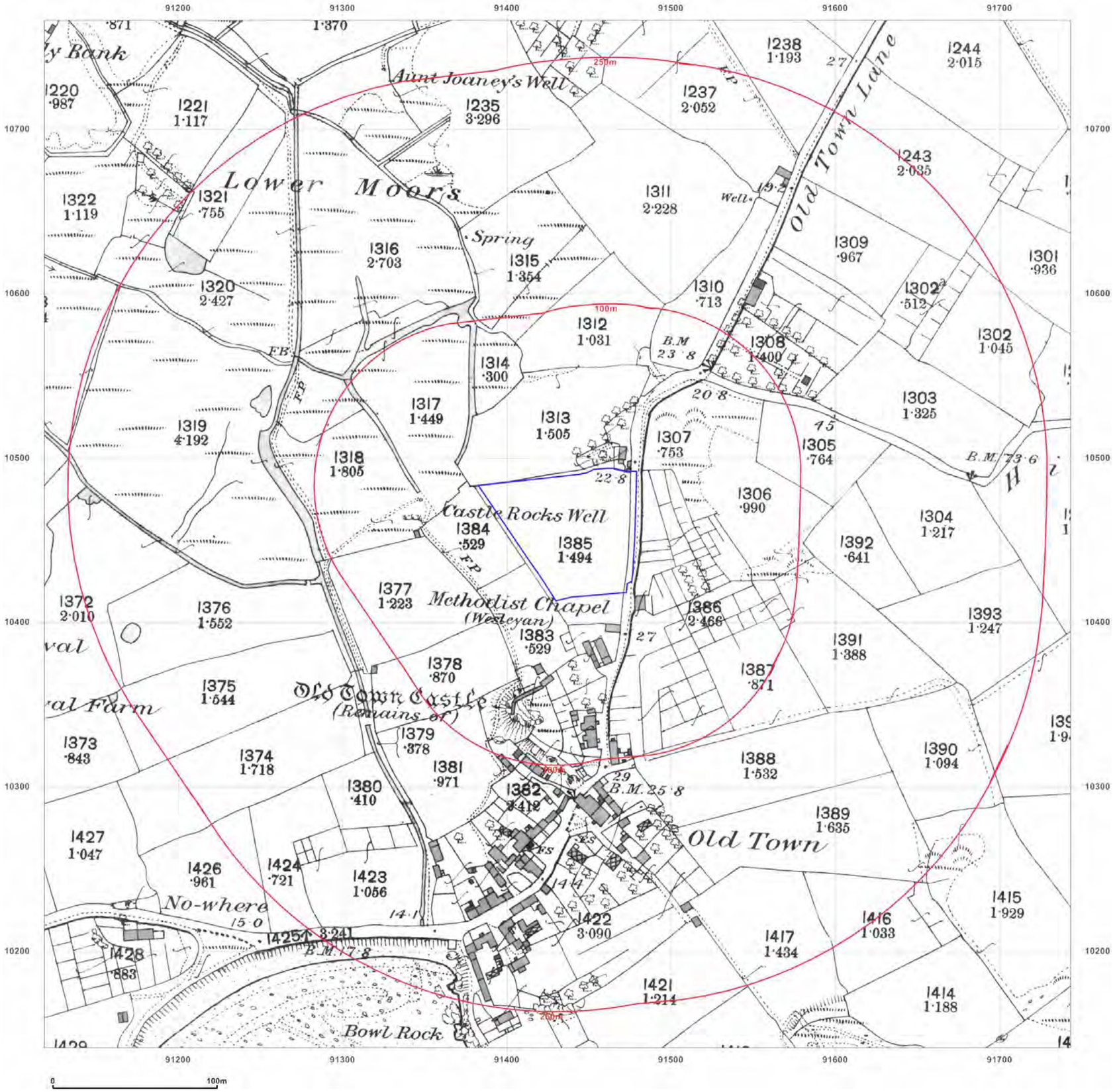
APPENDIX B: DESK STUDY INFORMATION

Groundsure Insight Report (Maps). January 2020 Report Ref: GS-6582079



Groundsure INSIGHTS

Site Details:

91440, 10457

Client Ref: 13394_AD
Report Ref: GS-6582079
Grid Ref: 91431, 10454

Map Name: County Series

Map date: **1890**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1890
Revised 1890
Edition N/A
Copyright N/A
Levelled N/A

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 29 January 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

Groundsure INSIGHTS

Site Details:

91440, 10457

Client Ref: 13394_AD
Report Ref: GS-6582079
Grid Ref: 91431, 10454

Map Name: County Series

Map date: **1908**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1908
Revised 1908
Edition N/A
Copyright N/A
Levelled N/A

Powered by OS

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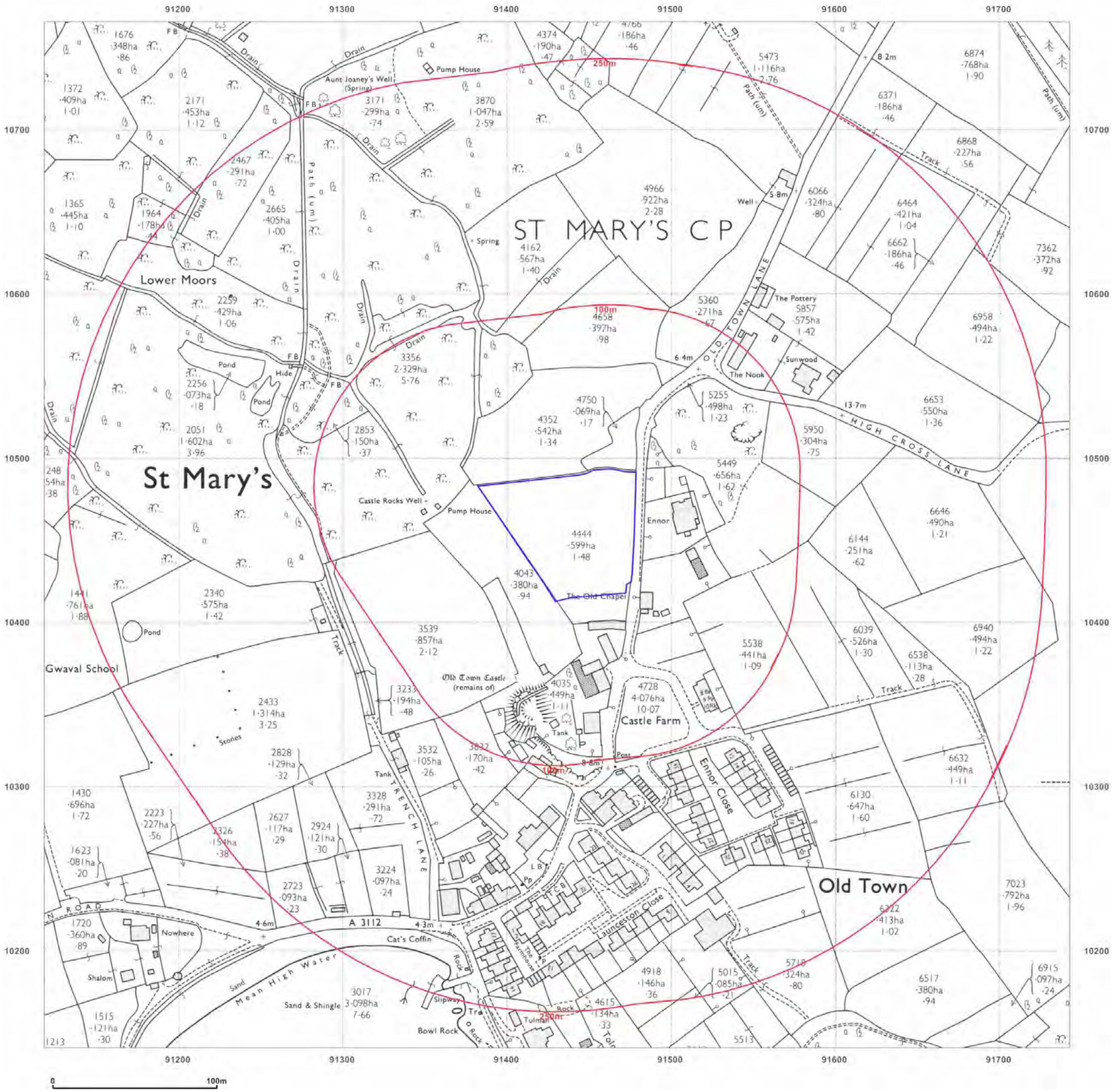
Production date: 29 January 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

91440, 10457

Client Ref: 13394_AD
Report Ref: GS-6582079
Grid Ref: 91431, 10454

Map Name: National Grid

Map date: **1978**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A
Revised 1978
Edition N/A
Copyright 1980
Levelled 1887

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Production date: 29 January 2020

Map legend available at:
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Groundsure INSIGHTS

Site Details:

91440, 10457

Client Ref: 13394_AD
Report Ref: GS-6582079
Grid Ref: 91431, 10454

Map Name: National Grid

Map date: **1980**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1980
Levelled N/A

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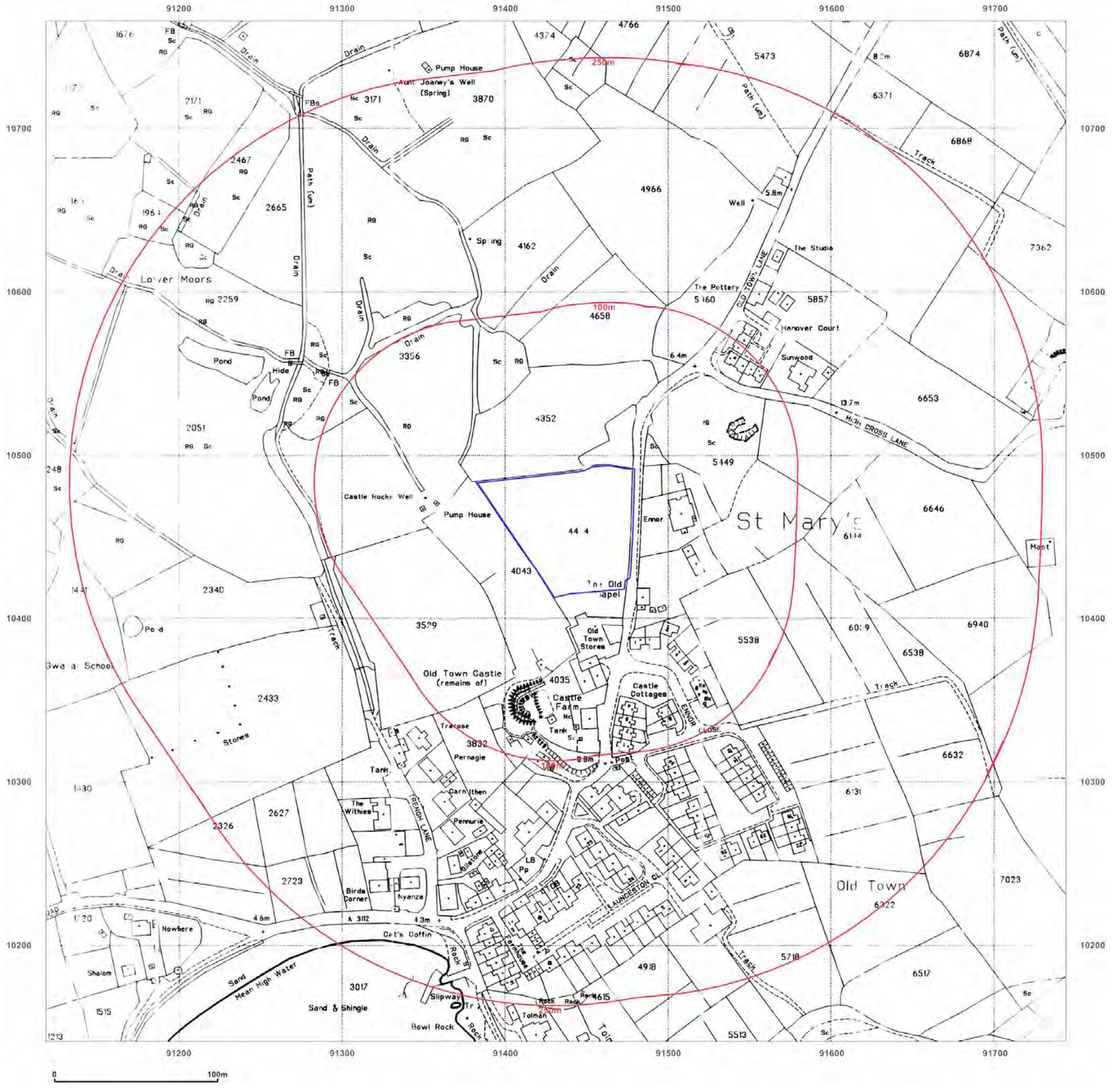

Groundsure INSIGHTS

Site Details:

91440, 10457

Client Ref: 13394_AD
Report Ref: GS-6582079
Grid Ref: 91431, 10454

Map Name: National Grid

Map date: **1995**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

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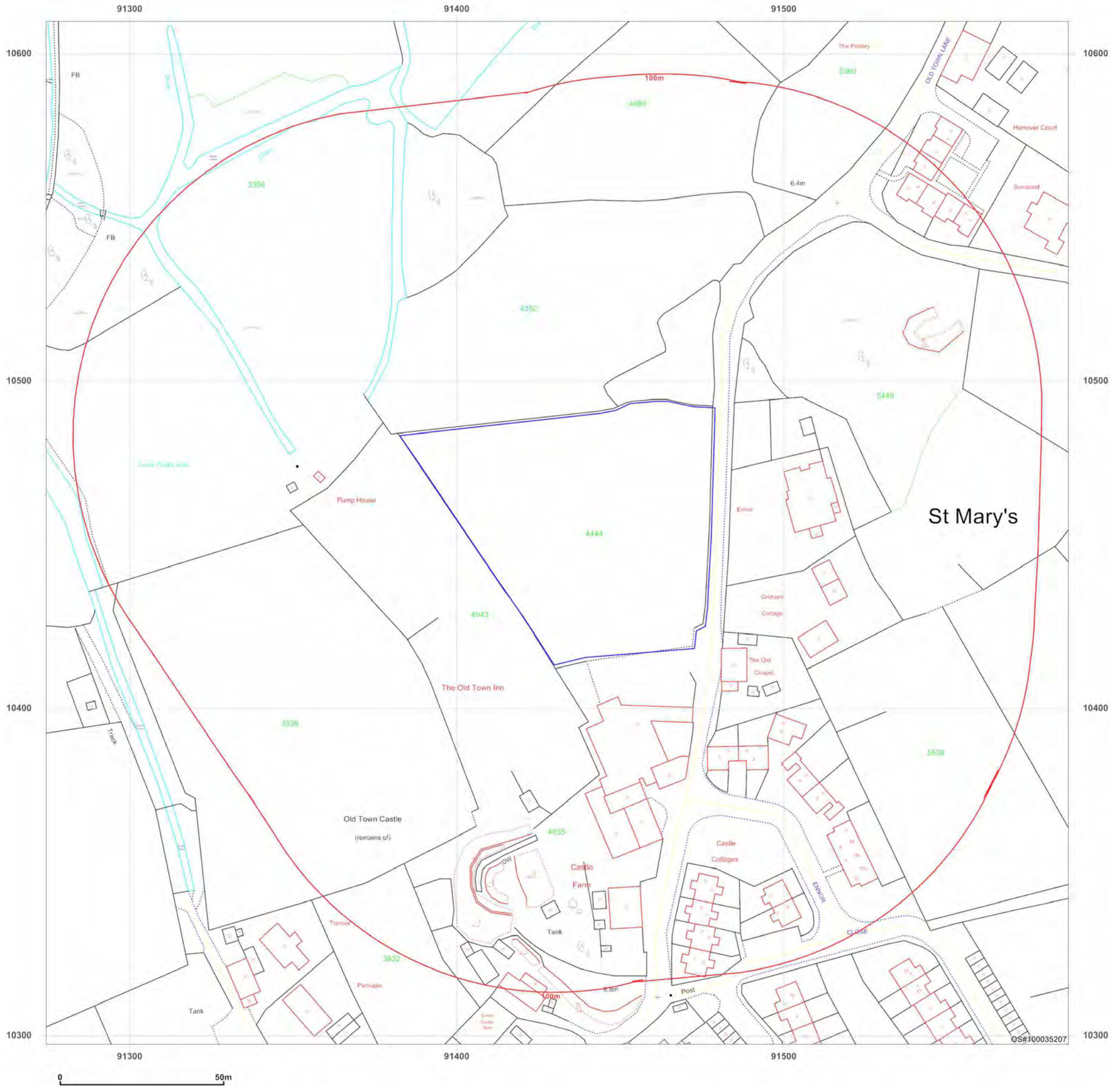
W: www.groundsure.com

Production date: 29 January 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

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Client Ref: 13394_AD
Report Ref: GS-6582079
Grid Ref: 91431, 10454

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

Production date: 29 January 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

APPENDIX C: SITE INVESTIGATION INFORMATION

Wheal Jane Consultancy (2020) Ennor Farm IoS, Ground Investigation Factual Report
Document No. SI19937C, Final 24th January

GROUND INVESTIGATION

Factual Report

Ennor Farm, IOS

24 January 2020

Wheal Jane Consultancy

Old Mine Offices, Wheal Jane, Baldhu, Truro, Cornwall, TR3 6EE

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consultancy@wheal-jane.co.uk

SI19937C

DOCUMENT CONTROL SHEET

Client	Council of Isles of Scilly c/o Campbell Reith
Engineer	Campbell Reith
Project Title	Ennor Farm, IOS
Document Title	Ground Investigation Factual Report
Document No.	SI19937C

Date	Status	Revision	Prepared By	Approved By
24 January 2020	Final	A	Bryony Halliday	Dan Jobson

CONTENTS

1 INTRODUCTION

1.1 Instruction

1.1.1 Wheal Jane Consultancy (WJC) was commissioned by Council of Isles of Scilly c/o Campbell Reith, to undertake a Ground Investigation at a site known as Ennor Farm, IOS.

1.1.2 This report has been prepared by Wheal Jane Consultancy solely for the benefit of the Client. It shall not be relied upon or transferred to any third party without the prior written authorisation of WJC.

1.2 Scope and Objectives

1.2.1 The general specification for the works was provided by Campbell Reith.

1.2.2 This report represents full factual records of the work carried out, the ground conditions encountered in the exploratory holes, the in-situ and laboratory results and the results of ground gas monitoring.

1.2.3 This assessment has been undertaken with guidance from BS10175:2011 and Environment Agency report CLR11, and as such represents a Ground Investigation.

1.3 Limitations

1.3.1 Field work consisted of discrete sampling across the site, to assess the character and degree of contamination. Conditions of the ground at locations not included within the investigation may be different from the tested locations.

1.3.2 This report considers site conditions at the time of the ground investigation, but ground conditions may change with time. If future work discovers ground conditions that vary significantly from the findings available in this report, the conclusions should be reviewed in the context of the new information.

1.3.3 Findings were assessed in the context of standards and methodology current at the time of reporting.

1.3.4 The findings and conclusions in this report are based upon information derived from a variety of sources. WJC cannot accept liability for the accuracy or completeness of any information derived from third party sources.

2 THE SITE

2.1 Site Location and Layout

2.1.1 The site is located on St Mary's, Isles of Scilly, approximately 0.9km east of the town centre of Hugh Town. The site is approximately centred on National Grid Reference SV 91437 10453.

2.1.2 The site is irregular in shape and covers an area of approximately 0.6ha.

2.1.3 A site location plan (SLP) is contained in Figure 2.1, to the rear of the report.

2.1.4 The current site plan is contained in Figure 2.2, to the rear of the report.

2.2 Surrounding area

Direction	Land Use
North	Agricultural
East	Road, Residential
South	Public House, Car Park
West	Agricultural

2.3 Proposed Development

2.3.1 It is proposed to develop the site for residential purposes. The exact layout is subject to change.

2.3.2 A plan illustrating the proposed development is contained as Figure 2.3.

3 SITE INVESTIGATION

3.1 Site Works

3.1.1 An intrusive site investigation was conducted on Wednesday 11th December 2019. The investigation was overseen by a geoenvironmental engineer from Wheal Jane Consultancy.

3.1.2 The following table summarises the intrusive investigation techniques employed during the site investigation;

Table 3.1: Site Works

Exploratory Hole Type	Exploratory Hole ID	Hole Depths (mBGL)	Comments
Windowless Sampling	WS01 – WS05	2.50 – 3.75	Undertaken for site coverage.
CBR Testing using the DCP Method	CBR1 – CBR3	1.00	Undertaken to aid design of roads and car parking.

3.1.3 A plan showing the location of the exploratory holes is provided as Figure 3.1.

3.2 Windowless Sample Boring

3.2.1 Five (5 No.) Windowless Sample Boreholes, designated WS01 – WS05 inclusive, were advanced to depths of between 2.50m and 3.75m using a tracked Terrier rig on the 11th December 2019. Standard Penetration Tests (SPTs) and representative soil samples were taken at regular intervals for geotechnical and environmental analysis and logged on site by a suitably qualified geoenvironmental engineer.

3.2.2 Upon completion exploratory holes WS01, WS02, WS04 and WS05 were backfilled with a mixture of arisings and Bentonite.

3.2.3 Water was encountered in boreholes WS01, WS02, WS03 and WS04 at depths of between 0.70m in the north west to 3.20m in the south west of the site.

3.2.4 The locations of all exploratory holes can be seen on the exploratory hole location plan, contained as Figure 3.1.

3.2.5 The exploratory hole logs are included as Appendix A to the rear of the report.

3.3 Installations

3.3.1 A gas and groundwater monitoring standpipe was installed in the following exploratory hole in order to allow long term monitoring;

Table 3.2: Borehole Installations

Exploratory Hole	Seal (mBGL)	Filter Zone (mBGL)	Bentonite Backfill (mBGL)
WS03	0.00 – 0.60	0.60 – 2.60	2.60 – 3.35

3.4 In-situ CBR

3.4.1 Three (3 No.) In-situ CBR tests, designated CBR1 – CBR3 inclusive, were advanced to a depth of 1.00m using a handheld Dynamic Cone Penetrometer (DCP) on the 11th December 2019.

3.4.2 The locations of all exploratory holes can be seen on the exploratory hole location plan, contained as Figure 3.1.

3.4.3 The results are contained in Appendix B to the rear of this report.

3.5 Geotechnical Sampling and Testing

3.5.1 Samples were dispatched to an accredited geotechnical laboratory in order to classify the geotechnical properties of the soils. The following tests were scheduled:

- Moisture Content
- Atterberg Limits (Only liquid limits were attained for three samples)
- Particle Size Distribution
- pH & Water-Soluble Sulphate

3.5.2 All testing was carried out in accordance with the procedures set out in BS EN ISO/IEC 17025:2005.

3.5.3 All samples were tested by a UKAS accredited laboratory.

3.5.4 The results are included as Appendix C.

3.6 Chemical Sampling and Testing

3.6.1 All retrieved soil samples were logged in accordance with BS5930;2015 and BS EN ISO 14689. Collection of media for environmental testing was obtained, stored in plastic tubs and glass jars and kept within a temperature controlled cool box before being dispatched for testing.

3.6.2 Sampling was specified by the Engineer.

3.6.3 The following potential contaminants were tested for in selected samples:

- WJC Screen Suite
    - Heavy Metals (As, Ba, Cd, CrIII, CrVI, Cu, Hg, Mn, Ni, Pb, Sb, Se, V, Zn)
    - Organic Matter

- Cyanide
- Total PAH
- Total TPH
- pH
- Sulphate

- WJC Screen Suite Water
  - Heavy Metals (As, Ba, Cd, CrIII, CrVI, Cu, Hg, Mn, Ni, Pb, Sb, Se, V, Zn)
  - Organic Matter
  - Cyanide
  - Total PAH
  - Total TPH
  - pH
  - Sulphate
- Pesticides Suite
- Asbestos ID

3.6.4 All samples were tested by a UKAS and MCERT accredited laboratory.

3.6.5 The results are included as Appendix D.

4 REFERENCE LIST

4.1.1 BSI (2011) BS 10175:2011 Investigation of Potentially Contaminated Sites - Code of Practice. London, British Standards Institution

4.1.2 BSI (2015) BS5930:2015. Code of Practice for Site Investigations. London, British Standards Institution

4.1.3 British Research Establishment (BRE) (2005) Special Digest 1 Concrete in Aggressive Ground. 3rd edn. Watford, BRE

4.1.4 Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE) (2008) Guidance on Comparing Soil Contamination Data with a Critical Concentration. London, CIEH

4.1.5 CIRIA (2001) CIRIA C552 - Contaminated land risk assessment: A guide to good practice. London, CIRIA

4.1.6 CIRIA (2007) CIRIA C665 - Assessing Risks Posed by Hazardous Ground Gases to Buildings. London, CIRIA

4.1.7 Contaminated Land: Applications in Real Environments (CL:AIRE), Association of Geotechnical and Geo-environmental Specialists (AGS) and The Environmental Industries Commission (EIC) (2010) Soil Generic Assessment Criteria for Human Health Risk Assessment. London, CL:AIRE

4.1.8 Contaminated Land: Applications in Real Environments (CL:AIRE) (2012) A Pragmatic Approach to Ground Gas Risk Assessment. Research Bulletin 17

4.1.9 Contaminated Land: Applications in Real Environments (CL:AIRE) (2016) CAR SOIL: Control of Asbestos Regulations 2012. Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials.

4.1.10 Environment Agency (2004) Contaminated Land Report 11 - Model Procedures for the Management of Land Contamination. Bristol, Environment Agency

4.1.11 Environment Agency (2009) Updated Technical Background to the CLEA Model. Science Report SC050021/SR3. Bristol: Environment Agency

4.1.12 Environment Agency (2009) Human Health Toxicological Assessment of Contaminants in Soil. Science Report SC050021/SR2. Bristol: Environment Agency

4.1.13 Great Britain. Environmental Protection Act (1990). London, The Stationery Office

4.1.14 Great Britain. Water Act (2003) London, The Stationery Office

4.1.15 Great Britain. Environmental Permitting Regulations (2007). London, The Stationery Office

4.1.16 Great Britain. Environmental Damage (Prevention and Remediation) Regulations (2009). London, The Stationery Office

4.1.17 Great Britain. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. London, The Stationery Office

4.1.18 National House Building Council (NHBC), Environment Agency and Chartered Institute of Environmental Health (CIEH) (2008) Research & Development Publication 66: Guidance for the Safe Development of Housing on Land Affected by Contamination. Amersham, NHBC

4.1.19 Royal Institution of Chartered Surveyors (RICS) (2012) Japanese Knotweed and Residential Property. Coventry, RICS

5 NOTES

5.1.1 This report is concerned solely with the property, as defined by this report, or parts thereof examined.

5.1.2 The report should not be used in connection with adjacent properties.

5.1.3 In respect of site works, Wheal Jane Consultancy cannot accept any liabilities for any additional mine workings found outside the limits of any areas examined.

5.1.4 The information supplied by third parties which has been used in compiling this Phase 2 ground investigation report, is derived from a number of statutory and non-statutory sources. While every effort is made by the supplier to ensure accuracy, the supplier cannot guarantee the accuracy or completeness of such information or data, nor to identify all the factors that may be relevant.

5.1.5 The conclusions and recommendations relate to the type and extent of development outlined in this report for this specific property only and should not be taken as suitable for any other form or extent of development on this property without further consultation with Wheal Jane Consultancy.

5.1.6 This report is confidential to the client, the client's legal and professional advisors, and may not be reproduced or distributed without our permission other than to directly facilitate the sale or development of the property concerned.

5.1.7 We have no liability toward any person not party to commissioning this report.

5.1.8 Unless otherwise expressly stated, nothing in this report shall create or confer any rights or other benefits pursuant to the Contracts (Rights of Third Parties) Act 1999 in favour of any person other than the person commissioning this report.

5.1.9 This report is not an asbestos inspection that may fall within the control of Control of Asbestos Regulations 2006

FIGURES:

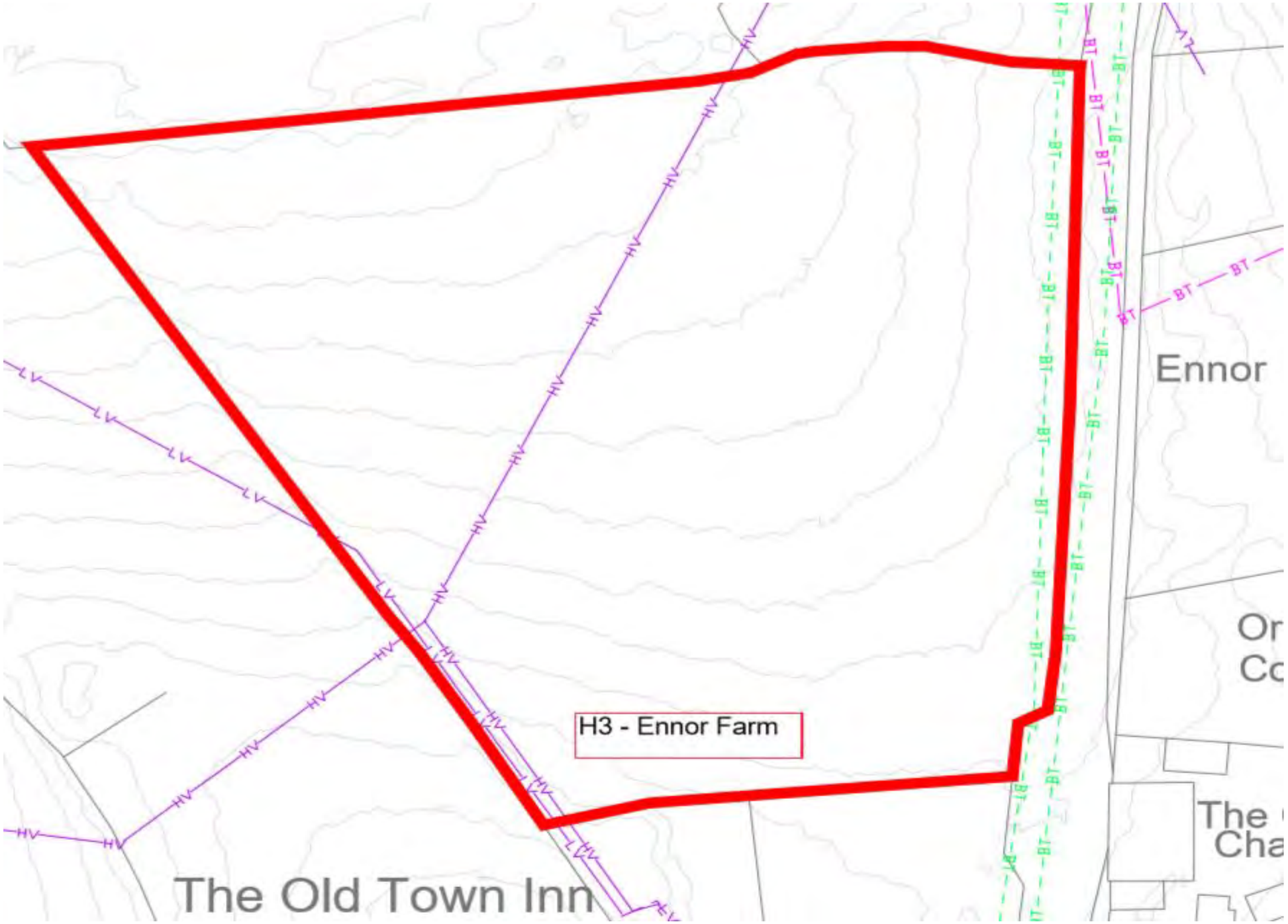
Title: Site Location Plan

Project: Ennor Farm

Client: Council of Isles of Scilly c/o Campbell Reith

Report Title: Ground Investigation

Date: 24/01/2020 Ref: 19937C Figure: 2.1



N

Legend:

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Current Site Layout

Project:

Ennor Farm

19937C

Client:

Council of The Isles of Scilly c/o Campbell Reith

Date:	24/01/2020
Scale:	NTS
Drawn by:	BH
Revision:	A
Figure:	2.2

N

Legend:

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Proposed Site Layout

Project:

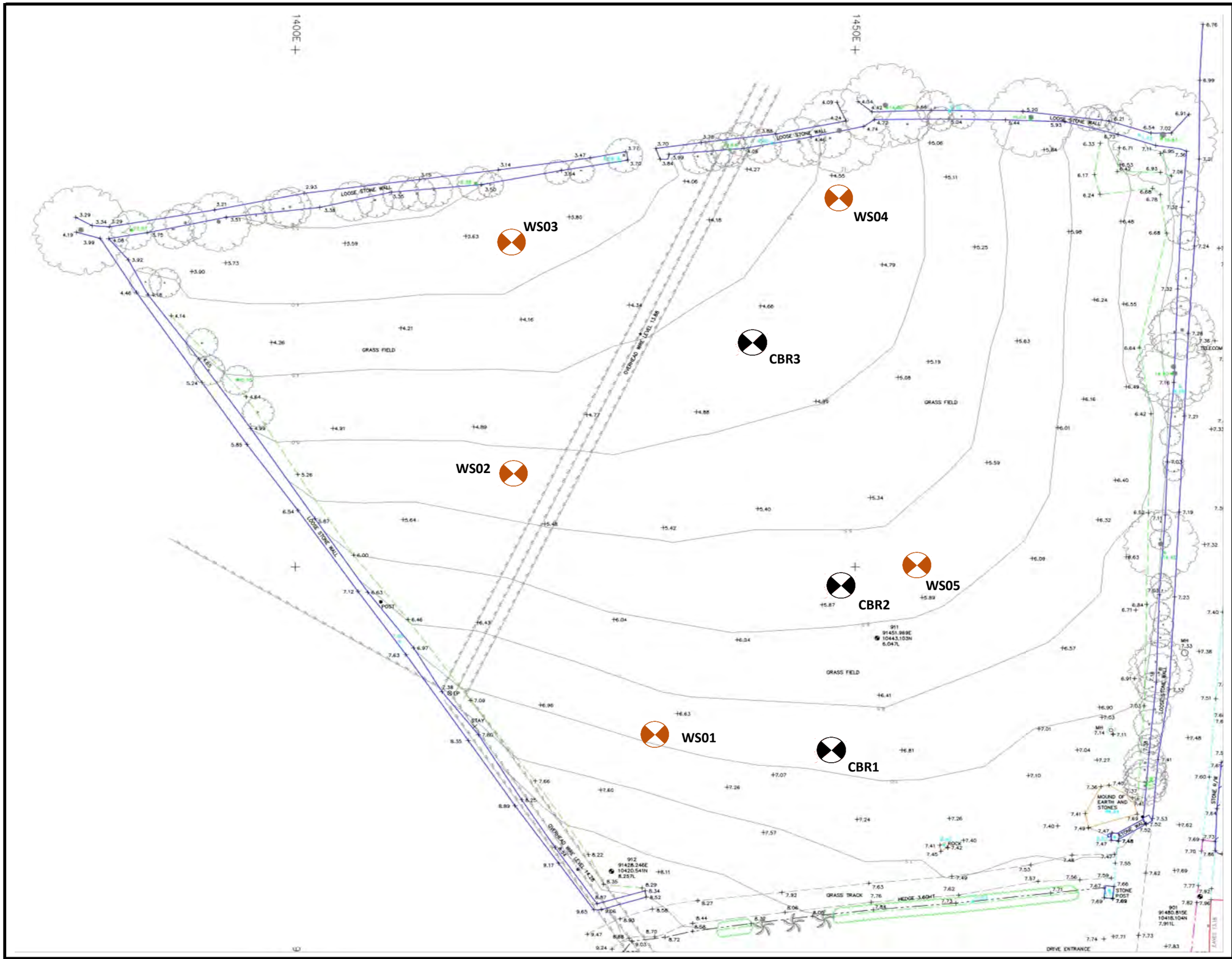
Ennor Farm

19937C

Client:

Council of Isles of Scilly c/o Campbell Reith

Date:	24/01/2020
Scale:	NTS
Drawn by:	DJ
Revision:	A
Figure:	2.3



N

Legend:

Windowless Sample Borehole

CBR completed using DCP method

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Exploratory Hole Location Plan

Project:

Ennor Farm

19937C

Client:

Council of Isles of Scilly c/o Campbell Reith

Date:	24/01/2020
Scale:	NTS
Drawn by:	BH
Revision:	A
Figure:	3.1

APPENDIX A

Windowless Sample Logs

Wheal Jane Consultancy

Wheal Jane Group

Site	Number
Isles of Scilly, Ennor Farm	WS01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler		7.00	Campbell Reith	19937C
	Location	**Dates**	**Engineer**	**Sheet**
	Ennor Farm	11/12/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Grass over dark brown slightly clayey, sandy TOPSOIL. Sand is fine to coarse.		
					(0.68)			
0.50	ES1			6.32	0.68			
						Very loose orangish brown clayey fine to coarse SAND.		
1.00-1.45	SPT N=2		1,1/0,1,0,1					
1.00	ES2							
1.20	D3				(1.12)			
				5.20	1.80			
					(0.20)	Soft orangish brown sandy, gravelly CLAY. Gravel is angular to subangular, fine to coarse of granite. Sand is fine to coarse.		
2.00-2.45	SPT N=7		1,2/1,2,2,2	5.00	2.00			
2.00-3.00	B4					Loose to very dense orangish grey silty, gravelly, fine to coarse SAND. Gravel is angular to subangular, fine to coarse of granite.		
					(1.75)			
3.00-3.45	SPT N=17		1,3/4,3,5,5					
			Water strike(1) at 3.20m.					▽1
3.60-4.05	SPT N=50		10,50/50					
				3.25	3.75	Complete at 3.75m		

Remarks
Hole terminated due to encountering Bedrock.
Samples damp from 3.20m

Scale (approx)	Logged By
1:25	BH

Figure No.
19937C.WS01

Wheal Jane Consultancy

Site	Number
Isles of Scilly, Ennor Farm	WS02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler		6.00	Campbell Reith	19937C
	Location	**Dates**	**Engineer**	**Sheet**
	Ennor Farm	11/12/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Grass over dark brown slightly clayey, sandy TOPSOIL. Sand is fine to coarse.		
					(0.50)			
0.40	ES1			5.50	0.50			
						Loose dark brown very silty, clayey fine to coarse SAND.		
					(0.60)			
0.90	ES2							
1.00-1.45	SPT N=10		1,2/2,3,3,2	4.90	1.10			
						Firm orangish brown sandy, gravelly CLAY. Gravel is angular to subangular, fine to coarse of granite. Sand is fine to coarse.		
					(0.90)			
1.60	D3							
2.00-2.45	SPT N=11		1,2/2,3,3,3	4.00	2.00			
2.00-3.00	B4					Medium to very dense orangish grey silty, sandy angular to subangular, fine to coarse GRAVEL of granite. Sand is fine to coarse.		
			Water strike(1) at 2.50m.					▽1
					(1.45)			
3.00-3.45	SPT N=81		10,11/10,14,21,36					
				2.55	3.45			
						Complete at 3.45m		

Remarks
Hole terminated due to encountering Bedrock.
Groundwater encountered at 2.50m.

Scale (approx)	Logged By
1:25	BH

Figure No. 19937C.WS02

Wheal Jane Consultancy

Wheal Jane Group

Site	Number
Isles of Scilly, Ennor Farm	WS03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler		5.00	Campbell Reith	19937C
	Location	**Dates**	**Engineer**	**Sheet**
	Ennor Farm	11/12/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	ES1				(0.80)	Grass over dark brown slightly clayey, sandy TOPSOIL. Sand is fine to coarse.			
0.70-3.35	WA4		Water strike(1) at 0.70m.					▽1	
0.80-1.60	B2			4.20	0.80				
1.00-1.45	SPT N=8		1,2/2,2,2,2		(0.80)	Soft orangish grey gravelly, sandy SILT. Gravel is angular to subangular, fine to coarse of granite. Sand is medium to coarse.			
1.70	ES3			3.40	1.60				
2.00-2.45	SPT N=7		1,1/1,2,2,2		(1.75)	Loose to very dense light brown clayey, sandy angular to subangular, fine to coarse GRAVEL of granite. Sand is fine to coarse.			
2.90-3.35	SPT N=69		8,11/14,16,18,21						
				1.65	3.35	Complete at 3.35m			

Remarks
Hole partially collapsed prior to installing.
Hole terminated due to encountering Bedrock.
Installed for Gas/Groundwater Monitoring. 0.00m - 0.60m plain. 0.60m - 2.60m slotted.
Water sample taken.
Groundwater encountered at 0.70m.

Scale (approx)	Logged By
1:25	BH

Figure No. 19937C.WS03

Wheal Jane Consultancy		Site: Isles of Scilly, Ennor Farm	Number: WS04
Excavation Method: Drive-in Windowless Sampler.	**Dimensions**	**Ground Level (mOD)**: 7.00	**Client**: Campbell Reith	**Job Number**: 19937C
	Location: Ennor Farm	**Dates**: 11/12/2019	**Engineer**: Wheal Jane Consultancy	**Sheet**: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.70)	Grass over dark brown slightly clayey, sandy TOPSOIL. Sand is fine to coarse.		
0.60	ES1			6.30	0.70			
1.00-2.00 1.00-1.45	B2 SPT N=8		Water strike(1) at 1.00m. 2,2/2,2,2,2			Loose to very dense orangish grey silty, very gravelly fine to coarse SAND. Gravel is angular to subangular, fine to coarse of granite.		▽1
1.50	ES3							
2.00-2.45	SPT N=4		1,2/1,1,1,1		(2.75)			
3.00-3.45	SPT N=82		7,14/12,16,20,34					
				3.55	3.45	Complete at 3.45m		

Remarks
Hole terminated due to encountering Bedrock.
Groundwater encountered at 1.0m.

Scale (approx)	Logged By
1:25	BH

Figure No. 19937C.WS04

Wheal Jane Consultancy

Wheal Jane Group

Site	Number
Isles of Scilly, Ennor Farm	WS05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler		8.00	Campbell Reith	19937C
	Location	**Dates**	**Engineer**	**Sheet**
	Ennor Farm	11/12/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Grass over dark brown slightly clayey, sandy TOPSOIL. Sand is fine to coarse.		
0.50	ES1				(1.10)			
1.00-1.45	SPT N=8		1,1/1,2,1,4					
1.00	ES2			6.90	1.10	Loose orangish brown clayey fine to coarse SAND.		
					(0.40)			
1.40	D3							
				6.50	1.50			
					(0.10)	Very dense orangish grey clayey, angular to subangular, fine to coarse GRAVEL of granite.		
1.60-2.05	SPT N=78		1,12/14,9,17,38	6.40	1.60			
						Complete at 2.50m		

Remarks
Hole terminated due to encountering Bedrock.
No groundwater enountered.

Scale (approx)	Logged By
1:25	BH

Figure No.
19937C.WS05

APPENDIX B

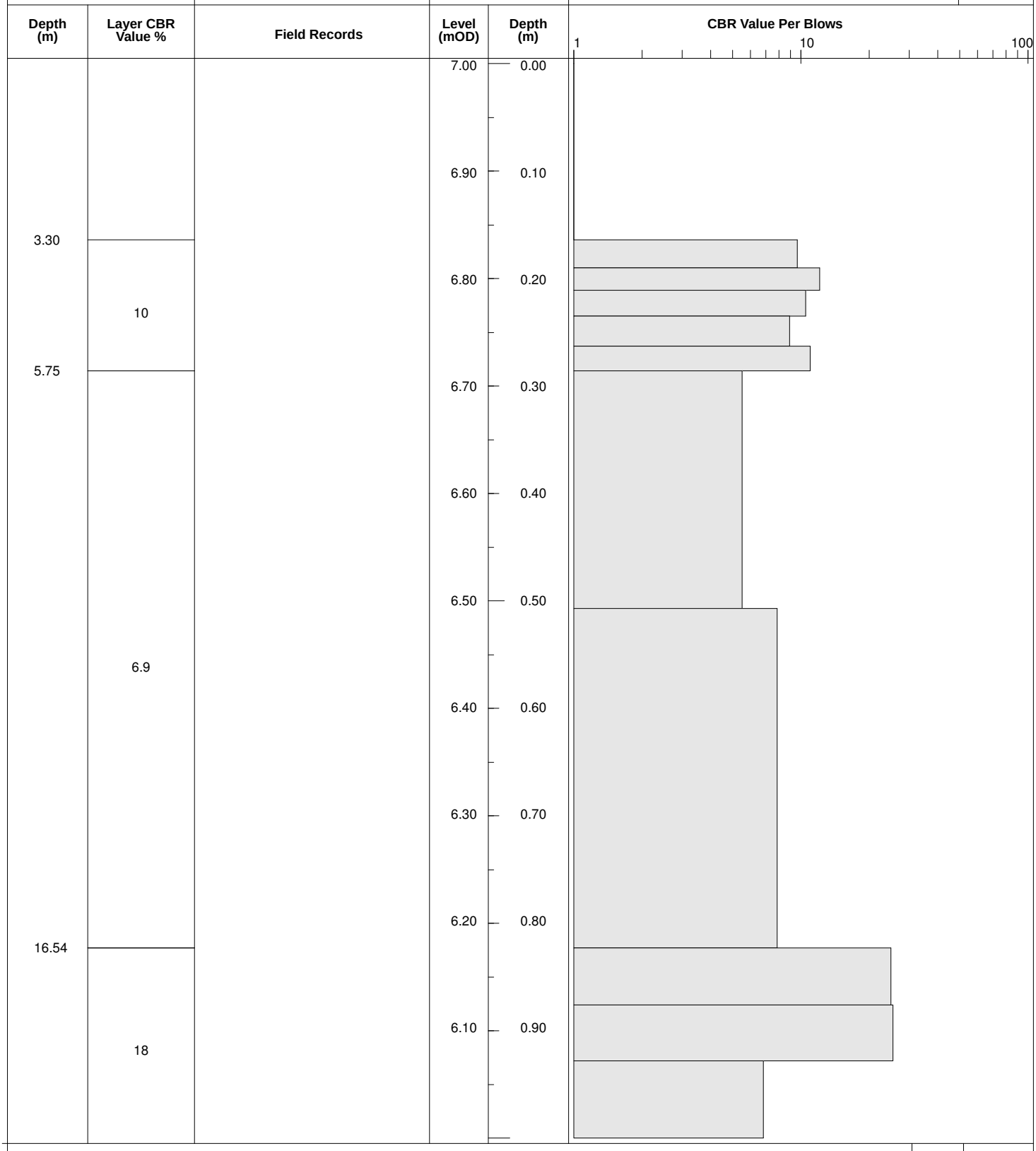
CBR Test Results

Wheal Jane Consultancy

Wheal Jane Group

Site	Probe Number
Isles of Scilly, Ennor Farm	CBR1

DCP Details	Excavation Method	Ground Level (mOD)	Client	Job Number
CBR testing undertaken using the DCP method.		7.00	Campbell Reith	19937C
	Location	**Dates**	**Engineer**	**Sheet**
	Ennor Farm	11/12/2019	Wheal Jane Consultancy	1/1



Remarks

Scale (approx)	Logged By
1:5	BH

Figure No. 19937C.CBR1

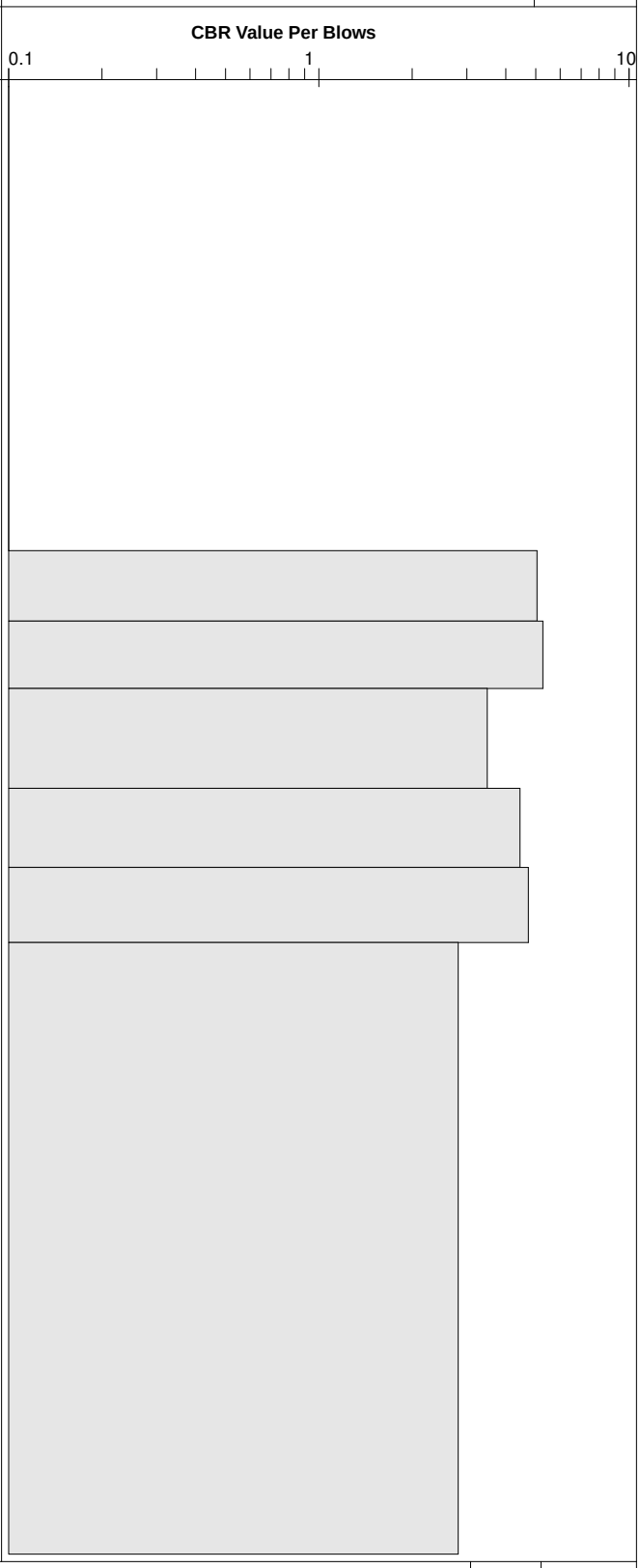
Wheal Jane Consultancy

Wheal Jane Group

Site	Probe Number
Isles of Scilly, Ennor Farm	CBR2

DCP Details	Excavation Method	Ground Level (mOD)	Client	Job Number
CBR testing using DCP method.		6.00	Campbell Reith	19937C
	Location	**Dates**	**Engineer**	**Sheet**
	Ennor Farm	11/12/2019	Wheal Jane Consultancy	1/1

Depth (m)	Layer CBR Value %	Field Records	Level (mOD)	Depth (m)
			6.00	0.00
			5.90	0.10
			5.80	0.20
			5.70	0.30
6.35				
	5.2		5.60	0.40
8.24				
	4.2		5.50	0.50
11.72				
			5.40	0.60
			5.30	0.70
	2.8		5.20	0.80
			5.10	0.90



Remarks

Scale (approx)	Logged By
1:5	BH

Figure No. 19937C.CBR2

Wheal Jane Consultancy		Wheal Jane Group	**Site** Isles of Scilly, Ennor Farm	**Probe Number** **CBR3**
DCP Details CBR testing using DCP method.	**Excavation Method**	**Ground Level (mOD)** 5.00	**Client** Campbell Reith	**Job Number** 19937C
	Location Ennor Farm	**Dates** 11/12/2019	**Engineer** Wheal Jane Consultancy	**Sheet** 1/1

Depth (m)	Layer CBR Value %	Field Records	Level (mOD)	Depth (m)	CBR Value Per Blows (0.1 – 1 – 10)
			5.00	0.00	
			4.90	0.10	
			4.80	0.20	
4.82					
	4.9		4.70	0.30	
			4.60	0.40	
9.77					
			4.50	0.50	
			4.40	0.60	
	3.0		4.30	0.70	
			4.20	0.80	
17.69					
			4.10	0.90	
	8.3				

Remarks

Scale (approx)	Logged By
1:5	BH

Figure No.
19937C.CBR3

APPENDIX C

Geotechnical Laboratory Testing Results

Test Report

South West Geotechnical Ltd
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Job No:	12130	**Date Received:**	30/12/19
Job Name:	Ennor	**Date Sent:**	14/01/20
Client Name:	Wheal Jane Ltd	**Transmittal Number:**	T5359
Client Job No:	-	**Senders Initials:**	DT
Client Address	Old Mine Offices, Wheal Jane, Baldhu, Truro, Cornwall, TR3 6EE	**Report Revision No.**	1
		Sampled by SWG lab staff?	NO

Ref.	Test Detail	No. of Tests / Report No.
A1	BS1377: Part 2: 1990: Clause 3 - Moisture Content - UKAS Accredited	6
A5	BS1377: Part 2: 1990: Clause 4 & 5 - Atterberg Limits - UKAS Accredited	6
A9	BS1377: Part 2: 1990: Clause 9.2 / 9.3 - Particle Size Distribution - UKAS Accredited	4
A10	BS1377: Part 2: 1990: Clause 9.4 - Sedimentation by Pipette - UKAS Accredited	3

Sampling not performed by South West Geotechnical laboratory staff. Results apply to the samples as received.

Approved Signatories:

David Trowbridge (Laboratory Manager)

Dan Ayre (Quality Manager)

Matt Stokes (Senior Technician)

8260
Accredited to
ISO/IEC
17025:2017

SOUTH WEST GEOTECHNICAL

Summary of Classification Test Results

Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Project No.	Project Name
12130	Ennor
Client Job No.	**Client**
19937C	Wheal Jane Consultancy

UKAS TESTING 8260 Accredited to ISO/IEC 17025:2017

Hole No.	Sample Type	Top	Base	Ref	Soil Description	*mc* Cl.3.2 %	Passing 425µm %	LL %	PL Cl5.3 %	PI Cl5.4 %	Particle density Mg/m3	Remarks
WS01	D	1.20		-	Brown slightly gravelly sandy SILT	22	96 - Sieved	27 - 1pt	NP	-	-	
WS01	B	2.00	3.00	-	Light brown silty very gravelly SAND	20	40 - Sieved	26	17	9	-	
WS02	D	1.60		-	Light brown slightly gravelly sandy SILT	21	97 - Sieved	26 - 1pt	NP	-	-	
WS03	B	0.80	1.00	-	Dark brown slightly gravelly sandy SILT	13	54 - Sieved	27	17	10	-	
WS04	B	1.00	2.00	-	Light brown very silty very gravelly SAND	13	44 - Sieved	26	17	9	-	
WS05	D	1.40		-	Grey slightly gravelly sandy SILT	22	95 - Sieved	26 - 1pt	NP	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	

Preparation Clauses: Particle Density (BS1377:Part 1: 1990: CL7.4.4) Atterberg Limits (BS1377:Part 1: 1990: CL7.4.3) Moisture Content (BS1377: Part 1: 1990: CL7.3.3 & 7.4.2)

Key

Atterberg Limits BS1377-2:1990
4pt cone (CL.4.3) unless :
1pt - single point test (CL.4.4)
4.2.3 - Natural
4.2.4 - Sieved
Moisture Content (mc) %

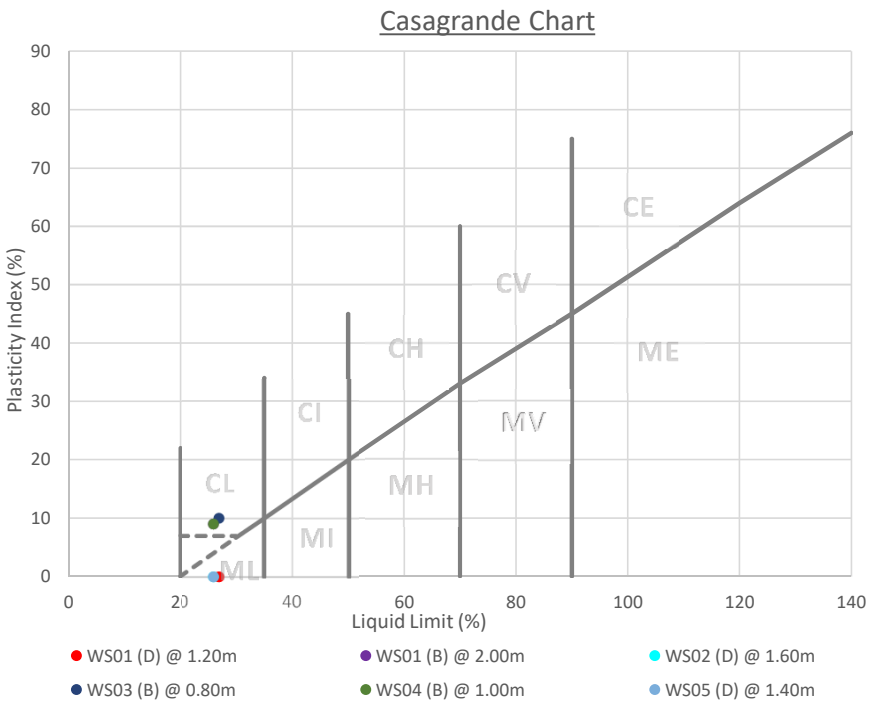
Particle density BS1377-2:1990
sp - small pyknometer CL.8.3
gj - gas jar CL.8.2

Date	Approved By	Page No.	1
14/01/2020	Matt Stokes - Senior Technician	KL001R Index Summary	

Graphical Summary of Atterberg Test Results

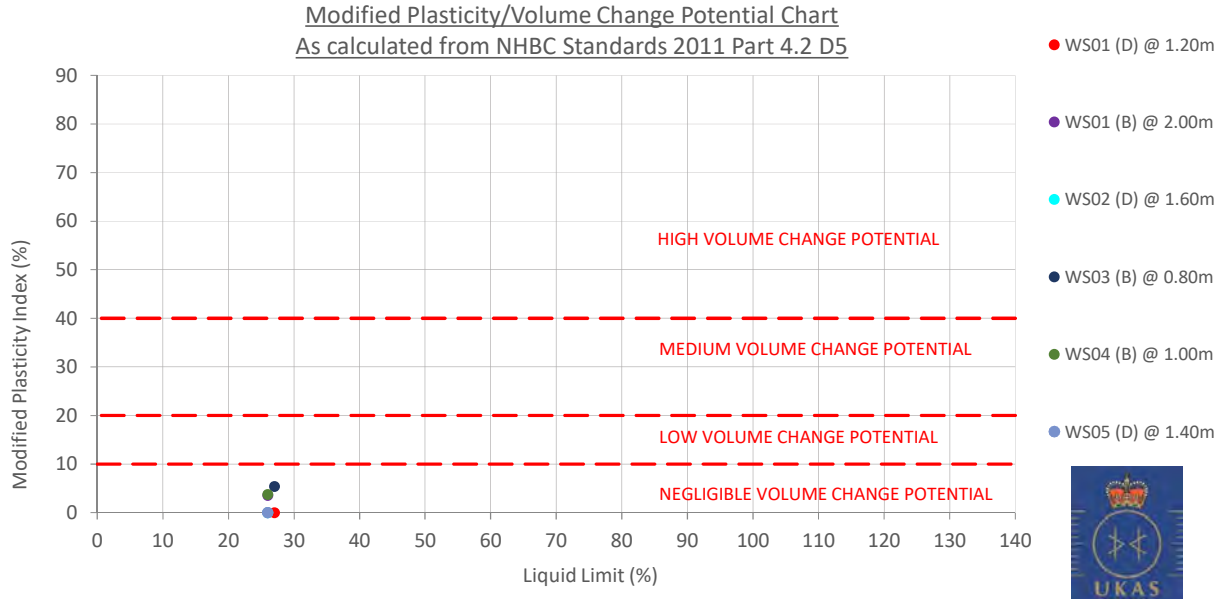
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Project No.	Project Name
12130	Ennor
Client Job No.	**Client**
-	Wheal Jane Ltd



Sample ID	Plasticity Index (%)	Modified Plasticity Index (%)
WS01 (D) @ 1.20m	NP	NP
WS01 (B) @ 2.00m	9	4
WS02 (D) @ 1.60m	NP	NP
WS03 (B) @ 0.80m	10	5
WS04 (B) @ 1.00m	9	4
WS05 (D) @ 1.40m	NP	NP
-	-	-
-	-	-
-	-	-
-	-	-

The Modified Plasticity Index (I'p) is defined as the Plasticity Index (Ip) of the soil multiplied by the percentage of particles less than 425µm.
ie. I'p x % less than 425um/100%

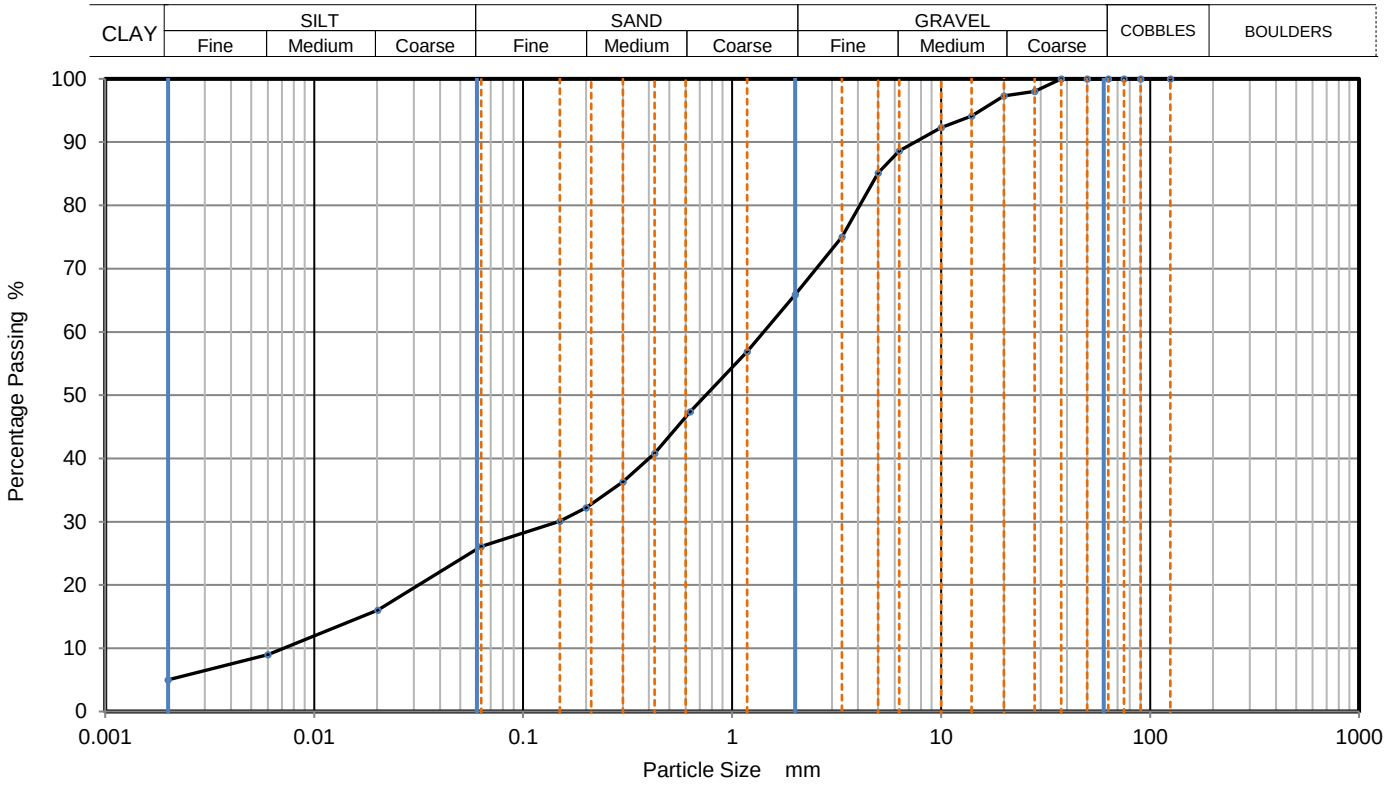


KL001a Index Graphical Summary	Approved By	Date
	David Trowbridge - Laboratory Manager	14/01/2020 16:40

8260
Accredited to ISO/IEC 17025:2017

PARTICLE SIZE DISTRIBUTION

				Project No.	12130
				Borehole/Pit No.	WS01
Project Name	Ennor			Sample No.	-
Soil Description	Light brown silty very gravelly SAND			Depth, m	2.00
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.4				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	16
90	100	0.0060	9
75	100	0.0020	5
63	100		
50	100		
37.5	100		
28	98		
20	97		
14	94		
10	92		
6.3	89		
5	85		
3.35	75		
2	66		
1.18	57		
0.63	47	Particle density	(assumed)
0.425	41	2.65	Mg/m3
0.3	36		
0.2	32		
0.15	30		
0.063	26		

Dry Mass of sample, g	2041

Sample Proportions	% dry mass
Very coarse	0
Gravel	34
Sand	40
Silt	21
Clay	5

Grading Analysis		
D100	mm	
D60	mm	1.42
D30	mm	0.146
D10	mm	0.00728
Uniformity Coefficient		190
Curvature Coefficient		2.1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

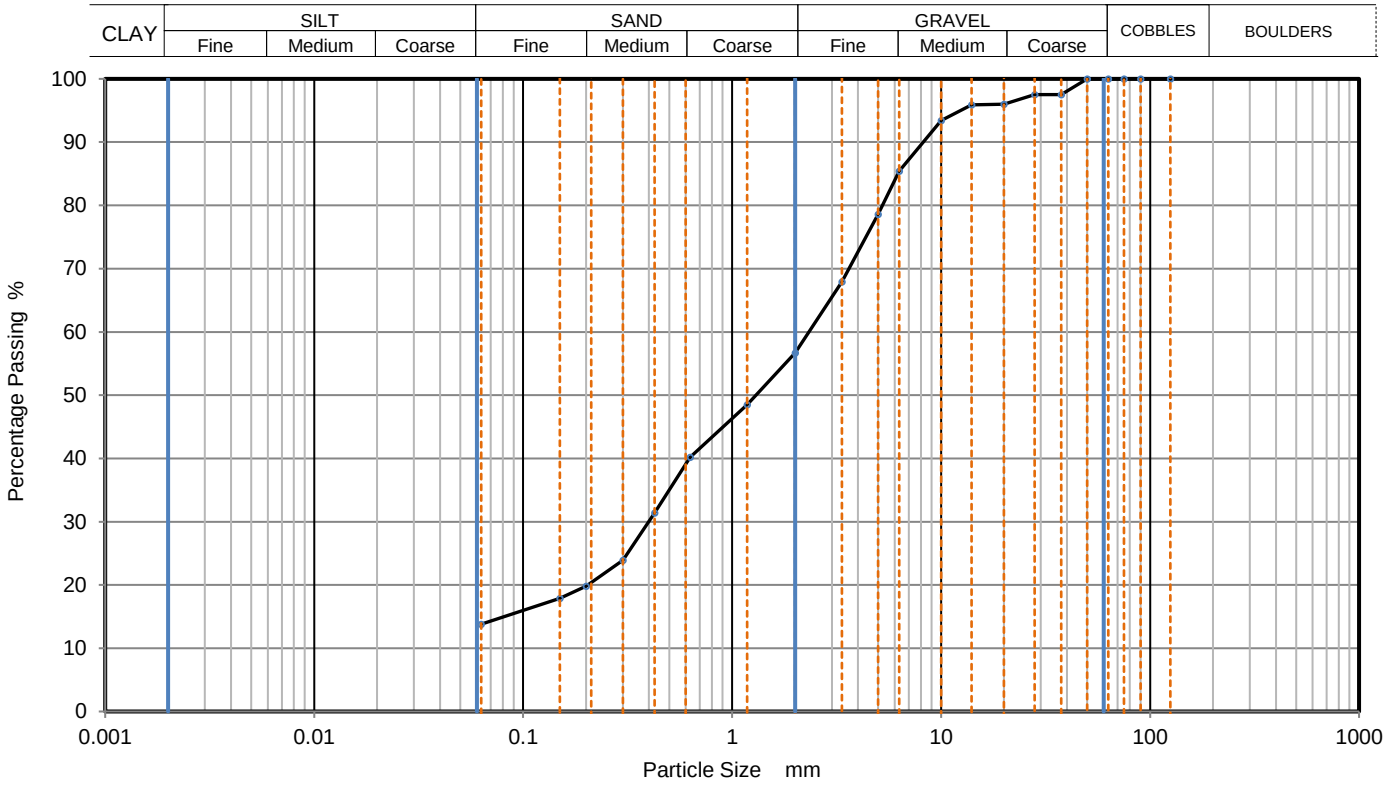
Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	14/01/2020	KL002R PSD

PARTICLE SIZE DISTRIBUTION

				Project No.	12130
				Borehole/Pit No.	WS02
Project Name	Ennor			Sample No.	-
Soil Description	Brown silty SAND and GRAVEL			Depth, m	2.00
Specimen Reference	1	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	98		
28	98		
20	96		
14	96		
10	93		
6.3	85		
5	79		
3.35	68		
2	57		
1.18	49		
0.63	40		
0.425	31		
0.3	24		
0.2	20		
0.15	18		
0.063	14		

Dry Mass of sample, g	4069

Sample Proportions	% dry mass
Very coarse	0
Gravel	43
Sand	43
Fines <0.063mm	14

Grading Analysis		
D100	mm	
D60	mm	2.33
D30	mm	0.398
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

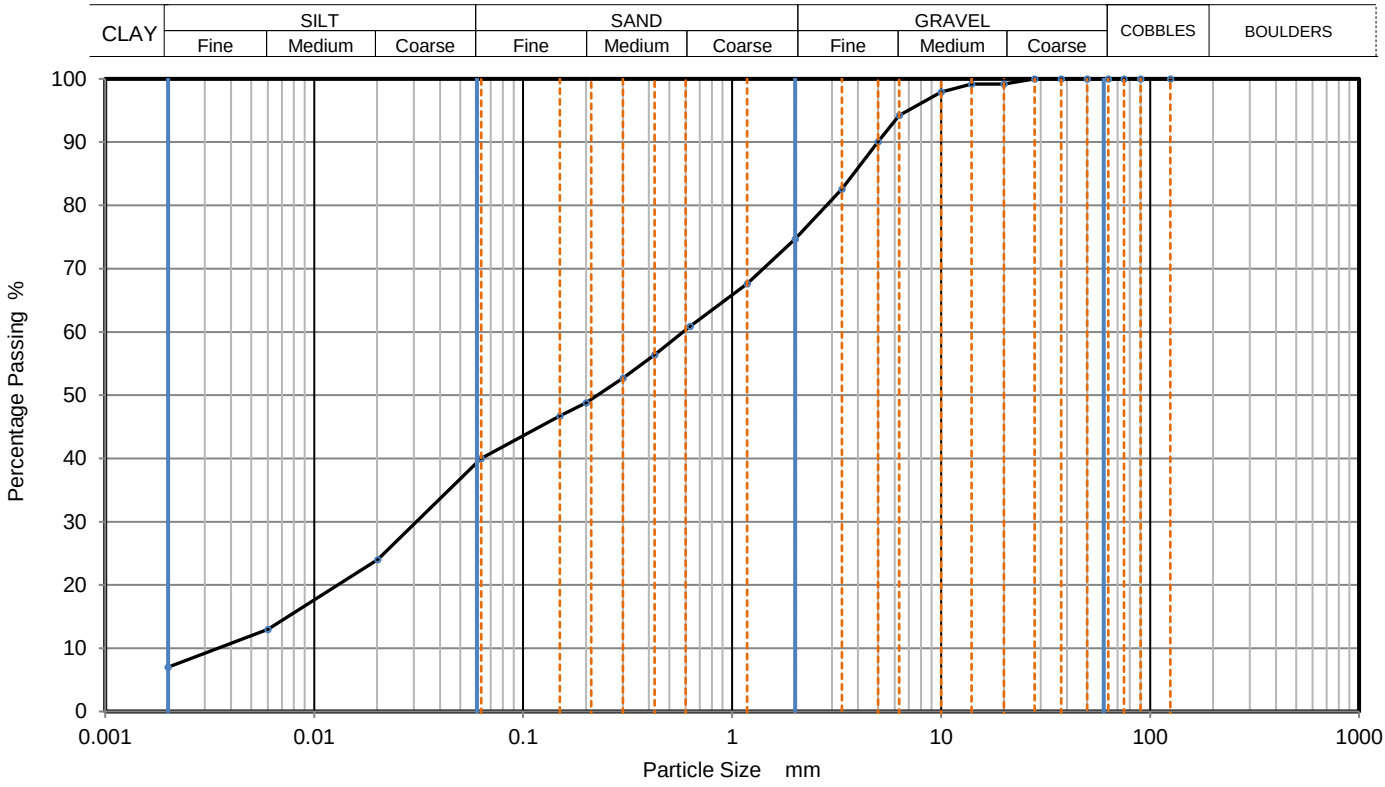
Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	14/01/2020	KL002R PSD

PARTICLE SIZE DISTRIBUTION

				Project No.	12130
				Borehole/Pit No.	WS03
Project Name	Ennor			Sample No.	-
Soil Description	Dark brown slightly gravelly sandy SILT			Depth, m	0.80
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.4				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	24
90	100	0.0060	13
75	100	0.0020	7
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	99		
10	98		
6.3	94		
5	90		
3.35	83		
2	75		
1.18	68		
0.63	61	Particle density (assumed)	
0.425	56	2.65	Mg/m3
0.3	53		
0.2	49		
0.15	47		
0.063	40		

Dry Mass of sample, g	2376

Sample Proportions	% dry mass
Very coarse	0
Gravel	25
Sand	35
Silt	33
Clay	7

Grading Analysis		
D100	mm	
D60	mm	0.583
D30	mm	0.0314
D10	mm	0.00343
Uniformity Coefficient		170
Curvature Coefficient		0.49

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

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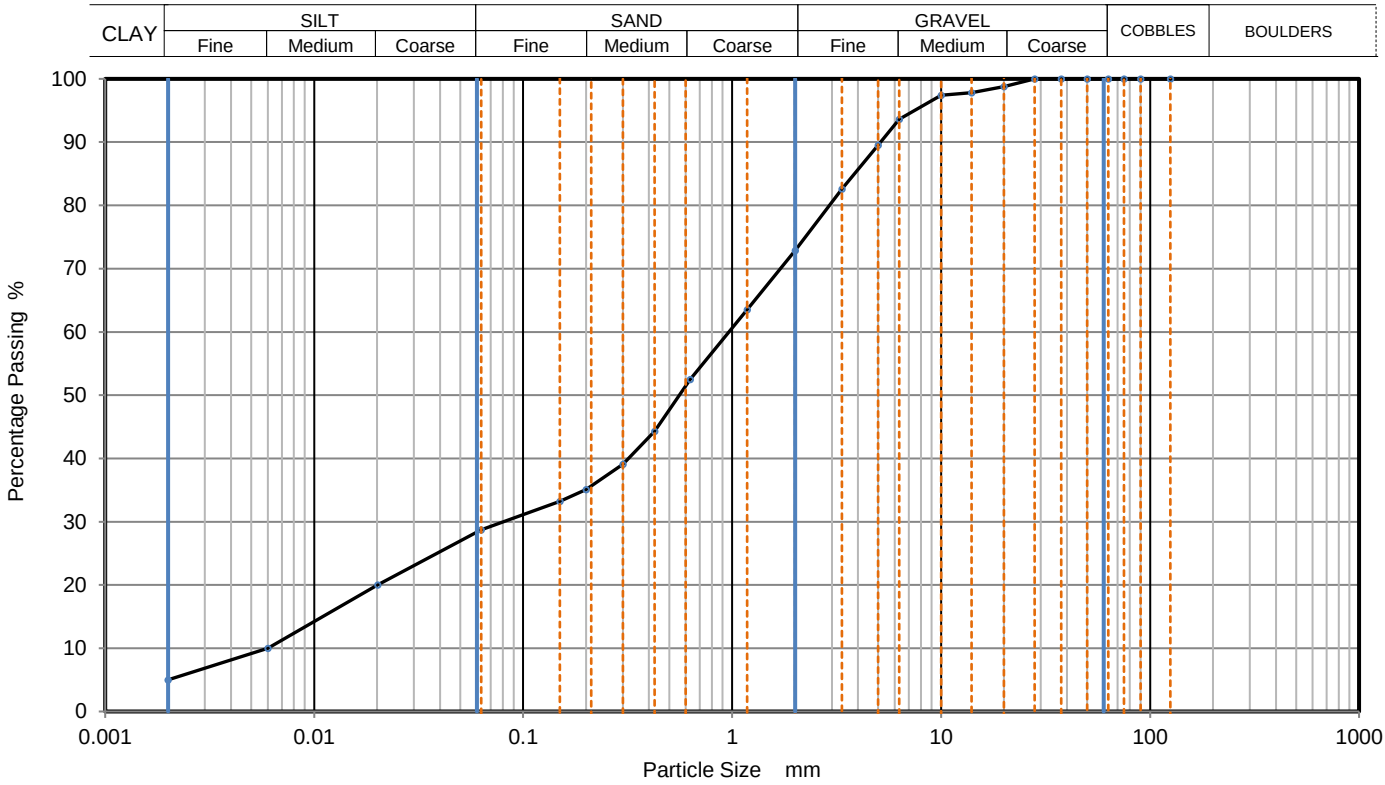
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	14/01/2020	KL002R PSD

PARTICLE SIZE DISTRIBUTION

				Project No.	12130
				Borehole/Pit No.	WS04
Project Name	Ennor			Sample No.	-
Soil Description	Light brown very silty very gravelly SAND			Depth, m	1.00
Specimen Reference	3	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.4				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	20
90	100	0.0060	10
75	100	0.0020	5
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	98		
10	97		
6.3	94		
5	90		
3.35	83		
2	73		
1.18	64		
0.63	53	Particle density	(assumed)
0.425	44	2.65	Mg/m3
0.3	39		
0.2	35		
0.15	33		
0.063	29		

Dry Mass of sample, g	2555

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	44
Silt	24
Clay	5

Grading Analysis		
D100	mm	
D60	mm	0.966
D30	mm	0.0805
D10	mm	0.00606
Uniformity Coefficient		160
Curvature Coefficient		1.1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5

UKAS TESTING
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Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	14/01/2020	KL002R PSD

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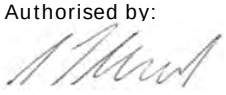
EX16 5HW

DETS Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 20-00077

Site Reference:	Ennor
Project / Job Ref:	12130 / T5359A
Order No:	None Supplied
Sample Receipt Date:	08/01/2020
Sample Scheduled Date:	08/01/2020
Report Issue Number:	1
Reporting Date:	13/01/2020

Authorised by:



Dave Ashworth
Technical Manager

DETS Ltd
Unit 1, Rose Lane Industrial Estate
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Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

4480

Soil Analysis Certificate						
DETS Report No: 20-00077	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
South West Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Ennor	TP / BH No	WS01	WS01	WS02	WS02	WS03
Project / Job Ref: 12130 / T5359A	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	1.20	2.00 - 3.00	1.60	2.00 - 3.00	0.80 - 1.00
Reporting Date: 13/01/2020	DETS Sample No	455069	455070	455071	455072	455073

Determinand	Unit	RL	Accreditation	(n)				
pH	pH Units	N/a	MCERTS	7.5	7.2	7.2	7.2	6.8
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	< 10	16	11	13	25
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	< 0.01	0.02	0.01	0.01	0.03

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate						
DETS Report No: 20-00077	Date Sampled	None Supplied	None Supplied			
South West Geotechnical Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Ennor	TP / BH No	WS04	WS05			
Project / Job Ref: 12130 / T5359A	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	1.00 - 2.00	1.40			
Reporting Date: 13/01/2020	DETS Sample No	455074	455075			

Determinand	Unit	RL	Accreditation	(n)				
pH	pH Units	N/a	MCERTS	6.4	6.8			
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	27	< 10			
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.03	< 0.01			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 20-00077	
South West Geotechnical Ltd	
Site Reference: Ennor	
Project / Job Ref: 12130 / T5359A	
Order No: None Supplied	
Reporting Date: 13/01/2020	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 455069	WS01	None Supplied	1.20	18	Brown sandy clay
^ 455070	WS01	None Supplied	2.00 - 3.00	12.5	Brown sludge
^ 455071	WS02	None Supplied	1.60	18	Brown sandy clay
^ 455072	WS02	None Supplied	2.00 - 3.00	13.8	Brown sandy clay with stones
^ 455073	WS03	None Supplied	0.80 - 1.00	11.5	Brown loamy sand with stones
^ 455074	WS04	None Supplied	1.00 - 2.00	10.8	Brown sandy clay with stones
^ 455075	WS05	None Supplied	1.40	19.9	Brown sludge

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

^ no sampling date provided; unable to confirm if samples are within acceptable holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 20-00077
South West Geotechnical Ltd
Site Reference: Ennor
Project / Job Ref: 12130 / T5359A
Order No: None Supplied
Reporting Date: 13/01/2020

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

APPENDIX D

Chemical Laboratory Testing Results

Bryony Halliday
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Watford,
Herts,
WD18 8YS

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e: reception@i2analytical.com

Analytical Report Number : 19-78035

Project / Site name:	Ennor	**Samples received on:**	16/12/2019
Your job number:	19937C	**Samples instructed on:**	17/12/2019
Your order number:	19937C	**Analysis completed by:**	31/12/2019
Report Issue Number:	1	**Report issued on:**	31/12/2019
Samples Analysed:	7 soil samples - 1 water sample		

Signed: A. Czerwińska

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-78035

Project / Site name: Ennor
Your Order No: 19937C

Lab Sample Number				1395282	1395283	1395284	1395285	1395286
Sample Reference				WS01	WS02	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.40	0.20	1.70	0.60
Date Sampled				11/12/2019	11/12/2019	11/12/2019	11/12/2019	11/12/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	17	15	15	9.2	17
Total mass of sample received	kg	0.001	NONE	1.2	1.3	1.5	1.4	1.5
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.3	7.2	6.9	7.1	6.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Sulphate as SO_4	mg/kg	50	MCERTS	5200	350	460	160	430
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1600	13	11	13	17
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.82	0.0063	0.0053	0.0067	0.0085
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	818	6.3	5.3	6.7	8.5
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	3.0	1.6	< 1.0
Organic Matter	%	0.1	MCERTS	1.0	2.7	3.3	0.2	2.5
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.64	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.7	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	1.8	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.93	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.89	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.0	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.50	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.86	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.44	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.57	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	9.32	< 0.80	< 0.80	< 0.80	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	32	12	12	19	11
Boron (water soluble)	mg/kg	0.2	MCERTS	1.0	0.7	0.6	0.3	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	10	8.0	17	7.8
Copper (aqua regia extractable)	mg/kg	1	MCERTS	27	20	17	11	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	74	32	57	14	26
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	5.2	3.5	12	3.2
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	35	24	45	22
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	180	< 10	< 10	< 10	< 10

Analytical Report Number: 19-78035

Project / Site name: Ennor
Your Order No: 19937C

Lab Sample Number				1395282	1395283	1395284	1395285	1395286
Sample Reference				WS01	WS02	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.40	0.20	1.70	0.60
Date Sampled				11/12/2019	11/12/2019	11/12/2019	11/12/2019	11/12/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-

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Project / Site name: Ennor
Your Order No: 19937C

Lab Sample Number				1395282	1395283	1395284	1395285	1395286
Sample Reference				WS01	WS02	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.40	0.20	1.70	0.60
Date Sampled				11/12/2019	11/12/2019	11/12/2019	11/12/2019	11/12/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	-	-	ND	-	-
SVOC % Match	%	N/A	NONE	-	-	0	-	-

Analytical Report Number: 19-78035

Project / Site name: Ennor
Your Order No: 19937C

Lab Sample Number				1395287	1395288			
Sample Reference				WS04	WS05			
Sample Number				None Supplied	None Supplied			
Depth (m)				1.50	0.50			
Date Sampled				11/12/2019	11/12/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	11	15			
Total mass of sample received	kg	0.001	NONE	1.5	1.5			
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.0	6.5			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0			
Total Sulphate as SO_4	mg/kg	50	MCERTS	160	440			
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	31	51			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	0.026			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15.4	25.7			
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0			
Organic Matter	%	0.1	MCERTS	0.1	2.5			
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	31	16			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	0.8			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	9.2			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	43			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	13	48			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	5.0			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	53	40			
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	< 10	< 10			

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Project / Site name: Ennor
Your Order No: 19937C

Lab Sample Number				1395287	1395288			
Sample Reference				WS04	WS05			
Sample Number				None Supplied	None Supplied			
Depth (m)				1.50	0.50			
Date Sampled				11/12/2019	11/12/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	-			
Phenol	mg/kg	0.2	ISO 17025	-	-			
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-			
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-			
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-			
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-			
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-			
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-			
2-Methylphenol	mg/kg	0.3	MCERTS	-	-			
Hexachloroethane	mg/kg	0.05	MCERTS	-	-			
Nitrobenzene	mg/kg	0.3	MCERTS	-	-			
4-Methylphenol	mg/kg	0.2	NONE	-	-			
Isophorone	mg/kg	0.2	MCERTS	-	-			
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-			
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-			
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-			
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-			
Naphthalene	mg/kg	0.05	MCERTS	-	-			
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-			
4-Chloroaniline	mg/kg	0.1	NONE	-	-			
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-			
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-			
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-			
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-			
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-			
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-			
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-			
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-			
Acenaphthylene	mg/kg	0.05	MCERTS	-	-			
Acenaphthene	mg/kg	0.05	MCERTS	-	-			
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-			
Dibenzofuran	mg/kg	0.2	MCERTS	-	-			
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-			
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-			
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-			
Fluorene	mg/kg	0.05	MCERTS	-	-			
Azobenzene	mg/kg	0.3	MCERTS	-	-			
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-			
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-			
Phenanthrene	mg/kg	0.05	MCERTS	-	-			
Anthracene	mg/kg	0.05	MCERTS	-	-			
Carbazole	mg/kg	0.3	MCERTS	-	-			
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-			
Anthraquinone	mg/kg	0.3	MCERTS	-	-			
Fluoranthene	mg/kg	0.05	MCERTS	-	-			
Pyrene	mg/kg	0.05	MCERTS	-	-			
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-			
Chrysene	mg/kg	0.05	MCERTS	-	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-			

Analytical Report Number: 19-78035

Project / Site name: Ennor
Your Order No: 19937C

Lab Sample Number				1395287	1395288			
Sample Reference				WS04	WS05			
Sample Number				None Supplied	None Supplied			
Depth (m)				1.50	0.50			
Date Sampled				11/12/2019	11/12/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	-	-			
SVOC % Match	%	N/A	NONE	-	-			

Analytical Report Number: 19-78035

Project / Site name: Ennor

Your Order No: 19937C

Lab Sample Number				1395289				
Sample Reference				WS03				
Sample Number				Water				
Depth (m)				None Supplied				
Date Sampled				11/12/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	6.2				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO_4	mg/l	0.045	ISO 17025	22.2				
Sulphide	µg/l	5	NONE	< 5.0				
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	12.4				
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10				
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16				
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	5.69				
Boron (dissolved)	µg/l	10	ISO 17025	74				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.20				
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0				
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.8				
Copper (dissolved)	µg/l	0.5	ISO 17025	3.4				
Lead (dissolved)	µg/l	0.2	ISO 17025	0.6				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.9				
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.0				
Zinc (dissolved)	µg/l	0.5	ISO 17025	10				
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10				

Analytical Report Number: 19-78035

Project / Site name: Ennor

Your Order No: 19937C

Lab Sample Number				1395289				
Sample Reference				WS03				
Sample Number				Water				
Depth (m)				None Supplied				
Date Sampled				11/12/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	µg/l	0.05	NONE	< 0.05				
Phenol	µg/l	0.05	NONE	< 0.05				
2-Chlorophenol	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05				
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05				
2-Methylphenol	µg/l	0.05	NONE	< 0.05				
Hexachloroethane	µg/l	0.05	NONE	< 0.05				
Nitrobenzene	µg/l	0.05	NONE	< 0.05				
4-Methylphenol	µg/l	0.05	NONE	< 0.05				
Isophorone	µg/l	0.05	NONE	< 0.05				
2-Nitrophenol	µg/l	0.05	NONE	< 0.05				
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05				
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05				
4-Chloroaniline	µg/l	0.05	NONE	< 0.05				
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05				
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05				
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05				
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05				
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05				
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05				
Dimethylphthalate	µg/l	0.05	NONE	< 0.05				
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05				
Dibenzofuran	µg/l	0.05	NONE	< 0.05				
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05				
Diethyl phthalate	µg/l	0.05	NONE	< 0.05				
4-Nitroaniline	µg/l	0.05	NONE	< 0.05				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Azobenzene	µg/l	0.05	NONE	< 0.05				
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05				
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Carbazole	µg/l	0.05	NONE	< 0.05				
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05				
Anthraquinone	µg/l	0.05	NONE	< 0.05				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				

Analytical Report Number: 19-78035

Project / Site name: Ennor

Your Order No: 19937C

Lab Sample Number				1395289				
Sample Reference				WS03				
Sample Number				Water				
Depth (m)				None Supplied				
Date Sampled				11/12/2019				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs TICs								
SVOCs TICs Compound Name		N/A	NONE	ND				
SVOC % Match	%	N/A	NONE	0				

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 19-78035

Project / Site name: Ennor

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1395282	WS01	None Supplied	0.50	Brown loam and clay with gravel and vegetation.
1395283	WS02	None Supplied	0.40	Brown loam and clay with gravel and vegetation.
1395284	WS03	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
1395285	WS03	None Supplied	1.70	Brown loam and clay with gravel.
1395286	WS04	None Supplied	0.60	Brown loam and clay with gravel and vegetation.
1395287	WS04	None Supplied	1.50	Brown loam and clay with gravel.
1395288	WS05	None Supplied	0.50	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 19-78035

Project / Site name: Ennor

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE

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Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Tentatively identified compounds (SVOC) in soil	Determination of semi-volatile organic compounds total ion count in soil by extraction with dichloromethane and hexane followed by GC-MS followed by a full library scan.	In-house method based on USEPA 8270	L064-PL	D	NONE
Tentatively identified compounds (SVOC) in water	Determination of semi-volatile organic compounds total ion count in water by extraction with hexane followed by GC-MS followed by a full library scan.	In-house method based on USEPA 8270	L070-PL	W	NONE
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Thiocyanate in water	Determination of thiocyanate in water by discreet analyser (colorimetry). Accredited matrices SW, GW, PW.	In house method based on SMWW 4500-CN-M. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE

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Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

The results included within the report are representative of the samples submitted for analysis.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS03	Water	W	19-78035	1395289	c	pH at 20oC in water (automated)	L099-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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