YGG Rhosafan, Port Talbot

784-B068544





DTS & Ground Investigation Report

Issue

Morgan Sindall

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AOD	above Ordnance Datum
bgl	below ground level
BGS	British Geological Survey
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C4SL	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Exposure Assessment
CoC	Constituent of Concern
CSM	Conceptual Site Model
DEFRA	Department of Environment, food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
DTS	Desktop Study
DRO	Diesel Range Organics
DWS	Drinking Water Standard
EA	Environment Agency (England)
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
GPR	Ground Penetrating Radar
LOD	Limit of detection
LQM	Land Quality Management
NRW	Natural Resources Wales
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal Protection Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-volatile organic compounds
TPH	Total Petroleum Hydrocarbon
TSV	Tier 1 Screening Values
VOC	Volatile Organic Carbon
VPH	Volatile Petroleum Hydrocarbons

EXECUTIVE SUMMARY

The Site	The site is located in the Sandfields area of Neath Port Talbot, South Wales. The site is approximately 3.37ha in area and is centred on National Grid Reference (NGR) 273930 190471. The approximate postcode of the site is SA12 7NN. The site is currently utilised in two halves; the western portion of the site is utilised as a NPTCBC skills and training and youth service centre, with associated car parking and allotment gardens to the south, followed by undeveloped amenity grasslands. The eastern portion of the site is utilised as the existing Ysgol Gynradd Gymraeg Rhosafan, with associated hard and soft standing playing fields and car park.
Geology, Hydrogeology and Hydrology	Artificial Ground, such as made up ground or infilled ground, is not shown to be present on the published BGS mapping. The published geology for the area of the site indicates the site to be underlain by Wind Blown (Aeolian) Sand over South Wales Middle Coal Measures Formation) comprising of Mudstone, Siltstone and Sandstone.
Ground Investigation	The site investigation was undertaken between 12/08/2024 and 19/08/2024. 3 groundwater and ground gas monitoring visits were undertaken between 02/09/2024 and 18/09/2024 following the completion of the ground investigation. The scope of the ground investigation was: • 4 No. Cable percussive boreholes to a maximum depth of 10mbgl (or refusal) with standard penetration tests at 1m intervals for the first 5mbgl and 1.5m thereafter. • Trial pitting of 16 No. locations, 12 No. of which to accommodate infiltration testing in accordance with BRE 365 methodology. • 16 No. TRLs by DCP method to aid in pavement design. • 2 No. vacuum excavated slot trenches to investigate GPR anomaly. • Installation of 4No. ground gas and groundwater monitoring well); • On-site inspection and logging of recovered samples; • Representative soil samples taken and submitted for geotechnical classification testing; • Representative soil samples taken, submitted, and tested for a suite of potential contaminants; • 3 No. return visits to monitor ground gas and groundwater levels. Phase 2 • 6 No. Asphalt cores taken and tested for the presence PAH/Coal Tar (PAK Marker) • 6no. hand augers to collect representative soil samples taken, submitted, and tested for a suite of potential contaminants;
Ground Conditions Encountered	The sequence of strata encountered beneath the site was; • Topsoil • Made Ground • Wind Blown (Aeolian) Sand
Preliminary Engineering Assessment	Based on the ground conditions it is considered that a retaining structure traditional strip foundation, placed within shallow natural deposits using conventional methods suggested by Hansen, may be Designed, in accordance with Eurocode 7 BS EN1997-1 (ULS DA1-2, partial factor of 1.25 for φ'), to an allowable net bearing pressure, Rd, of

	175kPa. A traditional strip or pad foundation, founded at a minimum depth of 0.75m bgl should result in settlement less that 25mm. Floor slabs may be ground bearing. It is recommended that for foundations the Design Sulphate Class for the site, as defined in BRE Special Digest 1, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1. Soakaway drainage is feasible for the development.
Contamination Assessment	Elevated concentrations of arsenic have been recorded in the near surface soil in two locations, as such additional samples were obtained from the vicinity of the exceedances and scheduled for bioaccessibility testing. The maximum bioaccessible fraction for arsenic was recorded as 6.9%. When this fraction is applied the exceedances noted in Phase 1, the resultant concentrations are noted to be below the screening threshold for public open space (residential) end use. It is also noted that recorded concentrations are below the screening values for a residential with plant uptake. Recorded concentrations of copper in soil derived leachate and groundwater samples are considered to be minor and again do not pose a significant risk to controlled waters. Asbestos containing materials have not been recorded during the site investigation.
Ground Gas Risk Assessment	A ground gas risk assessment has confirmed the site is representative of Characteristic Situation 1 (Very Low Risk) and as such, ground gas protection measures are not considered necessary for new developments on the site.
Recommendations	As with all brownfield sites, it is recommended that a reactive approach is adopted during the development phase to identify and assess the risks associated with any previously unidentified ground contamination which may be encountered.

1.0 INTRODUCTION

1.1 INSTRUCTION

Tetra Tech Environment Planning Transport Ltd (Tetra Tech) was commissioned by Morgan Sindall (the client) to undertake a Geo-Environmental Desk Top Study and subsequent GI and GIR for a site known as YGG Rhosafan, Port Talbot (known hereafter as "the site").

The location of the site is shown on Figure 1.

1.2 BRIEF

The brief was to provide a Phase 1 Geo-environmental Desk Study assessment report including a preliminary qualitative geotechnical and contamination risk assessment to support a planning application for the design development and construction of a new school with surrounding redevelopment.

The brief was also to provide an intrusive ground investigation to provide information on the ground conditions and enable a geotechnical assessment and contaminated land risk assessment to support the proposed development of the site.

The work was designed to comprise the following elements:

- 4 No. Cable percussive boreholes to a maximum depth of 10mbgl (or refusal) with standard penetration tests at 1m intervals for the first 5mbgl and 1.5m thereafter.
- Trial pitting of 16 No. locations, 12 No. of which to accommodate infiltration testing in accordance with BRE 365 methodology.
- 16 No. TRLs by DCP method to aid in pavement design.
- 2 No. vacuum excavated slot trenches to investigate GPR anomaly.
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples submitted and tested for a suite of potential contaminants;
- Three return visits to monitor ground gas and groundwater levels;
- Preparation of a Ground Investigation report.

Phase 2

- 6 No. Asphalt cores taken and tested for the presence PAH/Coal Tar (PAK Marker)
- 6no. hand augers to collect representative soil samples taken, submitted, and tested for a suite of potential contaminants;

The specification of works were completed in accordance with ICE specification for ground investigation and the works themselves be completed in general accordance with the principles set out in BS EN 1997-2:2007 and with the general practice described in BS5930:2015. The geo-environmental aspects of the ground investigation complied with the general requirements of BS 10175+A1:2017.

1.3 PROPOSED DEVELOPMENT

It is understood that the proposed development will involve the construction of a new school located within the existing southern areas of soft standing on site, this will also include associated play and sports areas, hard standing car park and associated footpath and roadways.

1.4 REPORT SCOPE

This report includes the following key elements:

- A record of the site visit and visual inspection walkover;
- A discussion of the current site status and key associated environmental influences observable by general visual inspection around the site;
- An historical site and area review, primarily referring to past editions of Ordnance Survey Maps;
- A discussion of the general expected ground and groundwater conditions within the topographical and area context referring to our own geological and hydrogeological maps library;
- Details of an Environmental database search (Groundsure report) of key relevant agencies, including Local and Statutory Authorities such as the Natural Resources Wales;
- A geotechnical and ground contamination assessment discussing the results of the research above not only concerning potential on-site conditions/constraints and contamination but also an overview of the potential for migration onto or off-site with respect to the surrounding neighbouring sites;
- A baseline UXO risk assessment using on-line databases to classify the site with regards to UXO risk;
- Development of a preliminary conceptual site model;
- Preliminary geotechnical hazard assessment;
- Qualitative ground contamination risk assessment (compliant with CIRIA 552 (CIRIA, 2001) methodology);

The GIR element of this report also includes the following key elements:

- Full factual records of the site works carried out;
- Summary of the ground conditions encountered;
- In-Situ testing results;
- Environmental laboratory testing results;
- Geotechnical laboratory testing results;
- Interpretation of Geotechnical and Environmental laboratory data, including a qualitative ground contamination risk assessment (compliant with CIRIA 552 (CIRIA, 2001) methodology);
- An executive summary of the report to allow a rapid, layman's overview.

1.5 LIMITATIONS

The recommendations and opinions expressed in this report are based on information obtained as part of the desk study or provided by others. Information provided from other sources is taken in good faith and Tetra Tech cannot guarantee its accuracy.

This report is subject to the report conditions presented in Appendix A.

The information contained in this report is intended for the use of the Morgan Sindall and Tetra Tech can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

2.0 SITE INFORMATION

2.1 LOCATION

The site is located in the Sandfields area of Neath Port Talbot, South Wales. The site is approximately 3.37ha in area and is centred on National Grid Reference (NGR) 273930 190471. The approximate postcode of the site is SA12 7NN.

The site address is: Rhosafan Welsh Primary School, Marine Drive, Sandfields, Neath Port Talbot, SA12 7NN.

A site location plan is presented in Figure 1.

2.2 GENERAL AREA CONTEXT

Table 2-1 - Surrounding land uses

Direction	Description
North	Immediately north of the site is residential housing, followed by C.900m the site of the former oil refinery works.
East	East of the site consists of residential housing and the town of Aberavon and Port Talbot at large.
South	South of the site consist of a single road of residential properties, followed by the shorefront of Port Talbot Beach.
West	West of the site consist of residential properties, followed by the shorefront of Port Talbot Beach.

2.2.1 Site Description

A site walkover inspection was undertaken by Tetra Tech on 12/08/2024. A series of photographs are presented at the end of this report and are cross referenced in the following section. The general site layout and photograph locations are shown in Figure 2.

2.2.2 Current Site Usage

The site is currently utilised in two halves; the western portion of the site is utilised as a NPTCBC skills and training and youth service centre, with associated car parking and allotment gardens to the south, followed by undeveloped amenity grasslands. The eastern portion of the site is utilised as the existing Ysgol Gynradd Gymraeg Rhosafan, with associated hard and soft standing playing fields and car park.

2.2.3 Access and Boundaries

The site is bounded by secure fencing along the north-eastern and south-eastern boundary, with a section to the rear of the building dissecting the work area, separating the two site users and a concrete wall forms the north-western and south-western boundaries of the site. There are two accessways from the north-east off of Marine Drive.

2.2.4 Topography

The site is generally flat in topography.

2.2.5 Ground Cover and Vegetation

The working area of the site predominately comprises soft standing with two investigation locations located within hardstanding areas, one centrally to the north-west and one to the east of the site.

2.2.6 Drainage

Several drainages covers and associated drainage lines run adjacent to the existing buildings on site, however not throughout the majority of the working area.

2.2.7 Services

Many services are located within the north and north-eastern portions of the site surrounding existing hardstanding and the existing buildings on site. Multiple soakaways are located within the soft standing to the south-west of the site.

2.2.8 On-Site Structures and Fuel Tanks

No tanks or permanent structures are within the majority of the working area. Several metal containers, and buildings are located in centrally and to the north-west of the site.

2.2.9 Electrical Substations

No electrical substations are mapped or have been identified on site.

2.2.10 Asbestos Containing Materials

No obvious indication of Asbestos Containing Materials has been identified on site, however given the age of the development the risk posed of the potential presence in the working area cannot be discounted.

2.2.11 Signs of Contamination

No obvious signs of contamination have been identified on site, however given the age of the development and the surrounding industrial nature of the wider town (>900m) the risk posed of the potential presence of contaminated soils in the working area cannot be discounted.

2.3 PREVIOUS INVESTIGATIONS

This section provides a summary of ground conditions encountered during previous phases of Geoenvironmental assessment on the site. The following table summarises the relevant reports made available to Tetra Tech.

Table 2-2 – Summary of Previous Reports

Author	Date	Title	Client	Comments
SOCOTEC	December 2019	Desk Study and Site Reconnaissance Report	Morgan Sindall	Ref: H9091-19
SOCOTEC	April 2020	Factual and Interpretative Report on Ground Investigation	Morgan Sindall	Ref: H9098-19

Information contained within the reports outlined above have been taken in good faith and Tetra Tech do not accept any responsibility for inaccuracies.

Tetra Tech understands that Morgan Sindall do not have reliance on the reports outlined above and as such the data is presented for information only.

2.3.1 Summary of SOCOTEC (December 2019) Desk Study and Site Reconnaissance Report for Morgan Sindall (Ref: H9091-19)

SOCOTEC undertook a Desk Study and Site Reconnaissance Report of the site (Ref: H9091-19).

The report highlights the proposed development as comprising of a single storey extension to the current primary school buildings, including four new classrooms, two toilet blocks and plant room, with a corridor connecting to the existing school building. *This development has since been completed and occupies a smaller footprint of the new larger proposed development.*

The report outlines an initial CSM and Preliminary Risk Assessment and identifies the risk posed to the development. Risks posed by land contamination at the site were anticipated to be low to moderate, primarily due to the historic and current industrial activities in the immediate surrounding area and the use of imported fill. Any contamination present on site could potentially pose a risk to construction workers and future end users by, for example, direct ingestion or inhalation of soils, dust and groundwater. Underlying groundwater or water bodies could be affected by any potential contamination and ground gases could affect future site users and the building envelope. Therefore, further site investigation was proposed to refine the CSM and gather geoenvironmental information to assess any potential risks with respect to future site users, construction workers and controlled waters pertinent to the site.

The Geotechnical Assessment indicates that the site will be underlain by Made Ground comprising Margam Slag, overlying Blown Sand deposits which are indicated to overlie Older Coastal Zone deposits. The report states that a ground investigation should be carried out to determine the ground conditions and groundwater levels at the proposed development to provide information for the assessment of geotechnical parameters to be used for preliminary design of foundations, along with an assessment of potential contamination on site.

The report recommends that a ground investigation comprising of 3 No. of cable percussive boreholes with SPTs to prove the location of rock head, hand excavated inspection pits adjacent to the current school building foundation arrangement, installation of combined gas and groundwater monitoring standpipes in order to assess the potential for ground gases to be produced and also obtain information on groundwater levels with 4 No. post fieldwork monitoring visits, geotechnical testing including classification tests (plasticity index / grading), shear strength testing and consolidation testing for foundation design and tests to determine the potential aggressive nature of the ground affecting concrete durability (ie sulphates and pH), geoenvironmental laboratory testing (Based on the CSM the chemical analysis suite should include as a minimum Heavy metals, cyanide, sulphide, extremes of pH, asbestos, phenol, oil / fuel hydrocarbons, aromatic hydrocarbons, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs). In addition, leachate and groundwater testing should be undertaken in order to assess the risk to the aquifers below the site), a factual report to present findings of the fieldwork

and laboratory testing phases of the investigation and an interpretative report to provide recommendations for dealing with any geoenvironmental and geotechnical hazards encountered, and guidance on suitable foundations for the project development.

The SOCOTEC Desk Study and Site Reconnaissance Report (Ref: H9091-19) is not relied upon as the newly proposed development covers a larger site area than the one highlighted within this SOCOTEC report.

2.3.2 Summary of SOCOTEC (April 2020) Factual and Interpretative Report on Ground Investigation for Morgan Sindall (Ref: H9098-19)

SOCOTEC undertook a Factual and Interpretative Report of the site (Ref: H9098-19).

The report contains a exploratory hole location plan showing 3 No. cable percussive boreholes and 2 No. hand dug foundation inspection pits. The exploratory hole locations are located centrally to the south.

The report summarises the strata encountered with Made Ground identified within all exploratory hole locations from ground level and thicknesses ranging from 0.20m to 1.20m. Blown Sand was encountered within all of the cable percussive borehole locations from 0.20m bgl and thickness ranging from 8.15m to 9.25m. The Standard Penetration Testing recorded within the Blown Sand ranges from 7 to 47. Groundwater was recorded between 3.84m to 4.46m bgl across the 3 No. installations within the Blown Sand.

The report indicates the 2 No. hand pits undertaken to identify the foundations of the old school building comprised of shallow concrete footings at approximately 0.7m bgl, founded within the sand stratum. It is assumed that so long as this foundation level has performed satisfactorily and that there are no signs of movement or distress within the existing building, then similar foundations would be expected to be satisfactory for the extension building, given similar ground conditions. Adjacent to the existing building the granular material has been identified as Made Ground as it was likely disturbed as part of the original construction. Any excavations near to the existing school should take into account the possibility of variations in the shallow material due to prior disturbance. Between 1.0m and 2.0m depth, the natural Blown Sand deposits are described as having a loose to medium dense relative density with an SPT ‘N’ value of 10, increasing rapidly with depth. Based on the observed groundwater level at approximately 4.0m depth, an allowable bearing pressure of 100 kPa or more is estimated for shallow footings up to 1.0m wide, limiting settlements to a customary 25mm. However, the presence of wood fragments was noted within the sand to a maximum depth of 1.60m (in BH01) and inspection of the formation should be carried out to ensure that if potentially decomposable material is present the foundations are taken down to below this level.

The report indicates that shallow excavations through the thin Made Ground and into the underlying natural deposits for the shallow foundations and service trenches, etc, would be within the scope of conventional backhoe excavators. The groundwater monitoring information indicates that such excavations unlikely to be subject to groundwater ingress. The side stability of excavations may be relatively poor in the granular materials, requiring suitable support or being cut to an appropriate batter angle.

The report indicates that from the geotechnical testing, a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment Class of AC-1 will be suitable for the proposed development.

The report identifies the main Potential Sources of Contamination as historical onsite fill sourced from imported slag used as fill from nearby steel works with potential contaminants of concern listed as; heavy metals, cyanide, sulphide, extremes of pH, asbestos, phenol, oil / fuel hydrocarbons, aromatic hydrocarbons, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and ground gases including methane and carbon dioxide. Current and historic features within 250m of the site such as; a boiler house within school grounds, electrical substations, tanks (unspecified), infilled land, printing work and car parks, are associated with potential contaminants of concern listed as; a range of organic and inorganic contaminants, including heavy metals and metalloids, cyanide, fuels oils, hydrocarbons, phenol, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), asbestos.

The report includes a Human Health Generic Quantitative Risk Assessment regarding in-situ soils, groundwater and leachates. No exceedances were noted within any in-situ soil samples tested. 18 No. of exceedances were recorded within the groundwater samples tested when compared to the Environmental Quality Standards (EQS) and comprised of PAHs. 3 No. of exceedances were recorded within the leachate samples tested when compared to the Environmental Quality Standards (EQS) and comprised of Cyanide (free). The Risks to Controlled Waters from PAHs and Cyanide (free) are deemed low as all groundwater and leachate concentrations were recorded below Laboratory Limit of Detection (LOD).

The report indicates that no remediation measures are required and highlights that the Indicative Waste Classification is non-hazardous.

The report indicates that the highest gas flow rate and carbon dioxide concentration readings gives a GSV of 0.07 l/hr, which is on the boundary of Characteristic Situations 1 and 2. As the rest of the readings have very low or effectively zero flows, these certainly fall below the 0.07 l/hr value defining Characteristic Situation 1 (very low risk) in the CIRIA guidance, normally associated with natural soils and 'typical made ground'. Overall, no special precautions are therefore indicated.

The SOCOTEC Factual and Interpretative Report (Ref: H9098-19) is not relied upon as the newly proposed development covers a larger site area than the one highlighted within this SOCOTEC report.

3.0 GEOLOGY, HYDROGEOLOGY, HYDROLOGY & RADON

3.1 GEOLOGY

Details of the geology underlying the site have been obtained from the following sources:

- British Geological Survey (BGS) Sheet No. EW247 Swansea Solid and Drift Edition 1:50 scale;
- BGS website (British Geological Survey, 2021), accessed 15/08/2024.
- Environmental database (Groundsure™) presented in Appendix B.
- BR211 Indicative Radon Mapping (Scivyer, 2015);

3.1.1 Made Ground

BGS Maps indicate that the site and entire surrounding area is landscaped ground (artificially modified ground).

3.1.2 Superficial Geology

BGS Maps indicate that the site is underlain by Aeolian (Wind Blown) Deposits, with the nearest change 176m to the southwest being Marine Beach Deposits.

3.1.3 Solid Geology

BGS Maps indicate that the site and majority of the surrounding area is mapped as mudstone, siltstone and sandstone of the South Wales Middle Coal Measures Formation. Within this geology an inferred fault is mapped 323m east.

3.1.4 Historical Borehole Logs

A review of historic logs held by the BGS in the area reveal a total of 15 No. within 250m, of these 6 No. are between 184m and 199m away. All of these identified logs are confidential and inaccessible at the time of reporting.

3.1.5 BGS Soil Chemistry

The Groundsure Report also provides Urban Soil Chemistry Averages for the site (source: Urban Soil and Soil Chemistry data provided by the British Geological Survey). The information is summarised in the table below.

Table 3-1 – Urban Soil Chemistry Averages

Determinand	Soil Concentration Range	
	Minimum (mg/kg)	Max (mg.kg)
Arsenic	35	45
Cadmium	1.8	1.8
Chromium	60	90
Lead	100	100
Nickel	15	30

3.2 HYDROGEOLOGY

3.2.1 Aquifer Classification

The Superficial deposit of Aeolian (Wind Blown) Deposits and the bedrock of South Wales middle Coal Measures Formation are designated as a Secondary A Aquifers. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

3.2.2 Groundwater Vulnerability

Guidance released by the EA (Envionment Agency , March 2017) states that activities that have the potential to affect the quality or quantity of groundwater must prevent groundwater pollution. All groundwater is vulnerable to pollution, and some geological formations are more vulnerable than others. The risks of groundwater pollution from any given activity depend in part on:

- The physical, chemical and biological properties of the underlying soil and rocks;
- Depth and quality of soil;
- The presence of glacial sediment and other materials – known as 'drift' deposits; and,
- Depth of the unsaturated zone.

All of the above affect how groundwater is more or less vulnerable to pollution, with type of vulnerability generally one of the following:

- Intrinsic vulnerability – this relates to the physical characteristics, it includes soil type, presence of superficial soils, or rock type; and,
- Specific vulnerability – this relates to the effect of the proposed activity including any contaminant and consequent risk to groundwater.

A review of the Groundwater Vulnerability Maps for England has revealed that the Superficial deposits are categorised as 'Secondary Aquifer – High'.

High vulnerability aquifers are defined as being able to *"able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits"*. EA guidance document[1] goes on to state that high vulnerability aquifers *"…results in a high overall pollution risk to groundwater from surface activities. Operations or activities in these areas are likely to require additional measures over and above good practice pollution prevention requirements to ensure that groundwater isn't impacted."*

3.2.3 Groundwater Source Protection Zones

The EA defines groundwater Source Protection Zones (SPZs) around identified abstractions to aid the assessment of risk to groundwater or abstraction sources from development. SPZs have three subdivisions and bespoke SPZs are defined for all major abstraction sources intended for human consumption or food use, e.g. boreholes and springs. These sub-divisions are defined as follows:

- SPZ1 – Inner protection zone - defined as the 50-day travel time from any point below the water table to the abstraction source. This zone has a minimum radius of 50 metres;

- SPZ2 – Outer protection zone - defined by a 400-day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the abstraction source, depending on the size of the abstraction;
- SPZ3 – Source catchment protection zone - defined as the area around an abstraction source within which all groundwater recharge is presumed to be discharged at the abstraction source.

The site is not shown to be situated within an NRW defined groundwater SPZ.

3.2.4 Depth to Groundwater and Anticipated Groundwater Flow Direction

Any groundwater is anticipated to flow generally southwest.

3.2.5 Groundwater Abstractions

No groundwater abstractions have been identified within 2.0km of the site.

3.3 HYDROLOGY

Details of the hydrology of the area have been obtained from the following sources:

- DataMapWales interactive mapping website (Data Map Wales, 2024), accessed 14/08/2024; and,
- Environmental database (Groundsure™).

3.3.1 Watercourses

No inland water courses have been identified on site or in the surrounding 250m.

The only surface water body in the surrounding area is the sea – the Swansea Bay costal body, 192m Southwest.

3.3.2 Surface Water Abstractions

No surface water abstractions have been identified within 2.0km of the site.

3.3.3 Discharge Consents

No surface water discharge consents have been identified within 250m of the site.

3.3.4 Pollution Incidents and Prosecutions

A summary of recorded Pollution Incidents and Prosecutions are presented in the table below.

Table 3-2 – Summary of Pollution Incidents and Prosecutions within 250m of the site.

Location	Details
15m north	25/03/2003; Ref: 145783; Atmospheric pollutant and effects – Dust, with minor impact to land and air, and no impact to water.

3.4 RADON

The BRE document 211 (Scivyer, 2015) mapping coverage for the site area was consulted and indicates that the site is located within an area where no radon protection measures are required for new developments. This statement is supported by the Groundsure Report (Appendix B) which confirms that the site is in a low probability radon area as less than 1% of homes are above the action level.

3.5 HISTORICAL MINING

According to the Coal Authority Interactive Viewer (The Coal Authority, 2021) the site is located within a Coal Mining Reporting Area. The site is not located within a Development High Risk Area.

3.5.1 Non-Coal Related Mining

No areas of non-coal related mining have been identified on site.

Areas of ground running adjacent to the present-day coastal road, located 157m southwest have been identified as unspecified ground workings in mapping dated 1921 and 1947.

3.6 BGS RECORDED MINERAL SITES

There are no BGS recorded mineral sites within 1.0km of the site.

4.0 UNEXPLODED ORDNANCE

Based on freely available mapping data from Zetica UXO (Zetica UXO, 2008), the site is located within a Low-Risk Area with regards to Unexploded Ordnance (UXO). A 'Low Risk' area is defined by Zetica as:

'Low risk regions are those with a bomb density of up to 10 bombs per 1000 acres. These areas are considered to have a significant but low UXB risk. In general, further action to mitigate the risk is considered prudent, although not essential. Care is required when assessing the risk for specific sites where the risk may be higher because of local wartime activity'.

5.0 SITE HISTORY

5.1 INTRODUCTION

The historical development of the site and surrounding area has been assessed using information available from historical Ordnance Survey (OS) maps within the Groundsure Report for the site which is presented in Appendix B of this report.

In the context of the summary of historical development of the surrounding area, the descriptions are limited to within approximately 500m of the site boundary, unless specified in the following section.

5.2 SITE HISTORY

5.2.1 Detailed Analysis of Site History

The table below provides a detailed account of the review of available OS mapping coverage and historical aerial imagery for the site and general area dating back to 1876.

Table 5-1 – Summary of Historical Data

Map Date & Scale	Within Site Boundary	Surrounding Area
1876 – 1880 1:2500	The site comprises marshland and sand dunes of the Aberavon Burrows.	The surrounding area comprises marshland and sand dunes of the Aberavon Burrows with a beach located approximately 250m to the south-west of site.
1884 1:10560	The site remains unchanged.	The surrounding area remains unchanged.
1897 – 1921 1:10560	The site remains unchanged.	The beach located 250m to the south-west is labelled as Aberavon Sands. The Rhondda and Swansea Bay Railway is located approximately 775m to the north-east. A brick works is located approximately 1.0km to the south-east from 1914 to 1921.
1947 1:10560	The site remains unchanged.	Residential and industrial development has occurred in excess of 1.0km to the south-east of the site.
1956 – 1976 1:2250 & 1:10560	The site has undergone development and now comprises Tirmorfa Primary School with assumed playgrounds and playing fields.	The surrounding area has undergone major residential development directly to the north-east, south-east, south-west and north-west of the site. A road has been constructed along the former railway line route located approximately 775m to the north-east.
1980 1:10000	The site remains unchanged.	Further residential development has occurred within the wider surrounding area

Map Date & Scale	Within Site Boundary	Surrounding Area
		which is predominantly residential and has been named Sandfields. Commercial development has occurred in excess of 750m to the north-east.
1993 – 2024 1:1250 & 1:10000	The site remains unchanged.	The wider surrounding area has undergone further residential and commercial development.

5.2.2 Summary of Site History

The site has comprised of marshlands and sand dunes from 1876 to 1956. From 1956 the site has undergone development and has comprised Tir Morfa Primary School with associated playgrounds and playing fields.

The immediate and wider surrounding area remained relatively unchanged until 1947, since then major residential development has occurred with associated infrastructure development and commercial development.

6.0 ENVIRONMENTAL DATABASE SEARCH

6.1 INTRODUCTION

Regulatory authority information relevant to the site and its surroundings has been obtained from the undertaking of an environmental database search (Groundsure™). The information is summarised below, and the environmental database records are enclosed in Appendix B. Distances stated are approximate and are taken from the boundary of the site to the database recorded entries.

The following summary is generally limited to locations within 250m of the site boundaries unless it is considered that installations or activities beyond that range could potentially have an impact on the site or be affected by the redevelopment of the site.

6.2 POLLUTION CONTROLS

The Groundsure report has not identified any Pollution Controls within 250m of the site:

6.3 WASTE

A summary of records pertaining to waste disposal, management and transfer facilities are presented in the table below.

Table 6-1- Summary of Waste Facilities within 250m of the Site

Facility Type	Location	Details
BGS Recorded Landfill	None	
Historical Landfill	None	
Registered Landfill	None	
Licensed Waste Management Facility		
Registered Waste Treatment or Disposal Sites	315m W	Treatment of waste (sorting and denaturing of controlled drugs for disposal) at Rushcliffe Independent Hospital
Local Authority Recorded Landfill	None	
Active Registered Waste Transfer Stations	None	

6.4 HAZARDOUS SUBSTANCES

The following table outlines records relating to the storage and use of Hazardous Substances within 250m of the site boundary.

Table 6-2 – Summary of Hazardous Substances within 250m of the Site

Type	Details
Control of Major Hazards Sites (COMAH)	None identified.
Explosive Sites	None identified.
Notification of Installations Handling Hazardous Substances (NIHHS)	None identified.

6.5 ENVIRONMENTALLY SENSITIVE AREAS

Table 6-3 – Summary of Environmentally Sensitive Areas

Designation	Location and Name	Details
Nitrate Vulnerable Zone (Surface Waters)	None identified.	
Nitrate Vulnerable Zone (Groundwater)	None identified.	
Special Protected Areas	None identified.	
Sites of Special Scientific Interest	None identified.	
Special Areas of Conservation	None identified.	
Adopted green belt	None identified.	
Green belt	None identified.	
Nature Reserve	None identified.	

6.6 FLOODING

The absence or presence of flooding potential at the site is summarised in the table below.

Table 6-4 - Summary of Flooding Potential

Designation	On Site	Detail
Flooding at Surface (from Groundwater)	Yes	Low risk – entire site.
Flooding below Ground Level (from Groundwater)	Yes	Low risk – entire site.

Flooding from Surface Waters	Yes	1 in 30 year, 0.1m-0.3m in isolated areas to the north of the site.

6.7 INDUSTRIAL LAND USE

The following section outlines the surrounding industrial land use within 250m and considered to be relevant to the site and the proposed development.

Table 6-5 - Summary of Industrial Land Use

Land Use	Detail
Contemporary Trade Directory Entries (on site)	None.
Contemporary Trade Directory Entries (surrounding area)	157m south-west – Unspecified ground workings.
Fuel Station Entries	None.
Energy features	Historical electricity substation 133-134m northeast mapped in 1993. And 137m northwest mapped in 1993.

6.8 SUMMARY OF ENVIRONMENTAL SETTING

No areas of significant concern have been raised as a result of examination of the environmental setting.

On site two areas in the northern areas of hardstanding have been found to have high risks of surface flooding (1 in 30-year returns, 0.1-0.3m).

An area stretching along the coastline at 157m southwest of the site has been identified as unspecified ground workings.

Two historic electricity substations have been identified 133-134m northeast and 137m northwest, both mapped in 1993.

7.0 RATIONALE FOR GROUND INVESTIGATION

Based on the findings of the Desk Top Study presented above, ground investigation is considered necessary to support the assessment process. The rationale for the intrusive phase of investigation in terms of geotechnical and ground contamination assessments is presented below.

7.1 GROUND CONTAMINATION

The UK procedure for the assessment of potential ground contamination considered the likely Source-Pathway-Receptor linkages between potential contamination on the site and proposed receptors in terms of both human health and the risks to the wider environment.

Based on the information presented in the proceeding sections the following sources have been identified on site which require further assessment through intrusive ground investigation.

- Made ground associated with the existing development on site.
- Reworked deposits and potential made ground associated with the landscaped ground identified across the entire site and surrounding area.

The proposed development includes the construction of a new school facility, with associated areas of hard and soft standing; play areas, spots pitches, car parking and associated road and pathways and as such the following potential receptors at risk are highlighted, both within the context of the current land use and the proposed development.

- Existing site users (Students and staff)
- Site workers (construction and demolition phase)
- Site end users (Students and staff)

7.2 GEOTECHNICAL CONSIDERATIONS

Based on the anticipated ground conditions and the proposed development the following elements are considered to require ground investigation in terms of ground conditions and potentials geotechnical constraints.

- Depth to competent strata;
- Presence of soft and unsuitable materials;
- Depth to groundwater;
- Soil infiltration rate;

7.3 PROPOSED GROUND INVESTIGATION

Based on the information summarised above a ground investigation was designed to assess the following elements:

- Investigation, logging and sampling of general ground conditions (superficial deposits and Made Ground soils) to assess the variability of soils and assess the depth to competent strata and/or bedrock;
- Installation of land gas and groundwater monitoring wells;
- Geotechnical testing of soils (in-situ and laboratory);
- Chemical laboratory testing of soils, soil derived leachate and groundwater chemistry for a range of contaminants including heavy metals, polycyclic aromatic hydrocarbons (PAHs), speciated hydrocarbons and asbestos testing of soils;
- Return visits to monitor land gas (In line with CIRIA 665 guidance) and groundwater;
- An interpretive land quality assessment including development of a refined conceptual site model (based on site specific data) and a qualitative risk assessment (compliant with UK CLR guidance and CIRIA 552 methodology) within the context of a commercial land use scenario;
- An interpretive geotechnical assessment of ground properties with respect to the proposed development of the site, including assessment of likely solutions for foundations, floor slabs and hard surface areas. Feasibility of soakaway drainage, sulphate chemical attack and other salient matters such as potential requirements for ground stabilisation.

8.0 SITE INVESTIGATION

The site investigation was undertaken between 12/08/2024 and 19/08/2024. 3 groundwater and ground gas monitoring visits were undertaken between 02/09/2024 and 18/09/2024 following the completion of the ground investigation.

The Phase 2 GI was undertaken in October 2024.

Details of the fieldwork methods are given in the notes section at the end of this report.

8.1 SCOPE

The scope of the site investigation included the following:

- 4 No. Cable percussive boreholes to a maximum depth of 10mbgl (or refusal) with standard penetration tests at 1m intervals for the first 5mbgl and 1.5m thereafter.
- Trial pitting of 16 No. locations, 12 No. of which to accommodate infiltration testing in accordance with BRE 365 methodology.
- 16 No. TRLs by DCP method to aid in pavement design.
- 2 No. vacuum excavated slot trenches to investigate GPR anomaly.
- Installation of 4No. ground gas and groundwater monitoring well);
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples taken, submitted, and tested for a suite of potential contaminants;
- 3 No. return visits to monitor ground gas and groundwater levels.

Phase 2

- 6 No. hand pits to a maximum depth of 0.80mbgl to collect samples
- 6 No. asphalt cores to test for PAH/Coal Tar

The ground investigation was designed to provide an overall assessment of ground conditions.

Figure 2 shows the layout of the exploratory holes advanced during the site investigation. Exploratory hole logs including photographic plates are presented in Appendix C.

9.0 GROUND CONDITIONS ENCOUNTERED

9.1 STRATA ENCOUNTERED

The sequence of strata encountered beneath the site was;

- Topsoil
- Made Ground
- Aeolian (Wind Blown) Deposits

A summary of each stratum depth is provided in the table below, with descriptions of each stratum detailed in the subsequent sections. Exploratory hole logs including photographic plates can also be seen in Appendix C.

Table 9-1 – Summary of Ground Conditions Encountered

Location	Depth to base of strata (m bgl)		
	Topsoil	Made Ground	Aeolian (Wind Blown) Deposits
BH01	GL – 0.20	Ne	0.20 – 10.0*
BH02	GL – 0.30	Ne	0.30 – 10.0*
BH03	GL – 0.20	0.20 – 0.60	0.60 – 10.0*
BH04	GL – 0.20	0.20 – 0.40	0.40 – 10.0*
SA01	GL – 0.20	0.20 – 0.35	0.35 – 1.50*
SA02	GL – 0.20	Ne	0.20 – 1.50*
SA03 (A, B & C)	GL – 0.25	0.25 – 0.75	0.75 – 1.50*
SA04	GL – 0.20	Ne	0.20 – 1.50*
SA05	GL – 0.20	0.20 – 0.75	0.75 – 1.50*
SA06	GL – 0.25	0.25 – 0.35	0.35 – 1.50*
SA07	GL – 0.20	0.20 – 0.45	0.45 – 1.70*
SA08	GL – 0.20	0.20 – 0.70	0.70 – 1.50*
SA09	GL – 0.15	0.15 – 0.40	0.40 – 1.80*
SA10	GL – 0.10	0.10 – 0.20	0.20 – 1.50*
SA11	GL – 0.20	Ne	0.20 – 1.65*
SA12	GL – 0.10	0.10 – 0.30	0.30 – 1.65*
TP01	Ne	GL – 0.40	0.40 – 1.10*
TP02 (A, B & C)	GL – 0.10	0.10 – 0.20	0.20 – 2.10*
TP03	Ne	GL – 0.40	0.40 – 1.10*
TP04	GL – 0.30	0.30 – 0.50	0.50 – 3.00*

9.1.1 Topsoil

Topsoil was encountered in eighteen exploratory hole locations across the site from ground level to 0.30m bgl. The Topsoil can generally be described as:

Soft brown and dark brown slightly sandy to sandy slightly gravelly to gravelly Clay with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.

9.1.2 Made Ground

Made Ground was encountered in fifteen exploratory hole locations from a minimum depth of ground level bgl to a maximum depth of 0.75m bgl. The Made Ground is generally described as:

Firm black slightly sandy gravelly Clay. Sand is fine to coarse. Gravel is fine to coarse angular to subangular coal, brick, slag, clinker and mudstone.

Greyish brown, black, brown, light brown, greyish yellow and dark greyish brown slightly gravelly to gravelly silty slightly clayey to clayey fine to coarse Sand with low cobble and boulder content. Gravel is fine to coarse angular to subangular sandstone, mudstone, coal, slag, clinker and brick. Cobbles and boulders are angular to subangular brick and concrete.

Black, red, grey slightly sandy to sandy slightly clayey to clayey fine to coarse angular to subrounded Gravel of mudstone, coal, slag, clinker, sandstone and concrete. Sand is fine to coarse.

9.1.3 Aeolian (Wind Blown) Deposits

Aeolian (Wind Blown) Deposits were encountered in all exploratory hole locations from a minimum depth of 0.20m bgl to a maximum depth of 10.0m bgl. The Blown Sands are generally described as:

Medium dense to very dense light brown, yellowish brown, greyish brown, light brownish yellow slightly gravelly locally silty fine to coarse Sand. Gravel is fine to coarse subangular to rounded sandstone, quartz and shell fragments.

9.2 GROUNDWATER

Groundwater was encountered within BH01 to BH04 at depths of between 2.90m to 8.70m bgl.

9.3 IN SITU TESTING

9.3.1 Standard Penetration Testing

Standard Penetration Tests were undertaken at 1.00m intervals for the first 5.00m of drilling and at 1.50m intervals thereafter in the cable percussion boreholes, in accordance with BS EN ISO 22476-3 (2005) and BS5930 (2015) to assess the relative density of the superficial deposits encountered within the borehole.

As stipulated by BS5930:2015, the SPT N-values represented on the borehole log are the uncorrected results which were obtained in the field, and these are presented on the borehole logs in Appendix B.

9.3.2 TRL probes

DCP probing, via TRL method, to provide California Bearing Ratio values for pavement design was undertaken in sixteen exploratory positions across the site or until refusal. Where shallow refusal was encountered, the test was relocated nearby.

Results are presented in Appendix D.

9.3.3 Soil Infiltration Testing

A total of 12 No. soil infiltration tests were carried out, designated as SA01 – SA12 The tests were undertaken within the shallow Aeolian (Wind Blown) Deposits. The results of these tests can be found in Appendix and are summarised 12.0

9.4 VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION

No visual or olfactory evidence of contamination noted during ground investigation works.

9.5 OBSTRUCTIONS

No obstructions noted during ground investigation works.

9.6 ASPHALT CORING & TESTING

A total of 6 No. asphalt cores, RC1 to RC6, were sampled across the site, taking representative samples from the various identified (by age and condition) asphalt types, which were then subsequently tested onsite for the presence of PAH/Coal Tar by means of PAK Marker Spray, the results of which are presented in the table below. No results were positive for PAH's.

Table 9-2 - Summary of Asphalt Cores & Testing

Core Location	Asphalt Thickness (mm)	PAH Identified (PAK Marker Spray)	Photo
RC1a	70	No	
RC2	70	No	
RC3	60	No	

Core Location	Asphalt Thickness (mm)	PAH Identified (PAK Marker Spray)	Photo
RC4	90	No	
RC5	70	No	
RC6	70	No	

10.0 LABORATORY TESTING

10.1 GEOTECHNICAL TESTING

A programme of laboratory testing was carried out on samples taken from the various strata encountered during the site investigation. Geotechnical testing was scheduled by Tetra Tech and carried out by GSTL Ltd, an approved supplier in accordance with the requirements of Tetra Tech quality system and UKAS accredited for a range of geotechnical tests. The test procedures used were generally in accordance with the methods described in BS1377:1990. Details of the specific tests used in each case are given in Table 10-1. Laboratory geotechnical test results are given in Appendix .

Table 10-1 - Summary of Geotechnical Testing

Test	No.	Test Method
PSD: Wet Sieve method	13	BS1377:1990 Part 2:9.2
PSD: Sedimentation by Pipette	5	BS1377:1990 Part 2:9.4
BRE Reduced Suite: pH, Acid Soluble Sulphate, Water Soluble Sulphate and Total Sulphur	12	BS1377:1990 Part 3 & BRE CP2/79 (non-accredited test)

10.2 ENVIRONMENTAL TESTING

Environmental chemistry was investigated by specialist chemical analysis of selected soil samples carried out by I2 Environmental Laboratories, an approved supplier in accordance with the requirements of Tetra Tech quality system and UKAS and MCERTS accredited for a range of chemical analyses. The testing was scheduled by Tetra Tech and is summarised in Table 10-2 for soil samples. The test results are included in Appendix G.

Table 10-2 - Summary of Environmental Testing

Test suite	No.
Soil Samples: • Tetra Tech Suite B ○ Heavy metals including Chromium (Hexavalent), Boron (water soluble), Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium and Zinc; ○ Inorganics – including pH, Water soluble Sulphate as SO4 (2:1 Extract), Cyanide (Easily liberatable- low level); ○ Speciated Petroleum Hydrocarbons (TPH CWG); ○ Speciated Polyaromatic Hydrocarbons (USEPA 16); ○ BTEX and MTBE; ○ Asbestos Screen; and, ○ Phenol.	8
Soil Derived Leachate Samples • Tetra Tech Leachate Suite A ○ Heavy metals including Antimony, Boron, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc; ○ Inorganics – including pH, Sulphate, Chloride, Nitrite, Nitrate, Total Cyanide, Ammoniacal Nitrogen and NH3 and NH4 and Total Alkalinity.	4
Groundwater Samples Tetra • Tetra Tech Leachate Suite A ○ Heavy metals including Antimony, Boron, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc; ○ Inorganics – including pH, Sulphate, Chloride, Nitrite, Nitrate, Total Cyanide, Ammoniacal Nitrogen and NH3 and NH4 and Total Alkalinity ○ Speciated Petroleum Hydrocarbons (TPH CWG); ○ Speciated Polyaromatic Hydrocarbons (USEPA 16); ○ BTEX and MTBE; ○ Phenol.	4
Waste Acceptance Criteria: Full Suite	3
Bioaccessibility Testing (BARGE methodology) • Arsenic • Cadmium • Lead • Nickel Vanadium	6

11.0 GROUNDWATER AND GAS MONITORING

11.1 GROUNDWATER MONITORING

Groundwater levels were monitored on 3 occasions following the completion of the ground investigation, between 02/09/2024 and 02/09/2024. The monitoring data is presented in Appendix H and summarised in Table 11-1 below.

Table 11-1- Summary of groundwater levels

Location	Base of borehole (m bgl)	Depth to water (m bgl)		
		02/09/2024	12/09/2024	18/09/2024
BH01	8.76	4.72	4.70	4.50
BH02	9.98	5.63	5.37	5.42
BH03	9.98	5.42	5.27	5.25
BH04	9.85	5.25	5.10	5.06

11.2 GROUND GAS MONITORING

Ground gas levels were monitored on 3 occasions following the completion of the ground investigation, between 02/09/2024 and 18/09/2024. The monitoring data is presented in Appendix H and in Table 11-2 below.

Table 11-2 – Summary of Phase 1 Ground Gas monitoring

Location	Max. Methane (peak) (% vol)	Max. Carbon Dioxide (peak) (% vol)	Min. Oxygen (steady) (% vol)	Max. Carbon Monoxide (steady) (ppm)	Max. Hydrogen Sulphide (steady) (ppm)	Max. Borehole flow (peak) (l/h)
BH01	0.20	1.10	19.10	<1	<1	0.50
BH02	0.20	0.80	20.02	<1	<1	5.20
BH03	0.20	1.80	18.30	<1	<1	0.60
BH04	0.20	1.80	18.70	<1	<1	0.60

The results indicate measurable concentrations of carbon dioxide (maximum of 1.80%/vol) and methane (maximum 0.2%/vol).

The maximum gas flow recorded across the monitoring round was a flow of 5.20 l/hr, recorded at BH03.

The monitoring rounds were undertaken during atmospheric pressure conditions ranging from 1008mb to 1028mb. A review of atmospheric pressure graphs on weatheronline.co.uk indicates that monitoring was undertaken during periods of raising, falling and steady pressure.

In addition, the ground gas monitoring results indicate hydrogen sulphide concentrations of 0ppm] across all monitoring rounds. Maximum concentrations of carbon monoxide of 0ppm were recorded.

12.0 SOIL INFILTRATION TESTING

12.1 BACKGROUND

On 7th January 2019, the Welsh Government introduced Schedule 3 of the Flood and Water Management Act 2010 which requires new developments to consider the feasibility of Sustainable Drainage Systems (SuDS) at the design stage. New developments over 100m^2 or including more than one property must obtain approval of the drainage system from the SuDS Approval Body (SAB) prior to the commencement of construction.

To support the assessment study, preliminary soil infiltration testing has been undertaken as part of the site investigation to provide information on the potential infiltration rates within the sub-strata on the site.

Soil infiltration tests have been undertaken in line with BRE 365 (2016) methodology and any deviations from this approach are documented within the following section. Where possible, locations and depths of test pits were determined based on the proposed drainage design.

12.2 SOIL INFILTRATION TESTS

Twelve soil infiltration tests were undertaken within a machine excavated trial pit as summarised in the following table.

Table 12-1 Summary of Soil Infiltration Test Locations

Test Location	Depth to Base (m bgl)	Top of Target Strata (m bgl)	Target strata
SA01	1.20	0.35	Sand
SA02	1.09	0.20	Sand
SA03	1.25	0.75	Sand
SA04	1.50	0.20	Sand
SA05	1.50	0.75	Sand
SA06	1.40	0.35	Sand
SA07	1.70	0.45	Sand
SA08	1.45	0.70	Sand
SA09	1.80	0.40	Sand
SA10	1.34	0.20	Sand
SA11	1.12	0.20	Sand
SA12	1.315	0.30	Sand

Three repeat fills were undertaken within the test location over a period of 1 day. Test locations were securely fenced and covered until the testing period was completed and excavations backfilled on completion.

The results of the soil infiltration tests are presented in the following table. Full test results are included in Appendix of this report.

Table 12-2 Summary of Soil Infiltration Test Results

Test Location	Soil Infiltration Rate (m/s)		
	Test 1	Test 2	Test 3
SA01	1.25 x10^{-4}	1.02 x10^{-4}	9.85 x10^{-5}
SA02	2.37 x10^{-4}	1.09 x10^{-4}	1.23 x10^{-4}
SA03	1.29 x10^{-4}	1.55 x10^{-4} (1.20mbgl)	1.39 x10^{-4} (1.085mbgl)
SA04	5.27 x10^{-4} (1.40mbgl)	4.34 x10^{-4} (1.33mbgl)	7.69 x10^{-4} (1.31mbgl)
SA05	3.35 x10^{-4} (1.46mbgl)	2.28 x10^{-4} (1.23mbgl)	1.31 x10^{-4} (1.20mbgl)
SA06	3.66 x10^{-4}	3.91 x10^{-4} (1.23mbgl)	3.46 x10^{-4} (1.30mbgl)
SA07	2.25 x10^{-4} (1.58mbgl)	2.28 x10^{-4} (1.23mbgl)	1.13 x10^{-4} (1.43mbgl)
SA08	1.79 x10^{-4}	1.63 x10^{-4} (1.23mbgl)	5.61 x10^{-4} (1.23mbgl)
SA09	N/A Major collapse during test.	1.41 x10^{-4} (1.39mbgl)	2.79 x10^{-4} (1.16mbgl)
SA10	3.92 x10^{-4}	2.47 x10^{-4}	3.00 x10^{-4} (1.24mbgl)
SA11	6.43 x10^{-4}	4.76 x10^{-4} (1.14mbgl)	5.01 x10^{-4} (1.18mbgl)
SA12	4.61 x10^{-4}	6.27 x10^{-4}	4.38 x10^{-4}

It is noted that the base depth of a number of pits change during the repeat tests, this is due to the localised collapse of the pits between tests.

12.3 GROUND CONDITIONS

12.3.1 Depth to groundwater

Due to the nature of where the soil infiltration testing was being undertaken, a trial pit was not excavated adjacent to the test location in order to identify the groundwater level.

Based on the findings of the fieldworks it is anticipated that groundwater is at 2.90m bgl or deeper. Based on the post completion monitoring it is anticipated that groundwater is at 4m bgl or deeper. It should be noted that groundwater levels can vary seasonally and year on year.

12.3.2 Strata Type

Testing was undertaken within the Aeolian (Wind Blown) Deposits. Full draft logs of the exploratory pits are included in Appendix C.

12.3.3 Ground Contamination

Significant ground contamination was not identified as part of the ground investigation, a contamination assessment is presented in Sections 16.0 and 17.0.

12.4 CONSTRAINTS AND LIMITATIONS

The information presented above is intended to assess the feasibility of soakaway drainage in order to support the development of the drainage strategy. Further testing, groundwater monitoring and ground investigation may be required to support a full SAB application or to inform the development of the final design process.

Ground conditions can vary throughout the year, including the location of the groundwater table. Consideration should be given to the potential effects of seasonal variation when reviewing the data above.

13.0 GEOTECHNICAL ASSESSMENT

13.1 GROUND CONDITIONS

Topsoil was encountered in eighteen exploratory hole locations across the site from ground level to 0.30m bgl.

Made Ground was encountered in fifteen exploratory hole locations from a minimum depth of ground level bgl to a maximum depth of 0.75m bgl.

Aeolian (Wind Blown) Deposits were encountered in all exploratory hole locations from a minimum depth of 0.20m bgl to a maximum depth of 10.0m bgl.

13.2 SOIL PROPERTIES

The ranges of the various soil properties measured are discussed below, to aid in the selection of design values. However, the appropriate choice of characteristic and design values will depend on the particular analysis and design philosophy used and should be selected by the designer.

Where characteristic values are given, these are reasonably conservative estimates of a measured or assessed property that may be used to represent the overall behaviour of the material. Design values are similar but also take into account the ground-structure interaction for a given structure so need to be selected by the designer. It is recommended, however, that design values used do not exceed the characteristic values given in this report.

13.2.1 Aeolian (Wind Blown) Deposits (Coarse-grained)

Coarse-grained Aeolian (Wind Blown) Deposits were identified within all positions immediately below the Made Ground/topsoil. A summary is presented in the table below.

Table 13-1 - Summary of test results within the coarse-grained Aeolian deposits

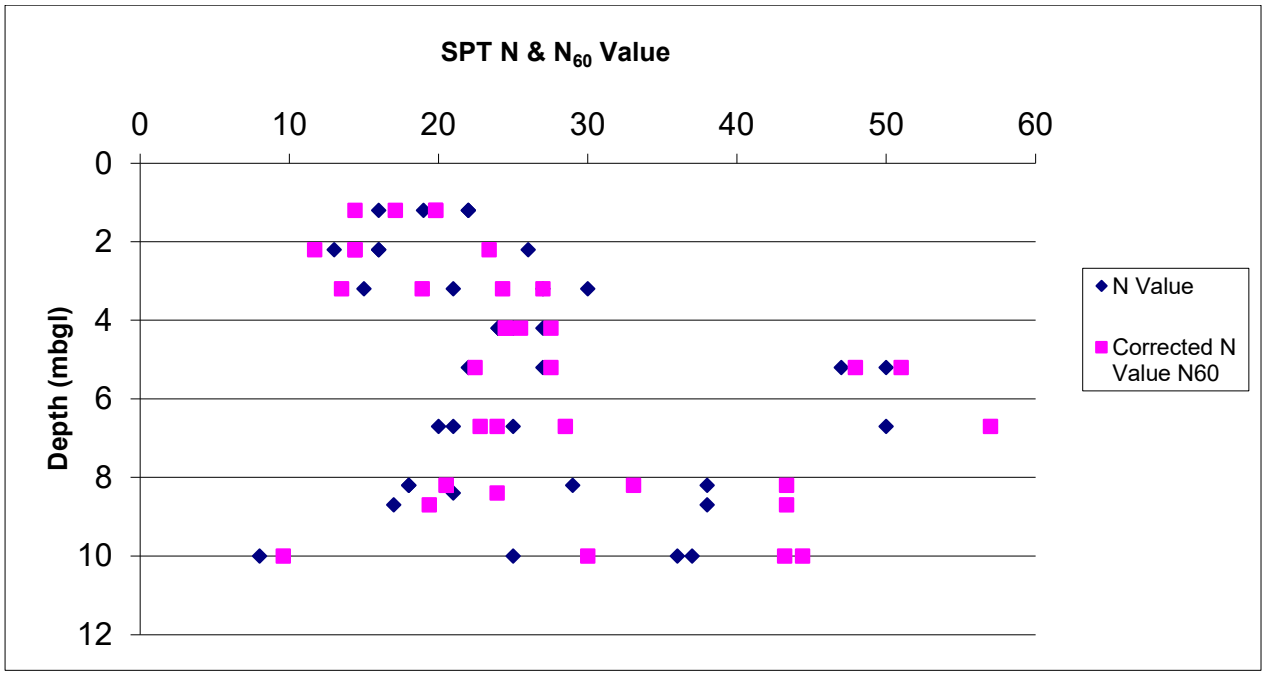
	No. of results	Range (min-max)	Average	Lower quartile	Upper quartile	Charact-eristic value+
SPT N Values	35	8 - 50	25	19	28	19
Angle of Shearing Resistance ϕ (°)*	35	29 – 41	35	33	35	33

Notes:
+ suggested characteristic values are appropriate for most normal applications but designers should satisfy themselves that they are suitable for the specific application and design method they are using;
* Estimated from a correlation from Peck, Hansen and Thornburn, Foundation Engineering, Wiley, 2nd ed., (1974)(6)

Based on the above, it is recommended that the following values are taken as design/characteristic values for this material:

- Angle of shearing resistance, ϕ 33°

Graph 1 - SPT N and Corrected SPT N_{60} vs Depth



13.3 SUMMARY OF CHARACTERISTIC MATERIAL PARAMETERS

Table 13-2 - Characteristic Material Parameters

	Unit	Parameter (Unit)	Characteristic Value	Rationale
Aeolian Deposits – Coarse Grained	**B1**	Unit Weight (kN/m³)	19	Conservative value based on lab testing
		Angle of Friction ϕ' (°)	33	Conservative value based on SPT, correlations and lab testing

14.0 GEOTECHNICAL DESIGN CONSIDERATIONS

14.1 PROPOSED DEVELOPMENT

The proposed development plan is presented at the end of this report and comprises the construction of a new school located within the existing southern areas of soft standing on site, this will also include associated play and spots areas, hard standing car park and associated footpath and roadways.

14.2 EARTHWORKS

Given the current levels of the site, significant earthworks (cut and fill) are not anticipated at this stage.

14.3 FOUNDATIONS

Within the area of the proposed building topsoil and Made Ground was encountered from ground level to 0.75m bgl, overlying coarse-grained medium dense to very dense Aeolian (Wind Blown) Deposits.

Based on the ground conditions it is considered that a traditional pad or strip foundations, placed within shallow natural deposits using conventional methods suggested by Hansen[(1)], may be Designed, in accordance with Eurocode 7 BS EN1997-1 (ULS DA1-2, partial factor of 1.25 for φ'), to an allowable net bearing pressure, Rd, of 175kPa (Note: No loadings for the structure have been supplied so the degree of utilisation, Λ_{GEO}, has not been assessed).

Based on the information above, and the material parameters presented in Section 13, traditional pad or strips founded at approximately 0.75m bgl should result in settlement less that 25mm. Settlements of foundations within coarse and fine-grained material were estimated using the Burland and Burbidge method[(2)]. Where deeper Made Ground exists, foundations should be taken deeper until natural ground is encountered, or alternatively replaced with compacted engineered granular fill.

Foundation excavations should be inspected by a suitably experienced engineer or inspector to ensure the founding material is suitable natural deposits. Any soft, loose or otherwise unsuitable material should be excavated and replaced by compacted granular backfill or lean concrete.

Construction elsewhere on the site would require further ground investigation.

14.4 FLOOR SLABS

Floor slabs may be ground bearing to combined dead and live loads of 20kNm^2. Any topsoil should be stripped and localised Made Ground excavated and replaced with compacted granular fill. The formation should be proof rolled and inspected by a suitably qualified engineer.

[1] Hansen, A General Formula for Bearing Capacity, Danish Geotechnical Institute Bulletin No. 11, 1961. Also, Danish Geotechnical Institute Bulletin No. 28, 1968; and Code of Practice for Foundation Engineering, Danish Geotechnical Institute Bulletin No. 32, 1978.
[2] Settlements of Foundations on Sand and Gravel, J.B Burland and M.C Burbidge, Proceedings of the Institute of Civil Engineers, Vol 78, 1985.

14.5 CHEMICAL ATTACK ON BURIED CONCRETE

Chemical tests undertaken on representative samples from the Aeolian (Wind Blown) Deposits show low levels of water-soluble sulphates and generally slightly alkaline conditions. Based on these conditions, it is recommended that for foundations the Design Sulphate Class for the site, as defined in BRE Special Digest 1, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1.

14.6 TEMPORARY WORKS

Battering or side protection will be needed where man-entry into excavations is required, especially for excavations deeper than 1.2m.

Shallow ground water strikes were not recorded during the intrusive investigation across the soils on the site.

It is possible that perched groundwater may be encountered within the Made Ground.

Therefore, deeper excavations (>1m) may require groundwater control which would need to be implemented in accordance with C750[3].

14.7 PAVEMENTS

Based on the 16 results gathered within the Aeolian (Wind Blown) Deposits, CBR values were in the range of 13% to 53% (average 32%). Given the very variable nature of the results obtained it is recommended a conservative value of 8% is adopted for pavement design within this stratum.

Proof rolling of the formation level will be required and any loose or soft spots should be removed and replaced with an engineer fill, in accordance with a suitable specification. The formation level will also need to be protected during inclement weather from deterioration.

Prior to placement of the founding material and the construction of the road pavement, the sub-formation and formation will need to be inspected and checked in accordance with a suitable specification to ensure the ground conditions are as expected. All testing should be carried out in accordance with DMRB CS 229 to confirm that the ground conditions at the time of construction are consistent with the previous design parameters.

14.8 DRAINAGE

Soakaway testing within the shallow coarse-grained Aeolian (Wind Blown) Deposits within trial pit soakaway exploratory hole locations yielded soil infiltration values of the magnitude 10^{-4} to 10^{-5} m/s with three tests undertaken at each location.

[3] Groundwater control: design and practice (second edition) (CIRIA750)

15.0 GEOTECHNICAL RISK REGISTER

15.1 INTRODUCTION

The following Geotechnical Risk Register (Risk Matrix

Table 15-2) has been considered with regard to the details of other construction related risks known at this time. The risks have been evaluated using the risk evaluation matrix suggested in CD622 'Managing Geotechnical Risk, which is reproduced as Table 15-1.

For the purposes of this report, risk has been assessed with reference to 'probability', 'impact' and 'risk rating'. Risk rating I = Probability (P) x Impact (I) as detailed in Table 15-1.

Table 15-1 - Risk Evaluation Matrix

Probability (P)		Impact (I)					Risk Rating (R = P x I)	Response to Risk
Very Likely	5	Very High	5	Potential to halt project		Potential for major claim or similar	17 to 25	Unacceptable: act now to prevent
Likely	4	High	4	Significant delay on overall project		Major impact on cost	13 to 16	Unacceptable: act now to prevent
Probable	3	Medium	3	Major delay on this task, significant impact on overall project unlikely	OR	Significant impact on cost	9 to 12	Early attention required
Unlikely	2	Low	2	Minor delay on this task, significant impact on overall project unlikely		Minor impact on cost	5 to 8	Regular attention required
Negligible	1	Very Low	1	No significant impact on task or project		Negligible impact on cost	1 to 4	Monitor

15.2 RISK MATRIX

Table 15-2 - Geotechnical Risk Register

Identified Geotechnical Hazard	Consequence	Risk before control			Risk Level	Control Measures	Residual Risk			Risk Level
		P	I	R			P	I	R	
Striking unrecorded services (including drainage)	Delay to programme of works and associated cost implication.	4	4	16	High	Buried services are present across the site and surrounding areas the Contractor should obtain from the Employer the latest statutory service plans and positively identify all services prior to commencing any excavations. Any works undertaken in the vicinity of existing buried services shall be undertaken in accordance with the statutory undertakers' requirements and the recommendations of HSG 47 'avoiding danger from underground services'.	3	4	12	Medium
Lack of groundwater information	Conservative and inefficient design Uncertainty as to requirement for dewatering or excavation stability	4	4	16	High	Design to assume ground water level is equal to 4m below ground level. Design to assume excavations will require support Design to consider need for ground water control	1	4	4	Negligible
Differential settlement due to the variable Made Ground and Aeolian (Wind	Loss of serviceability to structures Repairs required, entailing costs and legal preceding	4	4	16	High	Foundation subgrade material to be of a uniform soil with uniform mechanical properties Excavations and foundation sub-grade to be inspected and approved by qualified foundation engineer.	1	4	4	Negligible

Identified Geotechnical Hazard	Consequence	Risk before control			Risk Level	Control Measures	Residual Risk			Risk Level
		P	I	R			P	I	R	
Blown) Deposits deposits at site						Contractor to make allowance for over excavation of foundation and replacement of overburden with imported structural fill.				
Poor ground conditions (e.g: soft ground, running sands, excessive groundwater ingress, etc.)	Poor ground Conditions may result in further time and cost of installing a gravity wall due to the requirement for shoring temporary works or the creation of lifting or piling platforms.	4	4	16	High	Excavations and earthworks to be overseen by a qualified person who can identify poor ground conditions and advise on remedial measures or appropriate actions. Designer and client to consider to the use of ground improvement to enable safe site work. Include contractors and sub-contractors at early stage of project and brief them on any possible poor ground conditions encountered.	1	4	4	Negligible
Site workers exposed to contamination or reduced quality Made Ground	Illness or death of site operatives. Delays to site works. Requirement for further contamination assessment.	3	3	9	Medium	Food and drink to be consumed in designated areas. Uphold a strict hygiene routine on site prior to smoking, eating or drinking. Site operatives issued with appropriate PPE under CDM regulations.	2	3	6	Low
Soft sub-soil conditions	Toppling of equipment, damage to plant, injury or death of workers. Excessive differential settlement of foundations	4	5	20	Very high	Ground conditions on site to be inspected by a qualified engineer and soft ground to be subsequently identified so that they may be avoided, excavated and replaced, or treated. Contractor to adopt safe method of working. Location of heavy plant and crane bases away from edges of excavations. Accurate	1	5	5	Low

Identified Geotechnical Hazard	Consequence	Risk before control			Risk Level	Control Measures	Residual Risk			Risk Level
		P	I	R			P	I	R	
						understanding of soft soil from GI to plan working platforms. Appropriate design to be undertaken to minimise/eliminate risk from excessive/differential settlement. Designer to specify the removal of any soft ground encountered at formation/foundation levels. Designer to specify lift platforms, as required.				
Hard or dense strata	Programme and cost implications due to shallow refusal of sheet piles	4	5	20	Very High	Specialist piling contractor to be consulted regarding ground conditions, pile type and length.	3	3	9	Medium
Aggressive chemical ground conditions	Chemical attack on buried concrete, weakening of structure, structural failure of foundations	4	4	16	High	Design to consider soil aggressivity classification DS-1 and AC-1.	1	4	4	Negligible

16.0 GROUND CONTAMINATION ASSESSMENT – HUMAN HEALTH

16.1 INTRODUCTION

The UK Contaminated Land Regime (CLR) allows for a tiered approach to the assessment of ground contamination which is designed to allow increasingly site-specific assessment. In order to assess the potential risk posed by contaminants contained within the soils at the study area a generic quantitative risk assessment (gQRA) has been undertaken by comparing recorded concentrations of chemical constituents in soil with Generic Assessment Criteria (GAC) to identify whether, at the concentrations recorded, the presence of the constituent has the potential to adversely affect the health of site users (a Tier 1 assessment). GAC are set at levels where potential exposure is deemed to be within acceptable limits.

If the recorded concentrations of a particular constituent are below the GAC then the risk is generally considered to be acceptable and further assessment / or mitigation measures are not required. Where a substance is recorded at concentrations higher than GAC this does not necessarily indicate that a particular risk is present, however, it does typically signify the requirement to undertake further assessment in line with the UK tiered risk assessment framework.

16.2 ASSESSMENT CRITERIA

16.2.1 Generic Assessment Criteria

The following GAC for soils have been utilised for the screening process, in order of preference:

- CL:AIRE published C4SL (DEFRA, 2014);
- CIEH/LQM published S4UL (LQM/CIEH, 2015);
- Tetra Tech internal Tier 1 Screening Criteria (issue 15) derived using the derivation tool CLEA version 1.06, in line with the current UK Contaminated Land Regime.

C4SL are currently available for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead[4]. The C4SL were originally developed to support the categorisation of sites in accordance with Part 2A are also, based on DEFRA guidance, considered suitable for use during the assessment of sites as part of the planning process.

Where C4SLs are not available, 'Suitable for Use Levels' (S4UL) developed by CIEH/LQM have been used. The S4UL provide GAC based on minimal or tolerable risk intended to be protective of human health for individual or mixtures of substances. It is considered conservative and appropriate to use these values for contaminants for which C4SL are unavailable. GAC for volatile and semi-volatile organic compounds (VOC and SVOC) not presented in the S4UL document are sourced from CL:AIRE (CL:AIRE, January 2010).

Where no published screening values are available Tetra Tech have derived their own values (easily liberatable cyanide).

The CLEA model states that "For most exposure pathways, the contamination is assumed to be at or within one metre of the surface" (Environment Agency, 2009). It is considered that at depths greater than

[4] Arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI, lead assuming 6% SOM (1% SOM C4SL also published for benzene).

1.0m, the probability of human exposure via the direct contact pathways are significantly reduced, leaving inhalation of volatile compounds as the dominant pathway with regard to human health risks. Typically, volatile compounds only significantly affect the indoor inhalation pathway. The same screening concentrations have been used for all depths at this stage, though it is noted that these are highly conservative for depths below 1.00m bgl.

16.2.2 Proposed End Use

Screening criteria have been developed for the following land use scenarios:

- Residential with plant uptake;
- Residential without plant uptake;
- Allotments;
- Public open space (park and residential);
- Commercial / Industrial.

The proposed development on site will involve the construction of a new school located within the existing southern areas of soft standing on site, this will also include associated play and spots areas, hard standing car park and associated footpath and roadways. As such, the following screening assessment has been undertaken against a residential without plant uptake end use scenario to provide a conservative assessment.

16.2.3 Soil Organic Matter

For organic contaminants, the generic soil screening values have been derived for a range of concentrations of soil organic matter (1%, 2.5%, 6%). In order to provide a conservative assessment, the GAC derived for a 1% SOM have been adopted.

16.3 TIER 1 – SOIL SCREENING

A total of eight soil samples collected from across the site were submitted for chemical laboratory analysis. Full copies of laboratory certificates for all soil analysis are included in Appendix G.

Comparison of the chemical analysis results with the generic assessment criteria for a residential without plant uptake end use has identified the following exceedances, as detailed in Table 16-1.

Table 16-1 - Summary of Constituents of Concern

Constituent of Concern	No. of Samples	Min	Max	SSV	Exceedances	
					No. of exceedances	Location
pH	8	7.6	9.3	9	1	BH01 (1.50m bgl)
Arsenic	8	9.7	99	40	2	SA03 (0.70m bgl) & TP02 (0.20m bgl)

A summary table of all the data is also presented in Appendix .

Due to the sensitive nature of the assessment process, the concentrations of the determinants listed in the table above were also compared to Public Open Space (Residential) end use. When these screening values are applied, it is noted that exceedances are still recorded for Arsenic. Comparison to the exploratory hole logs for the Made Ground indicate the presence of slag and clinker which are considered to be the likely source of the heavy metals.

These are considered further in the following sections.

16.4 ASBESTOS

The samples sent for laboratory testing were also scheduled for asbestos screening. Asbestos containing materials or free fibres were not identified in any of the samples.

16.5 ADDITIONAL SAMPLING

Elevated concentrations of arsenic were identified two locations (SA03 and TP02) as part of the original ground investigation. During the return visit additional samples were obtained from these areas and scheduled for further testing including bioaccessibility testing.

16.5.1 Bioaccessibility Testing

A key consideration of the risk to human health is the bio-accessibility of the heavy metal, once ingested by the subject. This assessment replicates the processes which occur within the digestive tract based on the methodology presented by the Bioaccessibility Research Group of Europe (BARGE) Unified Bioaccessibility Method (UBM).

The BARGE UBM methodology (INERIS, 2010) states;

- Unified BARGE Method is an *in vitro* method for simulating the human digestive procedure using synthetic digestive fluids (saliva, gastric fluid, duodenal fluid and bile).
- The gastric phase is a digestive extract collected after 1 hour agitation with saliva and gastric fluids.
- The gastro-intestinal phase is a digestive extract collected after 1 hour agitation with saliva and gastric fluid followed by 4 hours agitation with duodenal fluid and bile.

The results are presented as the percentage of the total concentration that is deemed to be bioaccessible at each of the two stages of the assessment. The test is currently available for the following heavy metals:

- Arsenic;
- Cadmium;
- Lead.
- Nickel
- Vanadium

Bioaccessibility testing was undertaken on samples of the soil obtained from the areas where elevated concentrations of arsenic were previously identified. Exceedances of cadmium, lead, nick and vanadium were not identified in the phase 1 ground investigation, however the results are presented for information.

The following table presents a summary of the test results with the following parameters presented for each determinant.

- Concentration within sample.
- Concentration after stomach only extraction
- Concentration after stomach and intestine extraction.
- Percentage of heavy metal bioaccessible after stomach only extraction
- Percentage of heavy metal bioaccessible after stomach and intestine extraction

Table 16-2 – Summary of accessibility testing

Metal	Stage of Extraction	TP02a	TP02b	TP02c	SA03a	SA03b	SA03c
Arsenic	Sample (mg/kg)	21	14	11	14	12	17
	(Bioaccessible) – Stomach phase (mg/kg)	1.4	0.3	0.4	0.3	0.5	0.2
	Bioaccessible Fraction – Stomach phase (%)	**6.9**	**2.3**	**3.8**	2.1	4.5	**1.0**
	(Bioaccessible) – Stomach & Intestine phase (mg/kg)	< 0.1	< 0.1	< 0.1	2.0	1.2	< 0.1
	Bioaccessible Fraction – Stomach & Intestine phase (%)	< 1.0	< 1.0	< 1.0	**14.0**	**10.2**	< 1.0
Cadmium	Sample (mg/kg)	1.1	< 0.2	< 0.2	0.4	< 0.2	0.8
	(Bioaccessible) – Stomach phase (mg/kg)	0.3	< 0.1	< 0.1	0.1	< 0.1	0.2
	Bioaccessible Fraction – Stomach phase (%)	**29.7**	< 1.0	< 1.0	21.8	< 1.0	**28.4**
	(Bioaccessible) – Stomach & Intestine phase (mg/kg)	0.2	< 0.1	< 0.1	0.2	< 0.1	0.1
	Bioaccessible Fraction – Stomach & Intestine phase (%)	19.2	**< 1.0**	**< 1.0**	**46.5**	< 1.0	13.8
Lead	Sample (mg/kg)	50	7.5	6.7	19	11	30
	(Bioaccessible) – Stomach phase (mg/kg)	3.5	< 0.1	1.4	2.1	1.3	4.2
	Bioaccessible Fraction – Stomach phase (%)	**7.0**	**< 1.0**	**20.7**	**10.8**	11.6	**13.9**
	(Bioaccessible) – Stomach & Intestine phase (mg/kg)	1.6	< 0.1	0.6	< 0.1	3.5	2.9
	Bioaccessible Fraction – Stomach & Intestine phase (%)	3.2	< 1.0	8.9	< 1.0	**31.7**	9.6

Metal	Stage of Extraction	TP02a	TP02b	TP02c	SA03a	SA03b	SA03c
Nickel	Sample (mg/kg)	18	5.9	4.9	9.2	6.3	15
	(Bioaccessible) – Stomach phase (mg/kg)	1.2	1.1	0.3	0.8	0.2	0.7
	Bioaccessible Fraction – Stomach phase (%)	6.9	**18.2**	6.2	8.7	3.7	4.8
	(Bioaccessible) – Stomach & Intestine phase (mg/kg)	1.8	0.7	0.7	1.3	0.9	1.4
	Bioaccessible Fraction – Stomach & Intestine phase (%)	**9.8**	11.6	**15.0**	**14.6**	**13.8**	**9.6**
Vanadium	Sample (mg/kg)	29	13	13	18	13	24
	(Bioaccessible) – Stomach phase (mg/kg)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Bioaccessible Fraction – Stomach phase (%)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	(Bioaccessible) – Stomach & Intestine phase (mg/kg)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Bioaccessible Fraction – Stomach & Intestine phase (%)	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**

16.5.2 Summary of Results

The results of the bioaccessibility testing are presented in the table below, with the highest fraction of bioavailable metal highlighted for each sample.

It is noted that the overall concentrations recorded in the second phase of works were lower than those noted during the Phase 1 ground investigation. This further suggests that the elevated concentrations identified in TP02 and SA03 were localised and not representative of an area of significant contamination.

As such, the original exceedances have been considered in relation to the worst-case output from the bioaccessibility test results.

The sample showing the highest bioaccessible fraction in the second phase of testing was noted to be TP02, with a value of 6.9% bioaccessible.

Table 16-3 – Bioaccessibility calculations (arsenic)

Sample location	Concentration Arsenic (Phase 1 GI) mg/kg	Bioaccessible Fraction (%)	Bioaccssible concentration (mg/kg)	SSV (resi without plant uptake)
TP02 0.2m	96	6.9	6.6	40
SA03 0.7m	99	6.9	6.8	40

As can be seen in the table above, when the maximum bioaccessible fraction is applied to the results from the Phase 1 Ground Investigation, the bioavailable concentration is noted to be below the screening value for a residential without plant uptake end use scenario.

17.0 GROUND CONTAMINATION ASSESSMENT – WIDER ENVIRONMENT

17.1 INTRODUCTION

The potential for contaminated groundwater on site to adversely affect controlled water receptors (groundwater and surface water bodies) has been assessed at this stage by direct comparison of analytical data from the Tetra Tech ground investigation with relevant Water Quality Standards (WQS).

Similarly, the potential for soil contamination to impact controlled waters has been assessed by comparing analytical data from soil derived leachate tests directly against WQS.

17.2 ASSESSMENT CRITERIA

In light of the environmental setting of the site under consideration. The following water quality standards have been adopted, in order of preference.

- Water Framework Directive (WFD),
- Environmental Quality Standards (EQS);5
- WHO 2008 - Petroleum Products in Drinking Water (WHO 2008)
- UK Drinking Water Standards6.

17.2.1 Bioavailability

For certain heavy metals (copper, zinc, manganese, nickel and lead) the bioavailability of the metal within the water can be calculated to generate a bespoke screening criteria based on other groundwater parameters. This assessment is undertaken utilising the Metal Bioavailability Assessment Tool (M-BAT) which was developed using the $EQS_{(bioavailable)}$ developed in line with the Water Framework Directive.

In the case of copper, zinc, manganese and nickel the assessment takes into account the concentration of calcium, Dissolved Organic Carbon (DOC) and pH of the water sample. The assessment for lead only takes the DOC of the sample into account. A spreadsheet has been developed for the assessment by the UK Technical Advisory Group on the Water Framework Directive.

17.3 SOIL DERIVED LEACHATE METHODOLOGY

Soil derived leachate samples can be used to identify potentially mobile contamination within soil samples collected from the site. It should be noted that the laboratory test methodology indicates a potential mobility of contaminants and is usually considered to reflect a worst-case situation and unlikely to represent on-site conditions.

The laboratory preparation of leachate samples is likely to produce higher concentrations of leachable components than conditions encountered on site and as such the following assessment is considered to be inherently conservative in nature. Furthermore, the resulting data are screened against criteria

[5] Where WFD 2015 are not presented revoked WFD 2010 standards are used
[6] WHO 2005; WHO 2008; UK Water Supply Regulations 2010 and 1989 Regulations. Priority given to UK drinking water standards

intended to be protective of water bodies and drinking water supplies and are not intended to assess the potential significance of contaminant mobility.

17.4 TIER 1 SCREENING ASSESSMENT – SOIL DERIVED LEACHATE

Four soil derived leachate samples were screened against a suite of determinants outlined in Section 17.2.

The following table summarises the determinants which have been identified at concentrations in excess of the relevant WQS screening criteria.

Table 17-1 – Summary of Exceedances within Soil Derived Leachate Samples

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location
Copper	µg/l	6.1	1.3	1*	4	SA03 1.2m BH01 1.5m BH03 0.5m BH03 2.5m

** Freshwater waters EQS 2015*

Copper has been recorded at concentrations in excess of the relevant EQS screening value and are discussed further below.

Full copies of laboratory certificates for all soil analysis are included in Appendix G.

17.5 TIER 1 SCREENING ASSESSMENT – GROUNDWATER

Four groundwater samples were obtained from the monitoring installations on the site and analysed for the suite of determinants outlined in Section 10.2. The results were screened against a suite of determinants outlined in Section 17.2.

The following table summarises the determinants which have been identified at concentrations in excess of the relevant WQS screening criteria.

Table 17-2 – Summary of Exceedances within Groundwater Samples

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location
Copper	µg/l	6.0	2.8	1*	4	BH01, BH02, BH03, BH04

** Freshwater waters EQS 2015*

As can be seen in the table above, Copper has been identified at concentrations in excess of the relevant screening criteria.

17.6 SUMMARY OF EXCEEDANCES – CONTROLLED WATERS

Copper has been recorded at concentrations in excess of the relevant EQS screening criteria in both soil derived leachate and groundwater samples. The recorded concentrations may originate on site due to the recorded presence of slag within the Made Ground or be representative of the wider naturally occurring concentrations.

Whilst exceedances have been recorded, the concentrations are not considered to be significantly elevated, furthermore it is noted that the site is located close to the sea and as such groundwater within the site is unlikely to interact with freshwater bodies.

The recorded concentrations of copper are considered further within the risk assessment presented in Section 19.0.

18.0 PRELIMINARY GROUND GAS ASSESSMENT

18.1 INTRODUCTION

Three return ground gas monitoring visits were undertaken between the 2nd September 2024 and 18th September 2024]. Full factual site records of the gas monitoring results are presented in Appendix H and summarised in Section 11.2.

18.1.1 Ground Gas Monitoring

Ground gases are monitored within boreholes on the site recording the following parameters.

- Concentrations of ground gases;
  - Methane (%v/v);
  - Carbon dioxide (%v/v);
  - Oxygen (%v/v);
  - Carbon monoxide (ppm);
  - Hydrogen sulphide (ppm);
- Borehole flow rate (l/hr);
- Depth to groundwater;
- Atmospheric pressure trends;

Where groundwater levels are noted to be above the screened sections of the boreholes the data is not considered to be representative of the ground gas regime and are therefore not used within the risk assessment process.

Atmospheric pressure trends are recorded on site during the monitoring process, but are also noted in the preceding three days, and one day after each monitoring visit. Falls in atmospheric pressure are generally considered to indicate a higher potential for ground gas migration from the sub surface and as such monitoring during periods of falling pressure are considered to represent worst case scenarios as outlined in the CL:AIRE Technical Bulletin TB17 (CL:AIRE, August 2018).

18.1.2 Ground Gas Risk Assessment Methodology

The key reference document which has been used to undertake the semi-quantitative land gas assessment presented in this report is CIRIA C665 (CIRIA, 2007). This provides a framework for assessment of land gas risk to buildings/structures with foundations (i.e. houses and/or commercial properties).

The risk assessment process is based on a Source-Pathway-Receptor Conceptual Site Model Methodology, with consideration given to the potential sources likely to be present on the site and the ground gas monitoring regime designed to reflect the scale of the source potential.

The collected data has been used for the purposes of undertaking a semi-quantitative assessment in accordance with the CIRIA 665 methodology. The calculation used to calculate the gas screening value (GSV) for the site, together with the relevant definition of units, is as follows:

GSV (litres of gas/hr) = borehole flow rate (l/hr) x gas concentration (volume/100)

The calculated GSV values are used to determine the Characteristic Situation (CS) for the site in terms of methane and carbon dioxide, based on the conditions outlined in Table 18-1 below.

CS classification is applicable to all buildings, with the exception of low-rise housing with a ventilated underfloor void, in these situations, the NHBC Traffic Light System is adopted, as outlined in Table 18-2.

Table 18-1 –GSV Classification (Modified Wilson and Card Methodology)

Characteristic Situation	Risk Classification	Gas Screening Value Threshold (l/hr)	Additional Considerations
1	Very Low Risk	<0.07	Methane concentration <1% Carbon dioxide <5%
2	Low Risk	<0.7	Borehole flow rate <70 l/hr
3	Moderate Risk	<3.5	-
4	Moderate to High Risk	<15	Quantitative risk assessment required to evaluate scope of protective measures
5	High Risk	<70	-
6	Very High Risk	>70	-

Table 18-2 –NHBC Traffic Light Classification

Traffic Light	Methane		Carbon Dioxide	
	Typical maximum concentration (%v/v)	GSV (litres per hour)	Typical maximum concentration (%v/v)	GSV (litres per hour)
Green				
	1	0.16	5	0.78
Amber 1				
	5	0.63	10	1.56
Amber 2				
	20	1.56	30	3.13
Red				

It should be noted that the suggested threshold values lie between each traffic light boundary and therefore the wider conceptual model should be considered to provide a comprehensive assessment of the ground gas regime on the site before a classification can be attributed.

18.2 PRELIMINARY GROUND GAS RISK ASSESSMENT

18.2.1 Conceptual Site Model

The following sections outline the anticipated Source-Pathway- Receptor model associated with the proposed development on site.

Sources

The following potential sources have been identified on and off site.

- Made Ground associated with construction of current site layout.
- Peat within underlying areas of reclaimed ground.

Pathways

The following potential pathways have been identified which may act as preferential pathways for ground gas migration:

- The underlying strata have been classified as sands with good permeability. Therefore, there is potential for some vertical migration of ground gas;
- Buried service runs and existing foundations, including sub-floor voids.

Receptors

Within the context of ground gases, the following enclosed structures are considered to represent potential receptors.

- The existing structure on the site
- Structures and enclosed areas within proposed development.

18.2.2 Risk Assessment – Methane and Carbon Dioxide

In order to assess the significance of ground gases at the site, measured concentrations and flow rates have been used to derive Gas Screening Values (GSVs). GSVs are the product of gas concentration and gas flow measured in a borehole and provide an indication of the flow of the particular gas in question out of the ground.

Data obtained from boreholes which were flooded at the time of monitoring (groundwater level above the top of the slotted screen) are discounted from the assessment process. The worst-case values of gas concentration and flow from the remaining data set have been used to undertake the ground gas risk assessment.

The calculated GSVs are presented in Table 18-3 below.

Table 18-3 – Initial GSV Calculations

	Maximum Concentration (%)	Maximum Flow Rate (l/hr)	GSV (l/hr)	Characteristic Situation (Wilson and Card)	NHBC Traffic Light
Carbon Dioxide	1.80	0.6	0.0108	CS1	Green
Methane	0.20	0.6	0.0012	CS1	Green

These values have been compared with the Revised Wilson and Card Classification presented in Table 18-1.

The risk assessment process indicates the site is representative of Characteristic Situation 1 (Very Low Risk) and Green within the NHBC Traffic Light System based on the recorded concentrations of both methane and carbon dioxide , based on the worst case values recorded on the site.

18.2.3 Carbon Monoxide and Hydrogen Sulphide

Concentrations of carbon monoxide and hydrogen sulphide were not recorded during any of the three monitoring visits. The lack of recorded concentrations of Carbon Monoxide and Hydrogen Sulphide negate the requirement for additional risk assessment.

18.2.4 Atmospheric Pressure Trends

Atmospheric pressure trends fluctuated from 1009 to 1028 during the monitoring period. Rounds 1 and 2 were undertaken during falling pressure conditions with Round 3 being undertaken during rising pressure conditions.

18.3 SUMMARY AND DISCUSSION

The site has been classified as Characteristic Situation1 (Very Low Risk) / Green) based on the worst-case recorded concentrations of carbon dioxide and methane and maximum flow rates. Site classification of a Characteristic Situation 1 / Green indicates that ground gas protection measures are not required for new developments on the site.

19.0 CONCEPTUAL SITE MODEL & PRELIMINARY GROUND CONTAMINATION RISK ASSESSMENT

19.1 OVERVIEW

The information presented in the previous sections of this report have been collated and evaluated to establish an initial qualitative risk assessment for the site. A conceptual model of the site has been generated based on information derived from this Phase 1 Geo-environmental Assessment, supplemented by information attained during the Tetra Tech site walkover.

The site has been considered with regard to current UK legislation and guidance, namely Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2006, as amended, and in accordance with current UK good practice guidelines (for example BS10175:2011).

In general, ground contamination can occur through several causes, particularly from historical operations and activities. Contamination can result from either on-site sources or from on-site migration from off-site sources, leading to long term liabilities under recent legislation for any site owner.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- Source, i.e. a substance that is capable of causing pollution or harm;
- Pathway, i.e. a route by which the contaminant can reach a target; and
- Receptor (target), i.e. something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

19.2 CURRENT SITE USAGE AND PROPOSED DEVELOPMENT

The site is currently utilised in two halves; the western portion of the site is utilised as a NPTCBC skills and training and youth service centre, with associated car parking and allotment gardens to the south, followed by undeveloped amenity grasslands. The eastern portion of the site is utilised as the existing Ysgol Gynradd Gymraeg Rhosafan, with associated hard and soft standing playing fields and car park.

The proposed development will involve the construction of a new school located within the existing southern areas of soft standing on site, this will also include associated play and spots areas, hard standing car park and associated footpath and roadways.

19.3 CONCEPTUAL SITE MODEL

The key source, pathways and receptor model is outlined below within the context of potential development of the site.

As the proposed development is for a school premise, the following risk assessment is undertaken in the context of a residential without plant uptake end use scenario to provide a conservative approach.

19.3.1 Potential Sources of Contamination

The main potential sources of contamination on the site are associated with existing features as well as historical land uses on the site as summarised below.

On site Sources

- Made Ground associated with former development on the site.
  - Elevated concentrations of Arsenic have been recorded, associated with the presence of slag and clinker within the Made Ground materials encountered on site.
- Ground Gas
- Asbestos

Off Site Sources

- Mobile contamination from off site sources of Made Ground

19.3.2 Potential Contaminant Pathways

The following contaminant pathways are considered to potentially be active based on the current site use and proposed development:

Human Exposure Pathways

- Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapours (i.e. human interaction with surface and sub-surface materials).

Environmental Pathways

- Leaching and horizontal or vertical migration through the unsaturated ground, either through permeable sub-surface materials and/or preferential pathways;
- Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways;
- Leaching to surface water run-off/drainage;
- The migration and accumulation of gases or vapours through permeable sub-surface materials and/ or preferential pathways.

19.3.3 Potential Receptors at Risk

The following potential receptors have been identified:

Human Health

- Current site users (school staff, pupils and visitors);
- Future site users (school staff, pupils and visitors);
- Site workers during the redevelopment of the site;
- Adjacent site users (residential/commercial).

Wider Environment

- Secondary A Aquifer within superficial deposits and bedrock;

- Surface water – the Swansea Bay coastal body, 192m south-west;
- Plant uptake; and
- Building Infrastructure and supply pipes.
- Adjacent Properties

19.4 GROUND CONDITIONS RISK ASSESSMENT

The source, pathway, receptor linkages identified in the previous section are outlined and a qualitative risk assessment shown in the following tables.

The risk assessment considers the site within an area context and assesses potential risks to identified receptors in relation to the existing site setting and the proposed development. CIRIA C552 has been used to define the risk rating presented in the Qualitative Risk Assessment matrix, the methodology for which is presented in Appendix I.

Table 19-1 – CIRIA C552 Qualitative Risk Assessment

This matrix is based on CIRIA C552 risk evaluation methodology, definitions for risk ratings is presented in Appendix I						
Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Contamination associated with Made Ground	Ingestion, inhalation and direct dermal contact	Current site users	Medium	Low Likelihood	Low / Moderate Risk	Elevated concentrations of Arsenic have been recorded, associated with the presence of slag and clinker within the Made Ground materials encountered on site. Bioaccessibility testing undertaken in the vicinity of the exceedances are noted to indicate a maximum bioaccessible fraction of 6.9%. Risks to site construction workers can be managed through good on-site hygiene, and use of PPE. Risk management procedures are discussed in more detail in the following section.
		Future site users		Low Likelihood	Low / Moderate Risk	
		Construction workers		Low Likelihood	Low / Moderate Risk	
	Leaching and lateral migration	Groundwater	Medium	Low Likelihood	Low / Moderate Risk	Elevated concentrations of copper have been recorded at concentrations in excess of the EQS values in both the groundwater and soil derived leachate samples. However, recorded concentrations are not significantly elevated, and the site is located in an area where groundwater is potentially in continuity with the sea, as such freshwater bodies are unlikely to be significantly impacted by the recorded concentrations.
		Surface Water		Low Likelihood	Low / Moderate Risk	

This matrix is based on CIRIA C552 risk evaluation methodology, definitions for risk ratings is presented in Appendix I						
Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Asbestos	Inhalation	Current site users	Medium	Unlikely	Low Risk	Asbestos containing materials have not been recorded in samples obtained from the site, however as with all brownfield developments, the potential for asbestos containing materials to be present cannot be discounted. As such a reactive approach should be adopted during the development phase to identify any potential asbestos containing materials within the Made Ground. Operatives should be trained in asbestos awareness and the potential for asbestos to be present should be included within toolbox talks during the development.
		Future site users		Unlikely	Low Risk	
		Construction workers		Low Likelihood	Low / Moderate Risk	
Ground Gas	Lateral migration and accumulation in enclosed spaces Inhalation	Future site users	Severe	Unlikely	Low / Moderate Risk	A ground gas risk assessment presented above has confirmed that the site is representative of Characteristic Situation 1 (Very Low Risk) and as such, no ground gas protection measures are required for new developments on the site.
		Building infrastructure	Medium	Unlikely	Low Risk	

20.0 CONCLUSIONS AND RECOMMENDATIONS

20.1 CONCLUSIONS

20.1.1 Ground Contamination

Prior to the construction of the school, the site was undeveloped, with the land reclaimed from the marshy ground adjacent to the sea. The ground investigation identified a thin mantle of Made Ground with components of slag and clinker.

Human Health

With regards to the risks to human health, laboratory testing has identified elevated concentrations of arsenic in two samples potentially associated with the anthropogenic components of the Made Ground. There are no specific screening criteria applicable for a school scenario, however the recorded concentrations are noted to exceed the screening value for a public open (residential) end use (79 µg/l) but do not exceed the screening value for a public open space (park) end use (170µg/l). From information published by the BGS it is noted that the site is in an area where high background concentrations of arsenic are anticipated and as such, it is possible that these concentrations are typical of the surrounding site area.

Additional samples were obtained from the vicinity of the exceedances noted above, were scheduled for bioaccessibility testing for a range of heavy metals. With regards to arsenic concentrations a maximum bioaccessible fraction of 6.9% was recorded. When this fraction is applied the exceedances noted in Phase 1, the resultant concentrations are noted to be below the screening threshold for public open space (residential) end use. It is also noted that recorded concentrations are below the screening values for a residential with plant uptake.

Based on the information presented above and within the context of the proposed development, it is not considered that further assessment or risk management procedures will be considered necessary at this time.

Controlled Waters

Soil derived leachate and groundwater samples have also indicated elevated concentrations of copper, however due to the limited extent of the exceedances and location of the site in close proximity to the sea, risks to freshwater bodies and groundwater resources are not considered to be significant.

Asbestos

Asbestos containing materials have not been recorded as part of the ground investigation, however the presence of asbestos cannot be discounted and as such a reactive approach should be adopted during the development phase to manage risks associated with any asbestos which may be encountered.

Ground Gas

Ground gas monitoring on the site has indicated that the site is representative of Characteristic Situation 1 (Very Low Risk). As such, ground gas protection measures are not considered necessary for new developments on the site.

20.1.2 Geotechnical

Pad or strip foundations, placed within coarse-grained Aeolian (Wind Blow) Deposits to be designed to an allowable net bearing pressure, Rd, of 175kPa for 0.75m bgl.

Pad or strips founded at minimum depth of 0.75m bgl should result in settlement less than 25mm.

Floor slabs can be ground bearing.

The Design Sulphate Class for the site be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1.

A conservative CBR value of 8% is recommended for pavement design.

Soakaway drainage is feasible for the development.

20.2 RECOMMENDATIONS

As with all brownfield sites, it is recommended that a reactive approach is adopted during the development phase to identify and assess the risks associated with any previously unidentified ground contamination which may be encountered.

21.0 NOTES

1. Standards

All boring operations, sampling of soils, *in situ* testing and geotechnical laboratory testing have been carried out in accordance with the recommendations of the British Standards BS 5930(2015)[1], BS 1377 (1990)[2] and BS10175 (2001)[3].

Soil and rock descriptions follow the recommendations of BS 593. Where descriptions or classifications are based on other documents (e.g. BS 8004 (1986) or CIRIA Project Report 11 (1993)), this is stated in the report text.

2. Site methods

Unless specifically stated otherwise, the following methods are used for exploratory holes.

- Holes described as cable percussive are bored using a light cable percussive rig. Standard penetration tests are carried out where appropriate, as shown in the logs. Disturbed and undisturbed samples are taken from the exploratory holes at the depths on the records.
- Window sampling generally uses the windowless sampling method, using a tracked Geotool.
- Dynamic probes are usually heavy dynamic probes, using the same tracked Geotool used for window sampling.

3. Definitions and abbreviations

The following terms are used in the exploratory hole logs

Samples

U	Undisturbed 102mm dia. sample
TW	Thin Walled undisturbed 102mm dia. sample
B	Bulk sample
D	Small disturbed sample
W	Water sample
CBR	California Bearing Ratio test or CBR value obtained from Mexiprobe test

In situ tests

S	Standard penetration test (SPT)
N	SPT N value (blows/300mm)
HP	Hand penetrometer – shear strength
SV	Hand shear vane – shear strength
VOC	Volatile organic compounds (ppm)
PID	Photo-ionisation detector – used to detect the presence of VOCs.

Core recovery and rock quality

TCR	Total core recovery (%)
SCR	Solid core recovery (%)
RQD	Rock quality designation (%)
FI	Fracture index
NR	No recovery
NI	Not intact

Rotary drilling sizes

	Nominal diameter (mm)	
Index letter	**Borehole**	**Core**
N	75	54
H	99	76
P	120	92
S	146	113

Water strikes

▽	Level of water strike
▼	Water level rose to this level (see Remarks at foot of log for details)

Depth means depth below existing ground level unless otherwise specified. Values specified in soil descriptions given in the exploratory hole logs are depths unless otherwise specified.

22.0 REFERENCES

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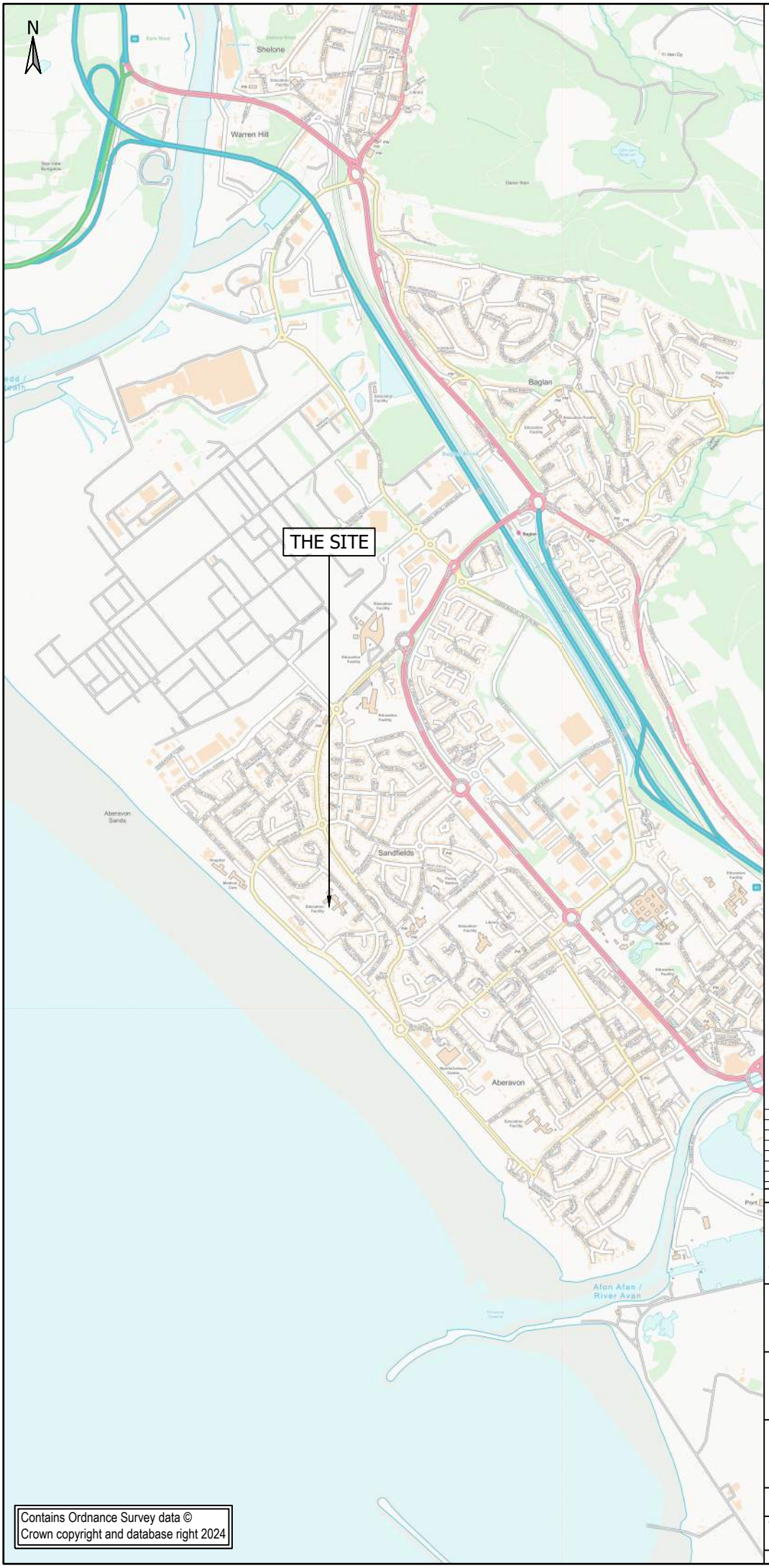
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FIGURES

Figure 1 – Site Location Plan



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Rev	Description	Date	Drn	Chk	App
P01	PRELIMINARY FIRST ISSUE	10.09.2024	PP	PV	SR

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TETRA TECH

Client

MORGAN SINDALL

Project Name

YGG RHOSAFAN

Sheet Title

SITE LOCATION PLAN

TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A4	Suitability
784-B068544	PP	10.09.24	PV	10.09.24	SR	10.09.24	As Shown	S0

Client Project Number	Originator	Volume/System	Level/Location	Type/Code	Role	Number	Revision
B068544	TTE	00	XX	DR	U	0001	P01

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TTE_MT_v1

Figure 2 – Ground Investigation Layout Plan



Rev	Description	Date	Drn / Chk / App
P01	PRELIMINARY FIRST ISSUE	10.09.2024	PP PV SR

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Client
MORGAN SINDALL

Project Name
YGG RHOSAFAN

Sheet Title
SITE INVESTIGATION LAYOUT PLAN

TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A2	Suitability
784-B068544	PP	10.09.24	PV	10.09.24	SR	10.09.24	1:500	S0

Client Project Number	Originator	Volume/System	Level/Location	Type/Code	Role	Number	Revision
B068544	- TTE	- 00	- XX	- DR	- U	- 0002	P01

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PROPOSED DEVELOPMENT PLAN

APPENDIX A: REPORT CONDITIONS

APPENDIX A – REPORT CONDITIONS

GROUND INVESTIGATION

This report is produced solely for the benefit of Morgan Sindall *and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.*

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Tetra Tech. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

APPENDIX B: GROUNDSURE REPORT

Groundsure
LOCATION INTELLIGENCE

Enviro+Geo Insight

RHOSAFAN WELSH PRIMARY SCHOOL, MARINE DRIVE, SANDFIELDS, NEATH PORT TALBOT, SA12 7NN

Order Details

Date: 02/08/2024

Your ref: 7016582

Our Ref: GS-MCK-9UY-WWL-FH2

Site Details

Location: 273930 190471

Area: 3.37 ha

Authority: Castell-nedd Port Talbot - Neath Port Talbot County Borough ↗



Summary of findings p. 2 >

Aerial image p. 9 >

OS MasterMap site plan p.14 >

Insight User Guide ↗

Contact us with any questions at:
info@groundsure.com ↗
01273 257 755

Certified B Corporation

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
15 >	1.1 >	Historical industrial land uses >	0	0	1	10	-
16 >	1.2 >	Historical tanks >	0	0	0	6	-
17 >	1.3 >	Historical energy features >	0	0	3	9	-
17	1.4	Historical petrol stations	0	0	0	0	-
18 >	1.5 >	Historical garages >	0	0	0	2	-
18	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped >	On site	0-50m	50-250m	250-500m	500-2000m
19 >	2.1 >	Historical industrial land uses >	0	0	2	11	-
20 >	2.2 >	Historical tanks >	0	0	0	8	-
21 >	2.3 >	Historical energy features >	0	0	3	9	-
21	2.4	Historical petrol stations	0	0	0	0	-
22 >	2.5 >	Historical garages >	0	0	0	4	-
Page	Section	Waste and landfill >	On site	0-50m	50-250m	250-500m	500-2000m
23	3.1	Active or recent landfill	0	0	0	0	-
23	3.2	Historical landfill (BGS records)	0	0	0	0	-
24	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
24	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
24	3.5	Historical waste sites	0	0	0	0	-
24	3.6	Licensed waste sites	0	0	0	0	-
24 >	3.7 >	Waste exemptions >	0	0	0	1	-
Page	Section	Current industrial land use >	On site	0-50m	50-250m	250-500m	500-2000m
26 >	4.1 >	Recent industrial land uses >	0	0	3	-	-
27	4.2	Current or recent petrol stations	0	0	0	0	-
27	4.3	Electricity cables	0	0	0	0	-
27	4.4	Gas pipelines	0	0	0	0	-
27	4.5	Sites determined as Contaminated Land	0	0	0	0	-

27	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
28	4.7	Regulated explosive sites	0	0	0	0	-
28	4.8	Hazardous substance storage/usage	0	0	0	0	-
28	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
28	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
28 >	**4.11 >**	**Licensed pollutant release (Part A(2)/B) >**	0	0	0	1	-
29	4.12	Radioactive Substance Authorisations	0	0	0	0	-
29	4.13	Licensed Discharges to controlled waters	0	0	0	0	-
29	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
29	4.15	Pollutant release to public sewer	0	0	0	0	-
30	4.16	List 1 Dangerous Substances	0	0	0	0	-
30	4.17	List 2 Dangerous Substances	0	0	0	0	-
30 >	**4.18 >**	**Pollution Incidents (EA/NRW) >**	0	1	0	7	-
31	4.19	Pollution inventory substances	0	0	0	0	-
31	4.20	Pollution inventory waste transfers	0	0	0	0	-
32	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	**Hydrogeology >**	On site	0-50m	50-250m	250-500m	500-2000m
33 >	**5.1 >**	**Superficial aquifer >**	Identified (within 500m)				
35 >	**5.2 >**	**Bedrock aquifer >**	Identified (within 500m)				
37 >	**5.3 >**	**Groundwater vulnerability >**	Identified (within 50m)				
38	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
38	5.5	Groundwater vulnerability- local information	None (within 0m)				
39	5.6	Groundwater abstractions	0	0	0	0	0
39	5.7	Surface water abstractions	0	0	0	0	0
39	5.8	Potable abstractions	0	0	0	0	0
39	5.9	Source Protection Zones	0	0	0	0	-
40	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	**Hydrology >**	On site	0-50m	50-250m	250-500m	500-2000m
41	6.1	Water Network (OS MasterMap)	0	0	0	-	-

41	6.2	Surface water features	0	0	0	-	-
42 >	6.3 >	WFD Surface water body catchments >	2	-	-	-	-
42 >	6.4 >	WFD Surface water bodies >	0	0	1	-	-
43 >	6.5 >	WFD Groundwater bodies >	1	-	-	-	-
Page	Section	River and coastal flooding >	On site	0-50m	50-250m	250-500m	500-2000m
44	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
45 >	7.2 >	Historical Flood Events >	0	0	1	-	-
45	7.3	Flood Defences	0	0	0	-	-
45 >	7.4 >	Areas Benefiting from Flood Defences >	0	0	1	-	-
46	7.5	Flood Storage Areas	0	0	0	-	-
47	7.6	Flood Zone 2	None (within 50m)				
47	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding >					
48 >	8.1 >	Surface water flooding >	1 in 30 year, 0.1m - 0.3m (within 50m)				
Page	Section	Groundwater flooding >					
50 >	9.1 >	Groundwater flooding >	Low (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
51	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
51	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
51	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
51	10.4	Special Protection Areas (SPA)	0	0	0	0	0
52	10.5	National Nature Reserves (NNR)	0	0	0	0	0
52	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
52	10.7	Designated Ancient Woodland	0	0	0	0	0
52	10.8	Biosphere Reserves	0	0	0	0	0
53	10.9	Forest Parks	0	0	0	0	0
53	10.10	Marine Conservation Zones	0	0	0	0	0
53	10.11	Green Belt	0	0	0	0	0
53	10.12	Proposed Ramsar sites	0	0	0	0	0

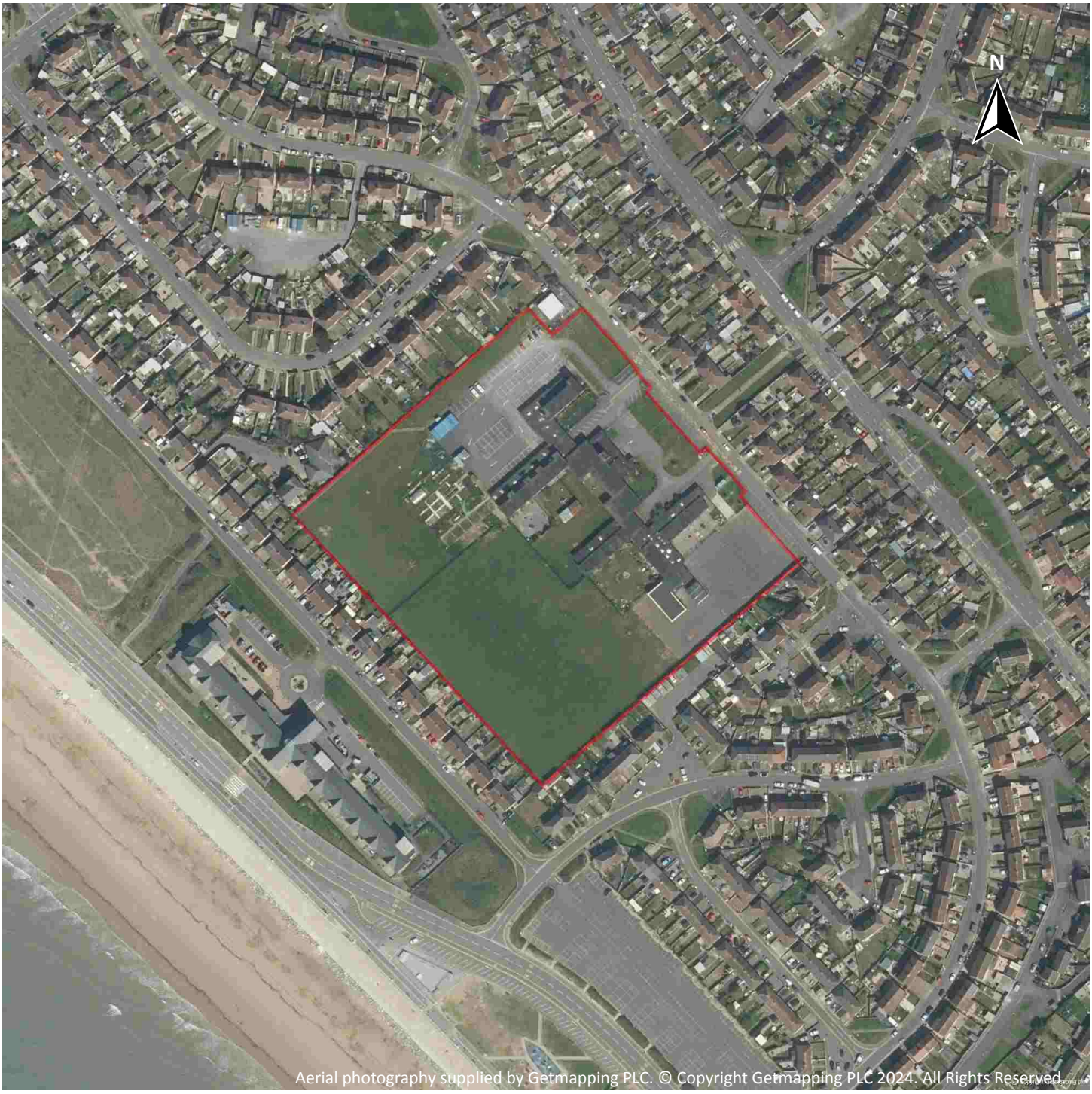
53	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
54	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
54	10.15	Nitrate Sensitive Areas	0	0	0	0	0
54	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
55	10.17	SSSI Impact Risk Zones	0	-	-	-	-
55	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
56	11.1	World Heritage Sites	0	0	0	-	-
56	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
56	11.3	National Parks	0	0	0	-	-
56	11.4	Listed Buildings	0	0	0	-	-
57	11.5	Conservation Areas	0	0	0	-	-
57	11.6	Scheduled Ancient Monuments	0	0	0	-	-
57	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	**Agricultural designations** >	On site	0-50m	50-250m	250-500m	500-2000m
58 >	**12.1** >	**Agricultural Land Classification** >	Grade 5 (within 250m)				
59	12.2	Open Access Land	0	0	0	-	-
59	12.3	Tree Felling Licences	0	0	0	-	-
59	12.4	Environmental Stewardship Schemes	0	0	0	-	-
59	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
61	13.1	Priority Habitat Inventory	0	0	0	-	-
61	13.2	Habitat Networks	0	0	0	-	-
61	13.3	Open Mosaic Habitat	0	0	0	-	-
61	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	**Geology 1:10,000 scale** >	On site	0-50m	50-250m	250-500m	500-2000m
62 >	**14.1** >	**10k Availability** >	Identified (within 500m)				
63 >	**14.2** >	**Artificial and made ground (10k)** >	1	0	0	1	-
64 >	**14.3** >	**Superficial geology (10k)** >	1	0	1	2	-

65	14.4	Landslip (10k)	0	0	0	0	-
66 >	14.5 >	Bedrock geology (10k) >	1	0	0	2	-
67 >	14.6 >	Bedrock faults and other linear features (10k) >	0	0	0	1	-
Page	Section	**Geology 1:50,000 scale** >	On site	0-50m	50-250m	250-500m	500-2000m
68 >	15.1 >	50k Availability >	Identified (within 500m)				
69 >	15.2 >	Artificial and made ground (50k) >	1	0	0	0	-
70 >	15.3 >	Artificial ground permeability (50k) >	1	0	-	-	-
71 >	15.4 >	Superficial geology (50k) >	1	0	1	0	-
72 >	15.5 >	Superficial permeability (50k) >	Identified (within 50m)				
72	15.6	Landslip (50k)	0	0	0	0	-
72	15.7	Landslip permeability (50k)	None (within 50m)				
73 >	15.8 >	Bedrock geology (50k) >	1	0	0	1	-
74 >	15.9 >	Bedrock permeability (50k) >	Identified (within 50m)				
74 >	15.10 >	Bedrock faults and other linear features (50k) >	0	0	0	1	-
Page	Section	**Boreholes** >	On site	0-50m	50-250m	250-500m	500-2000m
75 >	16.1 >	BGS Boreholes >	0	0	15	-	-
Page	Section	**Natural ground subsidence** >					
77 >	17.1 >	Shrink swell clays >	Negligible (within 50m)				
78 >	17.2 >	Running sands >	Negligible (within 50m)				
79 >	17.3 >	Compressible deposits >	Negligible (within 50m)				
80 >	17.4 >	Collapsible deposits >	Negligible (within 50m)				
81 >	17.5 >	Landslides >	Very low (within 50m)				
82 >	17.6 >	Ground dissolution of soluble rocks >	Negligible (within 50m)				
Page	Section	**Mining and ground workings** >	On site	0-50m	50-250m	250-500m	500-2000m
84	18.1	BritPits	0	0	0	0	-
85 >	18.2 >	Surface ground workings >	0	0	2	-	-
85	18.3	Underground workings	0	0	0	0	0
85	18.4	Underground mining extents	0	0	0	0	-
85	18.5	Historical Mineral Planning Areas	0	0	0	0	-

86	18.6	Non-coal mining	0	0	0	0	0
86	18.7	JPB mining areas	None (within 0m)				
86	18.8	The Coal Authority non-coal mining	0	0	0	0	-
86	18.9	Researched mining	0	0	0	0	-
87	18.10	Mining record office plans	0	0	0	0	-
87	18.11	BGS mine plans	0	0	0	0	-
87 >	**18.12 >**	**Coal mining >**	Identified (within 0m)				
87	18.13	Brine areas	None (within 0m)				
88	18.14	Gypsum areas	None (within 0m)				
88	18.15	Tin mining	None (within 0m)				
88	18.16	Clay mining	None (within 0m)				
Page	Section	Ground cavities and sinkholes	On site	0-50m	50-250m	250-500m	500-2000m
89	19.1	Natural cavities	0	0	0	0	-
89	19.2	Mining cavities	0	0	0	0	0
89	19.3	Reported recent incidents	0	0	0	0	-
89	19.4	Historical incidents	0	0	0	0	-
90	19.5	National karst database	0	0	0	0	-
Page	Section	**Radon >**					
91 >	**20.1 >**	**Radon >**	Less than 1% (within 0m)				
Page	Section	**Soil chemistry >**	On site	0-50m	50-250m	250-500m	500-2000m
93 >	**21.1 >**	**BGS Estimated Background Soil Chemistry >**	4	0	-	-	-
93 >	**21.2 >**	**BGS Estimated Urban Soil Chemistry >**	9	7	-	-	-
94	21.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
95	22.1	Underground railways (London)	0	0	0	-	-
95	22.2	Underground railways (Non-London)	0	0	0	-	-
95	22.3	Railway tunnels	0	0	0	-	-
95	22.4	Historical railway and tunnel features	0	0	0	-	-
95	22.5	Royal Mail tunnels	0	0	0	-	-

96	22.6	Historical railways	0	0	0	-	-
96	22.7	Railways	0	0	0	-	-
96	22.8	Crossrail 1	0	0	0	0	-
96	22.9	Crossrail 2	0	0	0	0	-
96	22.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 14/04/2020

Site Area: 3.37ha

Recent site history - 2017 aerial photograph



Capture Date: 26/05/2017

Site Area: 3.37ha

Recent site history - 2014 aerial photograph



Capture Date: 23/07/2014

Site Area: 3.37ha

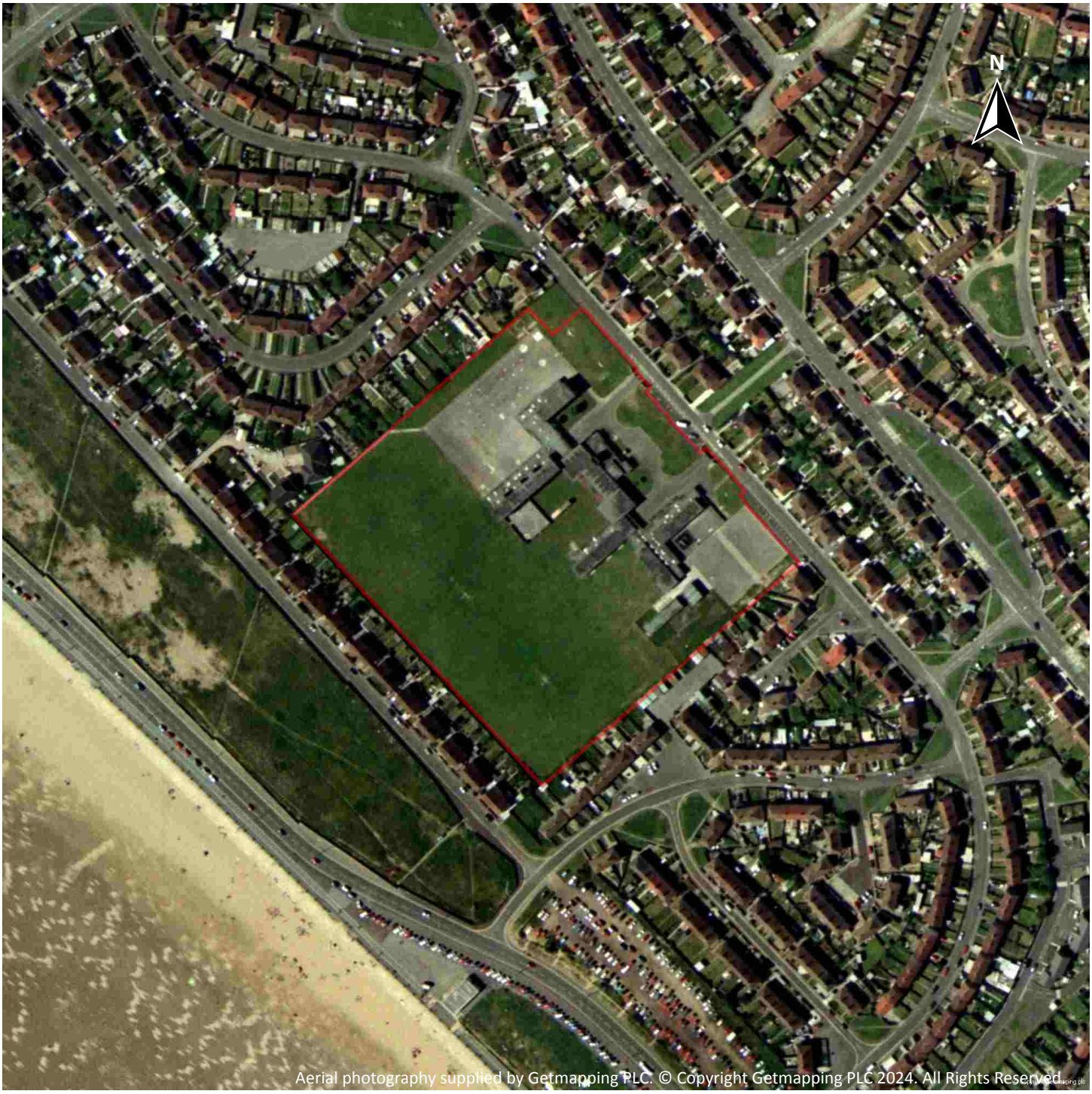
Recent site history - 2009 aerial photograph



Capture Date: 12/10/2009

Site Area: 3.37ha

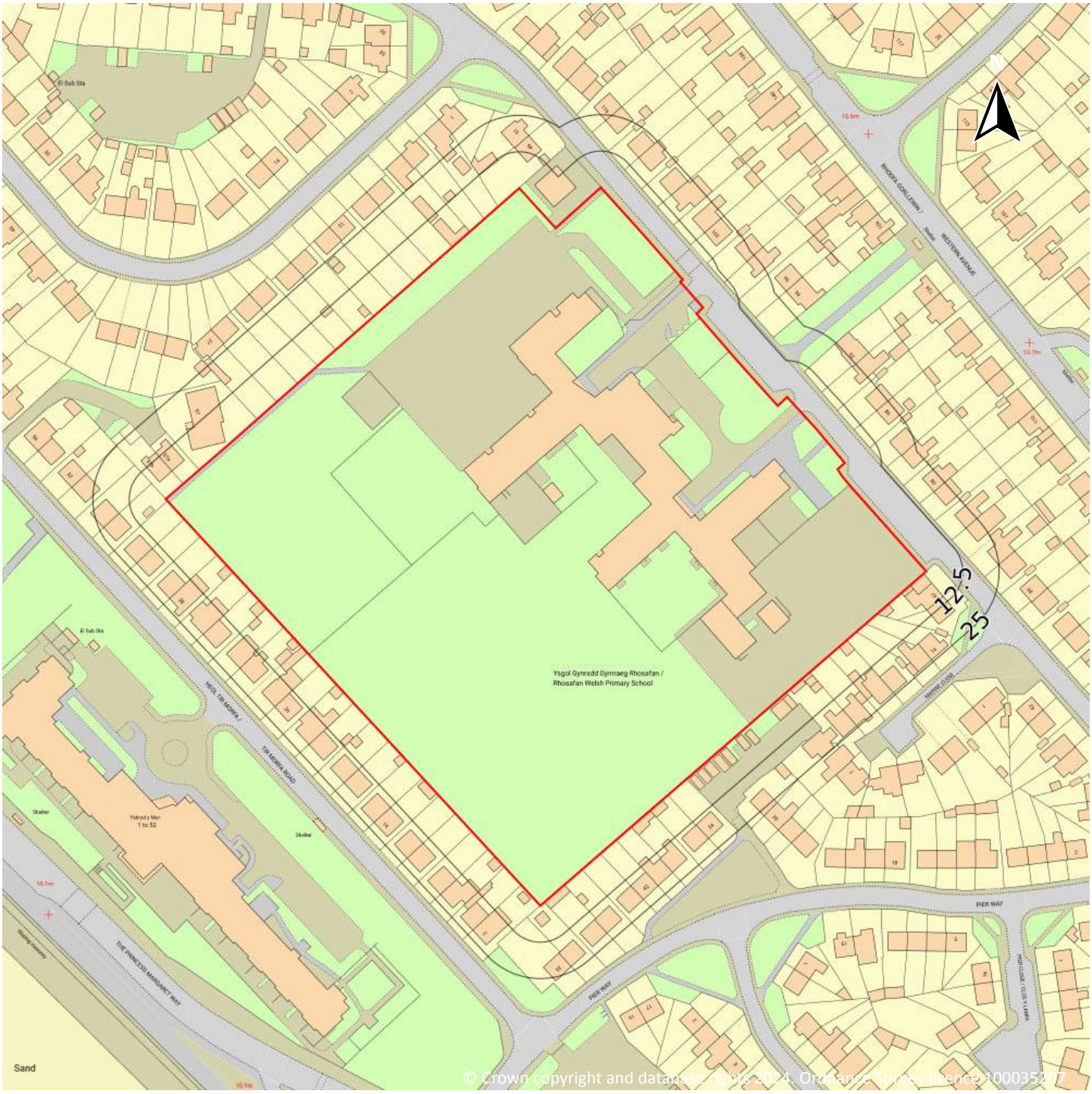
Recent site history - 2000 aerial photograph



Capture Date: 18/06/2000

Site Area: 3.37ha

OS MasterMap site plan



Site Area: 3.37ha

1 Past land use



1.1 Historical industrial land uses

Records within 500m	11

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
2	157m SW	Unspecified Ground Workings	1921 - 1947	351493

ID	Location	Land use	Dates present	Group ID
F	367m E	Police Station	1980	347518
F	392m E	Police Station	1962	347519
H	434m N	Unspecified Heap	1897	350177
H	439m N	Unspecified Heap	1947 - 1962	378105
H	441m N	Unspecified Heap	1921	391268
H	442m N	Unspecified Heap	1921	381661
I	464m SE	Garage	1965	341534
J	494m N	Unspecified Ground Workings	1947	357493
J	494m N	Unspecified Ground Workings	1921	363041
J	494m N	Unspecified Ground Workings	1921	377314

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**6**

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
C	309m S	Unspecified Tank	1963 - 1976	46386
E	321m E	Unspecified Tank	1976	46474
E	322m E	Unspecified Tank	1993	43276
E	322m E	Unspecified Tank	1963	42464
C	340m S	Unspecified Tank	1963 - 1976	42409
3	347m NE	Unspecified Tank	1976	39310

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	12

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
A	133m NE	Electricity Substation	1993	20608
1	134m NW	Electricity Substation	1993	20606
A	137m NE	Electricity Transformer	1976	21208
B	256m SE	Electricity Substation	1956	20600
B	256m SE	Electricity Transformer	1976	21205
B	259m SE	Electricity Substation	1993	20586
D	317m N	Electricity Transformer	1976	21207
D	317m N	Electricity Substation	1993	20607
4	362m N	Electricity Substation	1993	20605
5	405m NW	Electricity Substation	1993	20604
G	413m E	Electricity Substation	1993	20585
G	414m E	Electricity Transformer	1976	21204

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	2

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 15 >**

ID	Location	Land use	Dates present	Group ID
I	480m SE	Garage	1969	7621
I	487m SE	Garage	1961 - 1966	7881

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m	0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.

2 Past land use - un-grouped



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2.1 Historical industrial land uses

Records within 500m	13

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19 >**

ID	Location	Land Use	Date	Group ID
B	157m SW	Unspecified Ground Workings	1947	351493
B	157m SW	Unspecified Ground Workings	1921	351493
G	367m E	Police Station	1980	347518

ID	Location	Land Use	Date	Group ID
G	392m E	Police Station	1962	347519
I	434m N	Unspecified Heap	1897	350177
I	439m N	Unspecified Heap	1962	378105
I	441m N	Unspecified Heap	1947	378105
I	441m N	Unspecified Heap	1921	391268
I	442m N	Unspecified Heap	1921	381661
J	464m SE	Garage	1965	341534
K	494m N	Unspecified Ground Workings	1947	357493
K	494m N	Unspecified Ground Workings	1921	377314
K	494m N	Unspecified Ground Workings	1921	363041

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	**8**

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19 >**

ID	Location	Land Use	Date	Group ID
D	309m S	Unspecified Tank	1976	46386
D	310m S	Unspecified Tank	1963	46386
F	321m E	Unspecified Tank	1976	46474
F	322m E	Unspecified Tank	1993	43276
F	322m E	Unspecified Tank	1963	42464
D	340m S	Unspecified Tank	1976	42409
D	340m S	Unspecified Tank	1963	42409
2	347m NE	Unspecified Tank	1976	39310

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m	12

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19 >**

ID	Location	Land Use	Date	Group ID
A	133m NE	Electricity Substation	1993	20608
1	134m NW	Electricity Substation	1993	20606
A	137m NE	Electricity Transformer	1976	21208
C	256m SE	Electricity Transformer	1976	21205
C	256m SE	Electricity Substation	1956	20600
C	259m SE	Electricity Substation	1993	20586
E	317m N	Electricity Transformer	1976	21207
E	317m N	Electricity Substation	1993	20607
3	362m N	Electricity Substation	1993	20605
4	405m NW	Electricity Substation	1993	20604
H	413m E	Electricity Substation	1993	20585
H	414m E	Electricity Transformer	1976	21204

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m	4

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19 >**

ID	Location	Land Use	Date	Group ID
J	480m SE	Garage	1969	7621
J	487m SE	Garage	1966	7881
J	487m SE	Garage	1961	7881
J	487m SE	Garage	1966	7881

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill



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3.1 Active or recent landfill

Records within 500m	0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m	0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0

Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m	0

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m	0

Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m	0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m	1

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

Features are displayed on the Waste and landfill map on **page 23 >**

ID	Location	Site	Reference	Category	Sub-Category	Description
1	315m W	Rushcliffe Independent Hospital, Rushcliffe Independent Hospital, Scarlet Avenue, Port Talbot, Castell-Nedd Port Talbot, Sa12 7ph	NRW-WME082906	Treating waste exemption	Not on a farm	Sorting and de-naturing of controlled drugs for disposal

This data is sourced from the Environment Agency and Natural Resources Wales.

4 Current industrial land use



4.1 Recent industrial land uses

Records within 250m	3

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Company	Address	Activity	Category
2	53m W	Electricity Sub Station	West Glamorgan, SA12	Electrical Features	Infrastructure and Facilities
3	133m NW	Electricity Sub Station	West Glamorgan, SA12	Electrical Features	Infrastructure and Facilities
4	145m NE	Electricity Sub Station	West Glamorgan, SA12	Electrical Features	Infrastructure and Facilities

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	0

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m	0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m	1

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Address	Details	
6	480m SE	St. Albans Operating Company Limited, Murco Service Station, Princess Margaret Way, Port Talbot, SA12 7PE	Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No enforcements issued Date of enforcement: No enforcements issued Comment: No enforcements issued

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	**0**

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m	**0**

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	**0**

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	**0**

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m	8

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 26 >**

ID	Location	Details	
1	15m N	Incident Date: 25/03/2003 Incident Identification: 145783 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Dust	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
A	293m S	Incident Date: 30/05/2016 Incident Identification: 1602866 Pollutant: General Biodegradable Materials and Waste Pollutant Description: Algae	Water Impact: Category 4 (No Impact) Land Impact: Other Air Impact: Other
A	293m S	Incident Date: 30/05/2016 Incident Identification: 1602866 Pollutant: - Pollutant Description: -	Water Impact: Category 4 (No Impact) Land Impact: Other Air Impact: Other
B	299m W	Incident Date: 08/07/2002 Incident Identification: 90057 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

ID	Location	Details	
B	299m W	Incident Date: 08/07/2002 Incident Identification: 90057 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
B	306m W	Incident Date: 14/02/2016 Incident Identification: 1411112 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Other Atmospheric Pollutant or Effect	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
5	439m S	Incident Date: 04/03/2002 Incident Identification: 61828 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
7	495m NE	Incident Date: 23/07/2013 Incident Identification: 1137679 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Dust	Water Impact: - Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m	0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m	0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

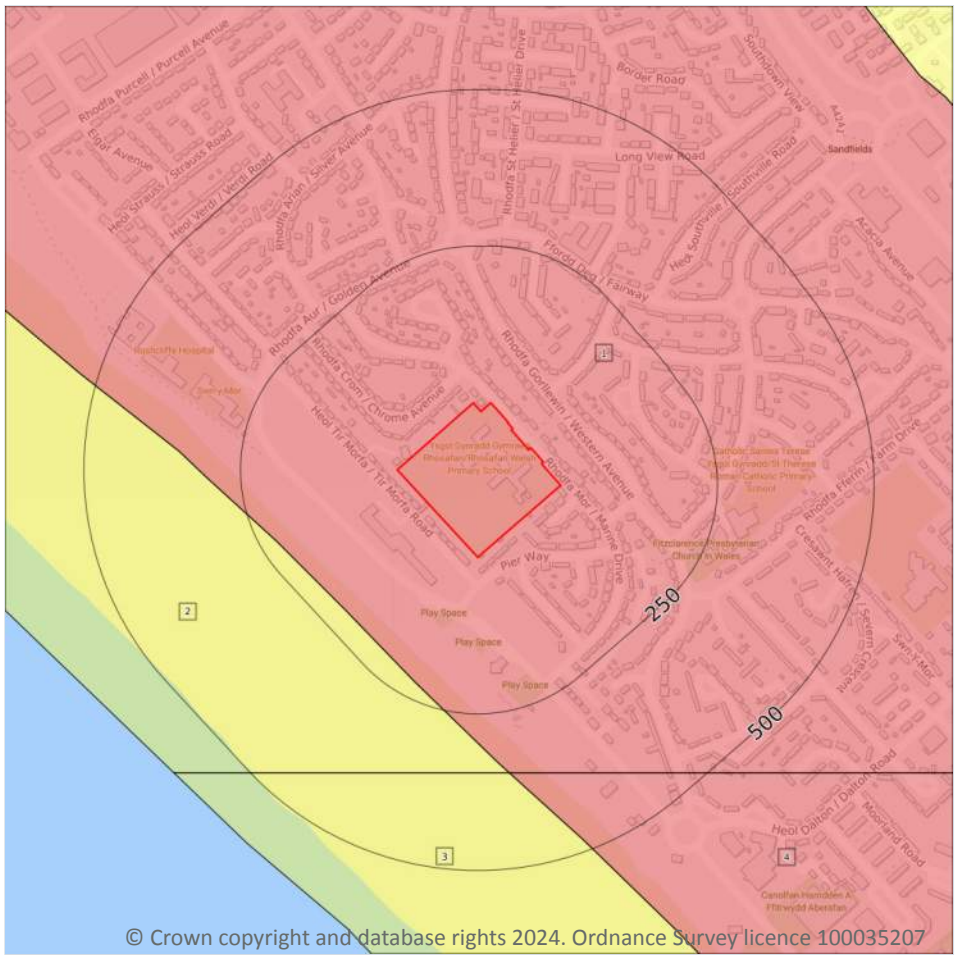
4.21 Pollution inventory radioactive waste

Records within 500m	0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

5 Hydrogeology - Superficial aquifer



5.1 Superficial aquifer

Records within 500m **4**

Aquifer status of groundwater held within superficial geology.

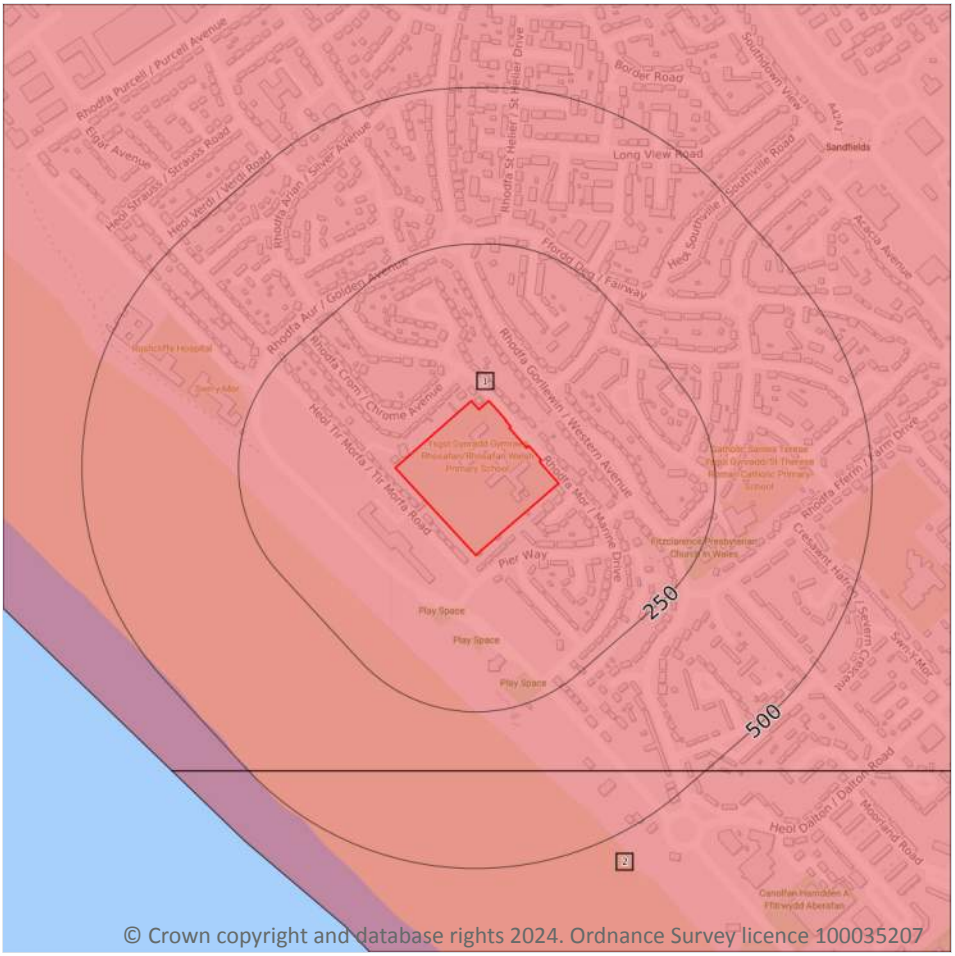
Features are displayed on the Hydrogeology map on **page 33 >**

ID	Location	Designation	Description
1	**On site**	**Secondary A**	**Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers**
2	211m SW	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

ID	Location	Designation	Description
3	344m S	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
4	348m S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



5.2 Bedrock aquifer

Records within 500m **2**

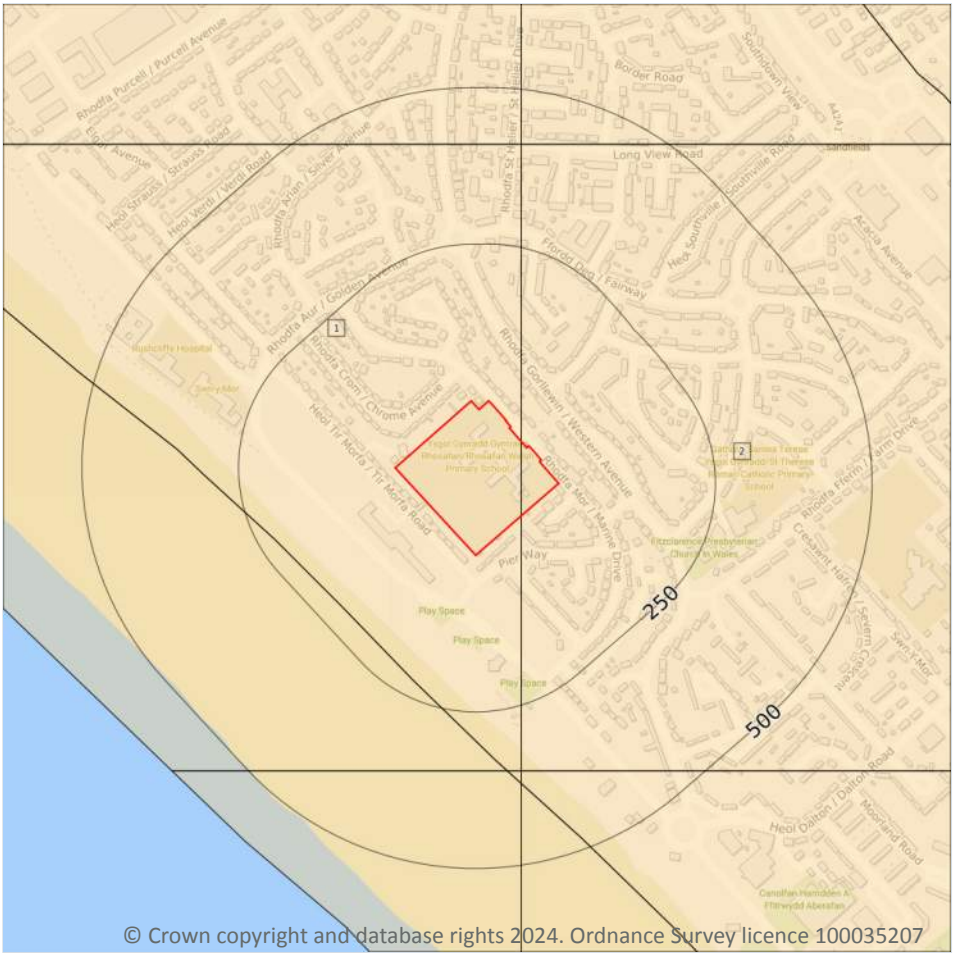
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 35 >**

ID	Location	Designation	Description
1	**On site**	**Secondary A**	**Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers**
2	344m S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



Site Outline

Search buffers in metres (m)

Superficial vulnerability
- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability
- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information
- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m	2

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 37 >**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: >550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: >10m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
2	On site	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: >550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: >10m Patchiness value: >90% Recharge potential: High	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site	0

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

5.5 Groundwater vulnerability- local information

Records on site	0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk ↗.

This data is sourced from the British Geological Survey and the Environment Agency.

Abstractions and Source Protection Zones

5.6 Groundwater abstractions

Records within 2000m	0

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m	0

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m	0

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.9 Source Protection Zones

Records within 500m	0

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.10 Source Protection Zones (confined aquifer)

Records within 500m	0

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.

6 Hydrology



6.1 Water Network (OS MasterMap)

Records within 250m	0

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	0

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	2

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 41 >**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	**On site**	**Coastal catchment**	**Not part of a river WB catchment**	**331**	**Neath**	**Tawe to Cadoxton**
2	**On site**	**River WB catchment**	**Baglan Brook - headwaters to conf with River Neath**	**GB110058026350**	**Neath**	**Tawe to Cadoxton**

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified	2

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site.

Features are displayed on the Hydrology map on **page 41 >**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
4	192m SW	Coastal	Swansea Bay	GB641008260000	Moderate	Fail	Good	2016
-	2592m N	River	Baglan Brook - headwaters to conf with River Neath	GB110058026350	Moderate	Good	Moderate	2016

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site	1

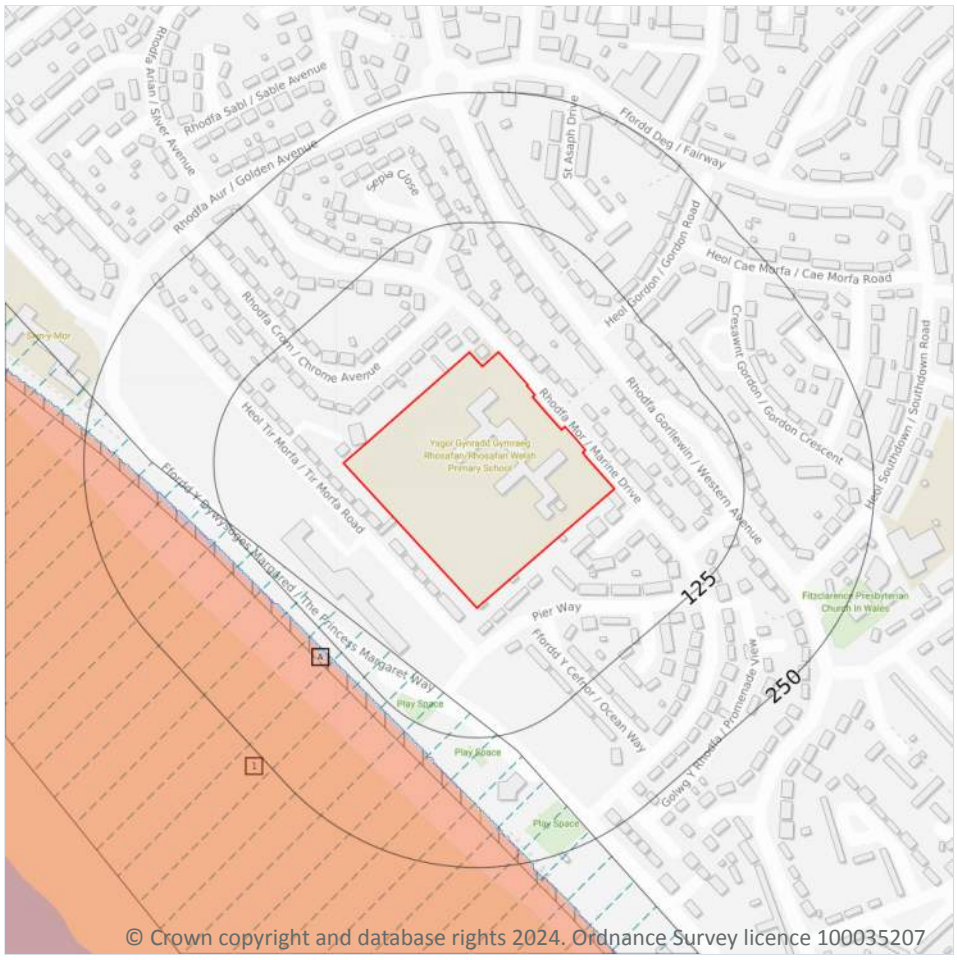
Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place.

Features are displayed on the Hydrology map on **page 41 >**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
3	**On site**	**Swansea Carboniferous Coal Measures**	**GB41002G201000**	**Poor**	**Poor**	**Good**	**2017**

This data is sourced from the Environment Agency and Natural Resources Wales.

7 River and coastal flooding



Site Outline

Search buffers in metres (m)

River and coastal flooding:

- High
- Medium
- Low
- Very Low
- Historical Flood Events
- Areas Used for Flood Storage
- Areas Benefiting from Flood Defences
- Flood Defences

7.1 Risk of flooding from rivers and the sea

Records within 50m	0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m	1

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

Features are displayed on the River and coastal flooding map on **page 44 >**

ID	Location	Event name	Date of flood	Flood source	Flood cause	Type of flood
1	84m S	Tideqa	2008-05-02 2008-05-02	Sea	Other	Tidal Coastal

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m	0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m	1

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

Features are displayed on the River and coastal flooding map on **page 44 >**

ID	Location	
A	133m SW	Area benefiting from flood defences

This data is sourced from the Environment Agency and Natural Resources Wales.

7.5 Flood Storage Areas

Records within 250m	0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.

River and coastal flooding - Flood Zones

7.6 Flood Zone 2

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

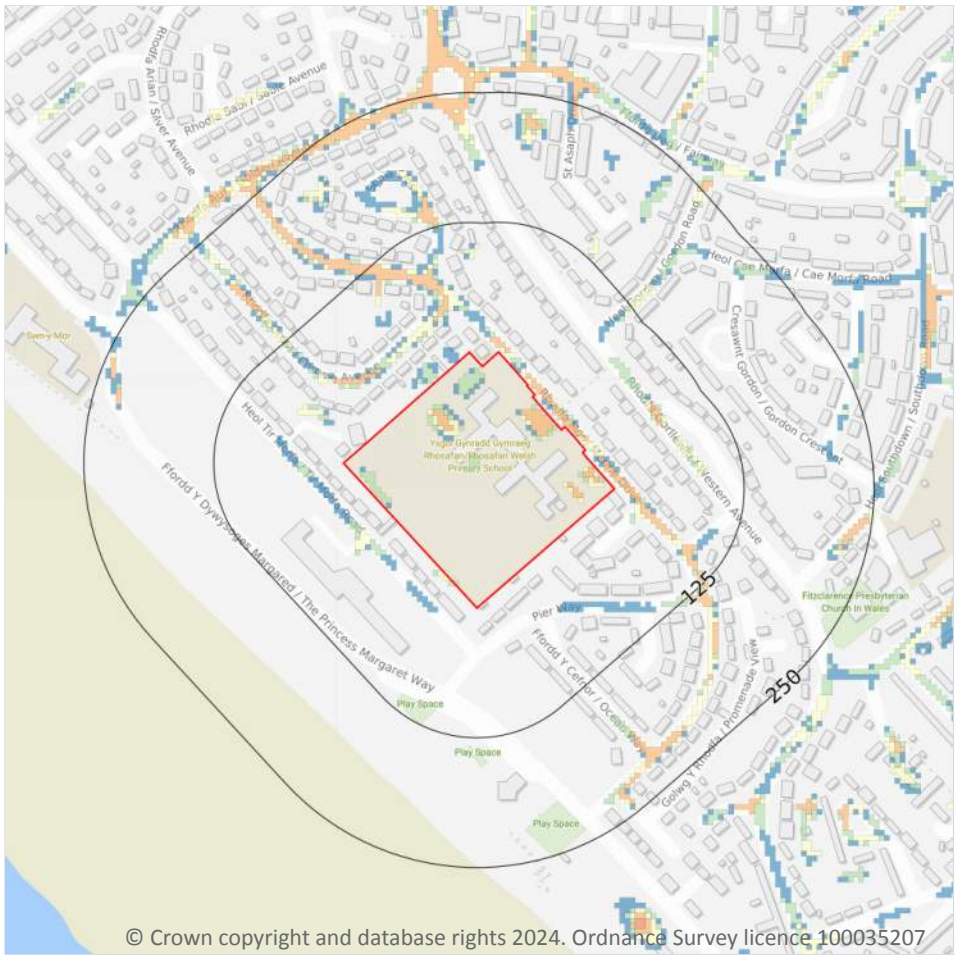
7.7 Flood Zone 3

Records within 50m	0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.

8 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site	**1 in 30 year, 0.1m - 0.3m**
Highest risk within 50m	**1 in 30 year, 0.1m - 0.3m**

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 48 >**

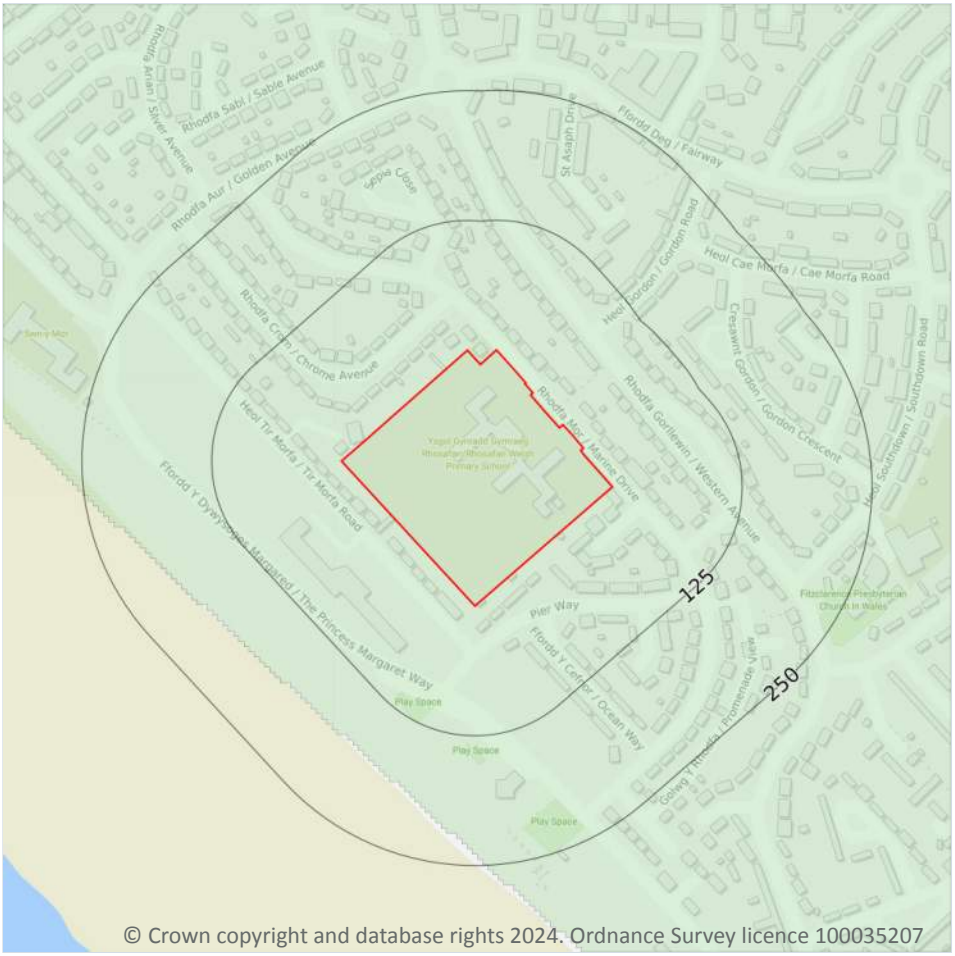
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Between 0.1m and 0.3m
1 in 250 year	Between 0.1m and 0.3m
1 in 100 year	Between 0.1m and 0.3m
1 in 30 year	Between 0.1m and 0.3m

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



Site Outline

Search buffers in metres (m)

- High
- Moderate - High
- Moderate
- Low
- Negligible

9.1 Groundwater flooding

Highest risk on site	**Low**
Highest risk within 50m	**Low**

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 50 >**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	0

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.3 Special Areas of Conservation (SAC)

Records within 2000m	0

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.4 Special Protection Areas (SPA)

Records within 2000m	0

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.5 National Nature Reserves (NNR)

Records within 2000m	0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.6 Local Nature Reserves (LNR)

Records within 2000m	0

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.7 Designated Ancient Woodland

Records within 2000m	0

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.8 Biosphere Reserves

Records within 2000m	0

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.9 Forest Parks

Records within 2000m	0

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m	0

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.11 Green Belt

Records within 2000m	0

Areas designated to prevent urban sprawl by keeping land permanently open.

This data is sourced from the Ministry of Housing, Communities and Local Government.

10.12 Proposed Ramsar sites

Records within 2000m	0

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m	0

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.

10.16 Nitrate Vulnerable Zones

Records within 2000m	0

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

This data is sourced from Natural England and Natural Resources Wales.

SSSI Impact Zones and Units

10.17 SSSI Impact Risk Zones

Records on site	0

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	0

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

This data is sourced from Natural England and Natural Resources Wales.

11 Visual and cultural designations

11.1 World Heritage Sites

Records within 250m	0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.2 Area of Outstanding Natural Beauty

Records within 250m	0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 National Parks

Records within 250m	0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

11.4 Listed Buildings

Records within 250m	0

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m	0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m	0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

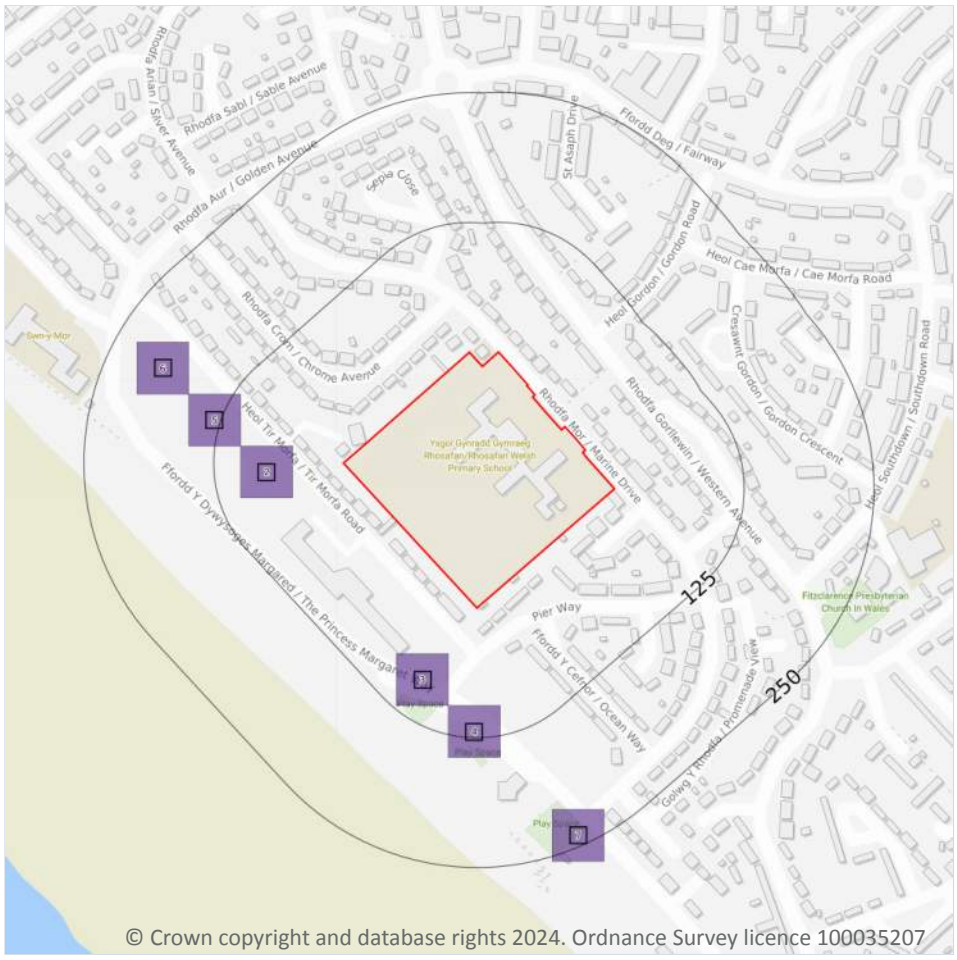
11.7 Registered Parks and Gardens

Records within 250m	0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

12 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Timber felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m	6

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 58 >**

ID	Location	Classification	Description
2	49m W	Grade 5	Very poor quality agricultural land
3	52m S	Grade 5	Very poor quality agricultural land
4	94m S	Grade 5	Very poor quality agricultural land

ID	Location	Classification	Description
5	100m W	Grade 5	Very poor quality agricultural land
6	163m W	Grade 5	Very poor quality agricultural land
7	207m S	Grade 5	Very poor quality agricultural land

This data is sourced from Natural Resources Wales.

12.2 Open Access Land

Records within 250m	0

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.

12.3 Tree Felling Licences

Records within 250m	0

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m	0

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m	0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

13.4 Limestone Pavement Orders

Records within 250m	0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

14 Geology 1:10,000 scale - Availability



Site Outline

Search buffers in metres (m)

Full coverage

Partial coverage

No coverage

14.1 10k Availability

Records within 500m	2

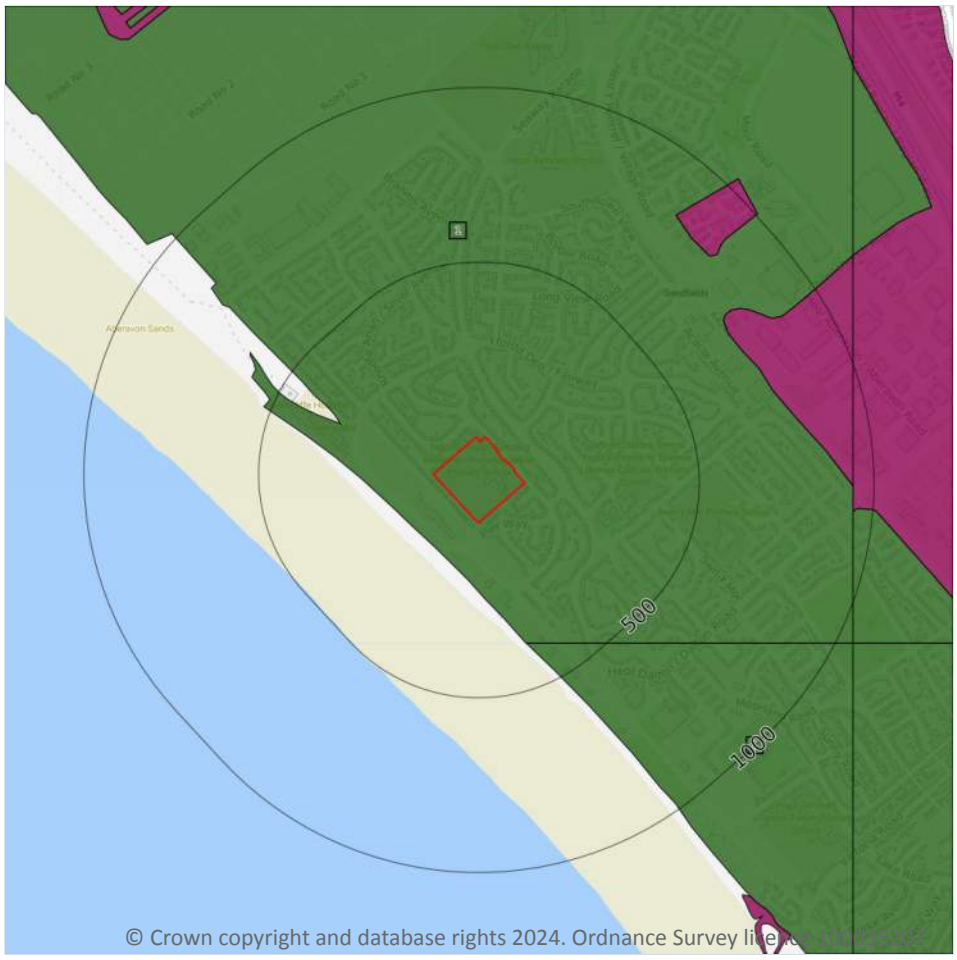
An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 62 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**No coverage**	**SS79SW**
2	344m S	Full	Full	Full	No coverage	SS78NW

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Artificial and made ground



Site Outline

Search buffers in metres (m)

- Reclaimed ground
- Made ground
- Worked ground
- Infilled ground
- Disturbed ground
- Landscaped ground

14.2 Artificial and made ground (10k)

Records within 500m	2

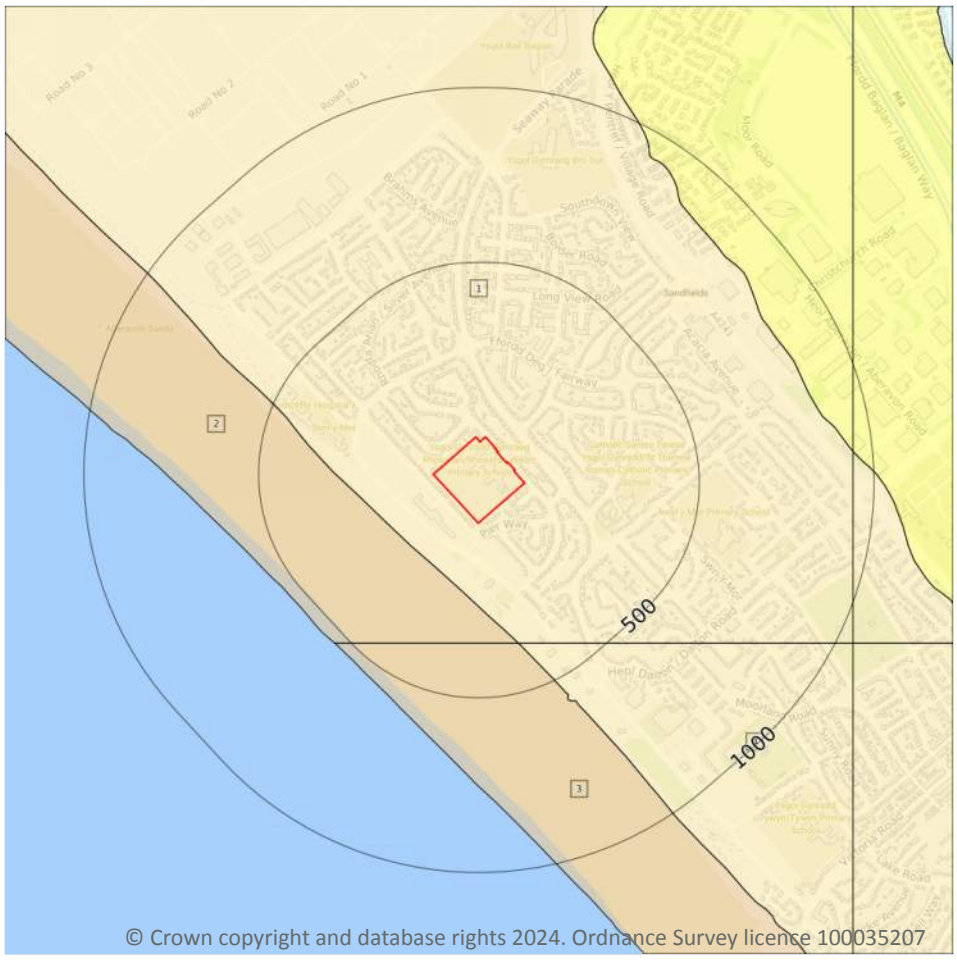
Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on **page 63 >**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**LSGR-UKNOWN**	**Landscaped Ground (Undivided)**	**Unknown/unclassified Entry**
2	371m S	LSGR-UKNOWN	Landscaped Ground (Undivided)	Unknown/unclassified Entry

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (10k)

Superficial geology (10k)
Please see table for more details.

14.3 Superficial geology (10k)

Records within 500m **4**

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 64 >**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**BSA-S**	**Blown Sand - Sand**	**Sand**
2	176m SW	BCHD-XSV	Beach Deposits - Sand And Gravel	Sand And Gravel
3	344m S	BCHD-XSV	Beach Deposits - Sand And Gravel	Sand And Gravel
4	363m S	BSA-S	Blown Sand - Sand	Sand

This data is sourced from the British Geological Survey.

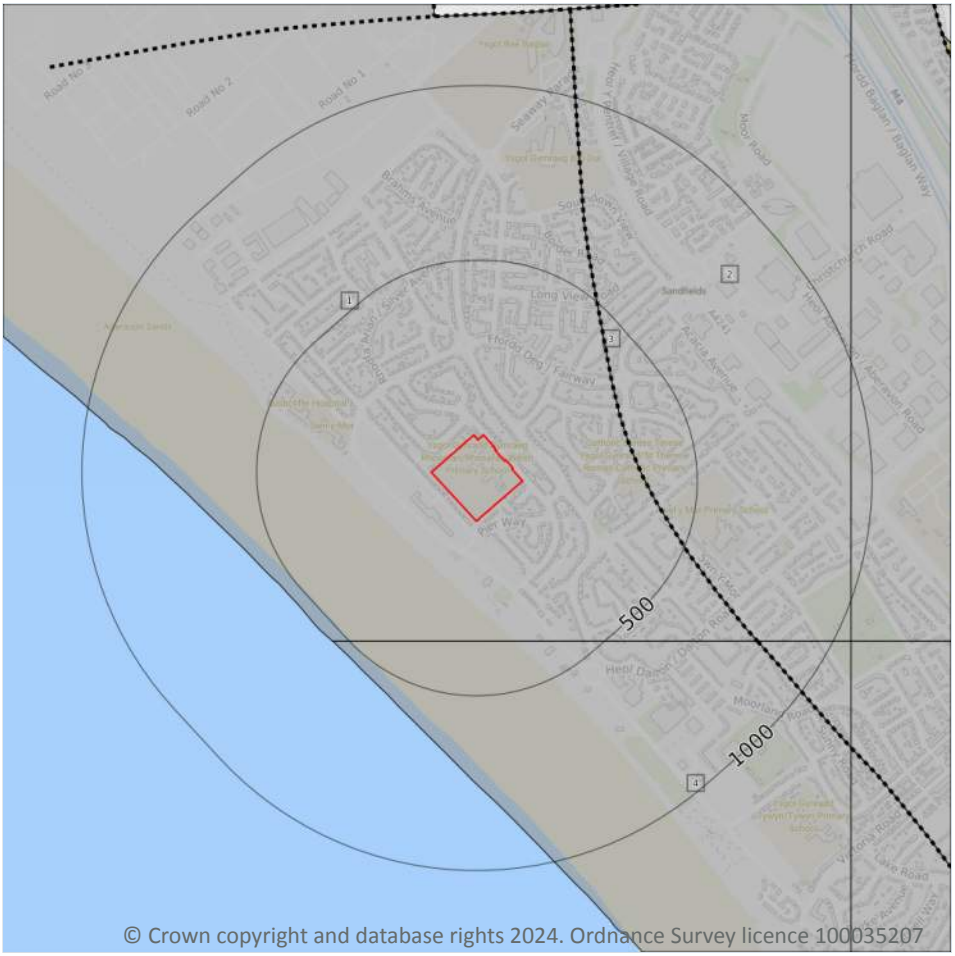
14.4 Landslip (10k)

Records within 500m	0

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Bedrock



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Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (10k)

Bedrock geology (10k)
Please see table for more details.

14.5 Bedrock geology (10k)

Records within 500m	3

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 66 >**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**SWMCM-MDSS**	**South Wales Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone**	**Bolsovian Sub-age - Duckmantian Sub-age**
2	323m E	SWMCM-MDSS	South Wales Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age

ID	Location	LEX Code	Description	Rock age
4	344m S	SWMCM-MDSS	South Wales Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m	**1**

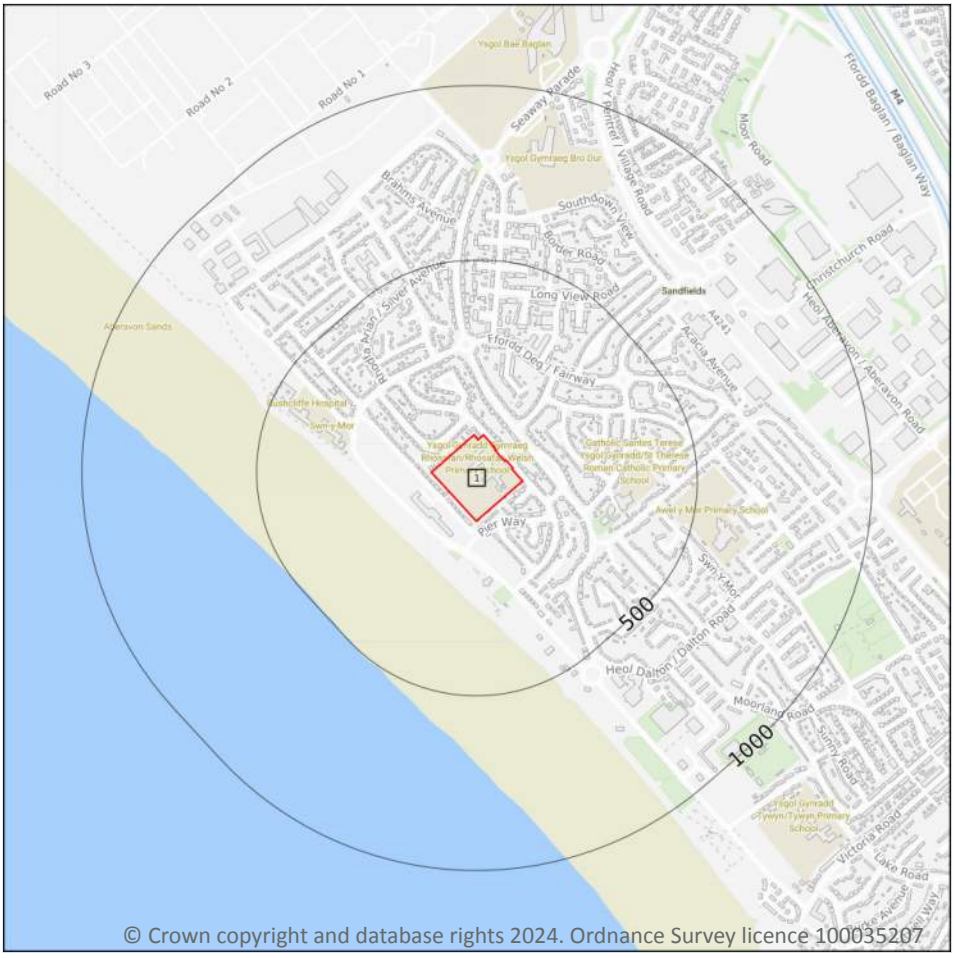
Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 66 >**

ID	Location	Category	Description
3	323m E	FAULT	Normal fault, inferred

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	1

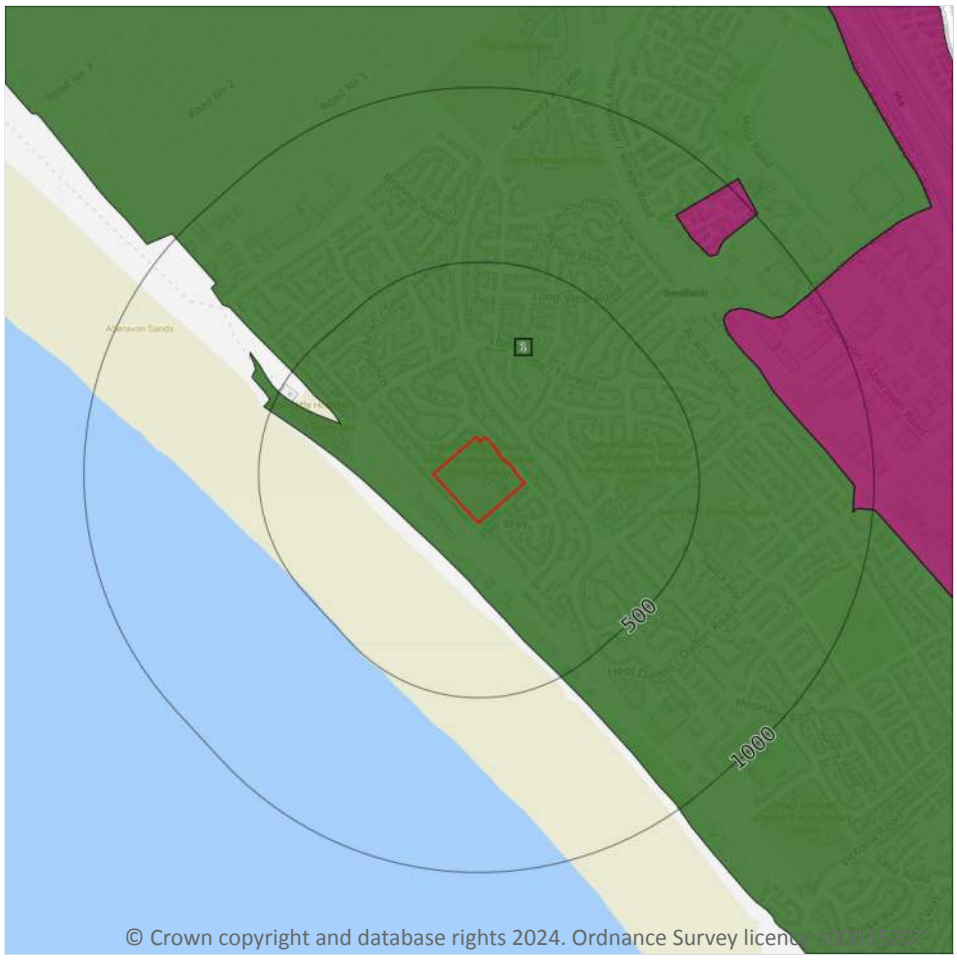
An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme. Where 50k data is not available, this area has been filled in with 625k scale data.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 68 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**Full**	**EW247_swansea_v4**

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Artificial and made ground



Site Outline

Search buffers in metres (m)

- Made ground
- Worked ground
- Infilled ground
- Disturbed ground
- Landscaped ground

15.2 Artificial and made ground (50k)

Records within 500m	1

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on **page 69 >**

ID	Location	LEX Code	Description	Rock description
1	On site	LSGR-ARTGR	LANDSCAPED GROUND (UNDIVIDED)	ARTIFICIALLY MODIFIED GROUND

This data is sourced from the British Geological Survey.

15.3 Artificial ground permeability (50k)

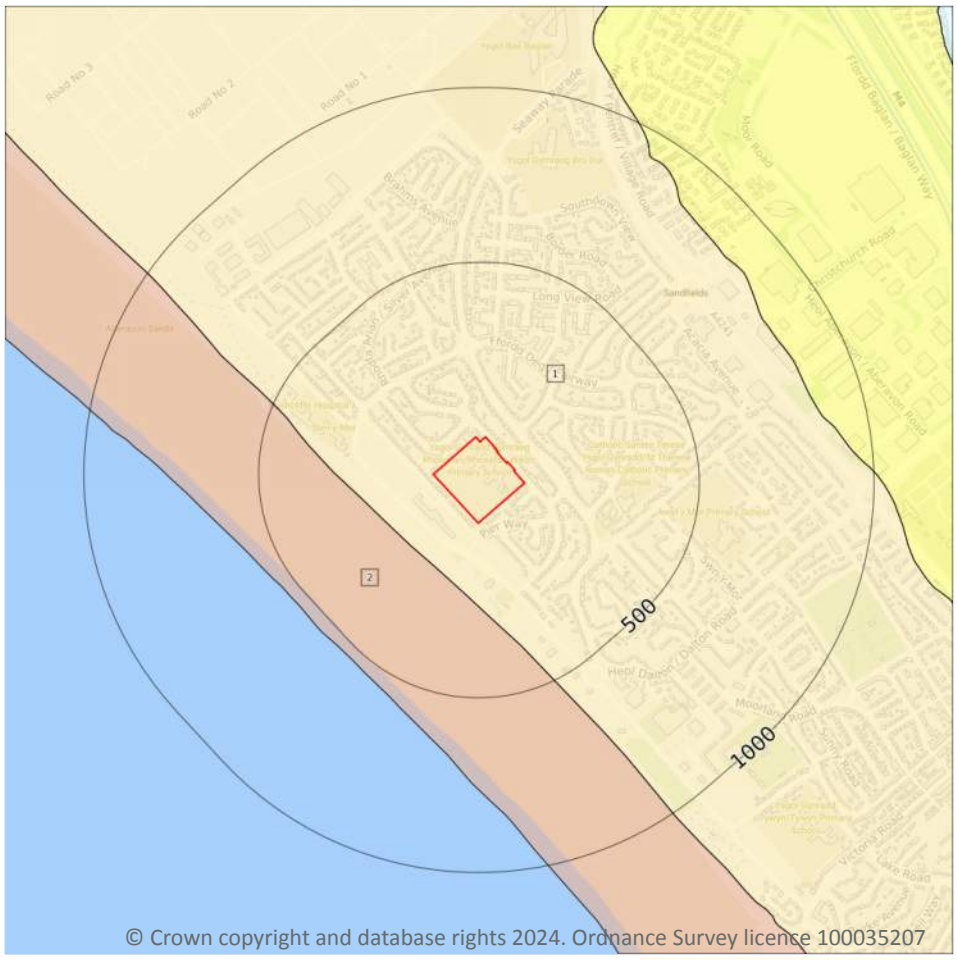
Records within 50m	1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Mixed**	**Very High**	**Low**

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m **2**

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 71 >**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**BSA-S**	**BLOWN SAND**	**SAND**
2	176m SW	MBD-S	MARINE BEACH DEPOSITS	SAND

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m	1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Intergranular**	**High**	**High**

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m	0

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

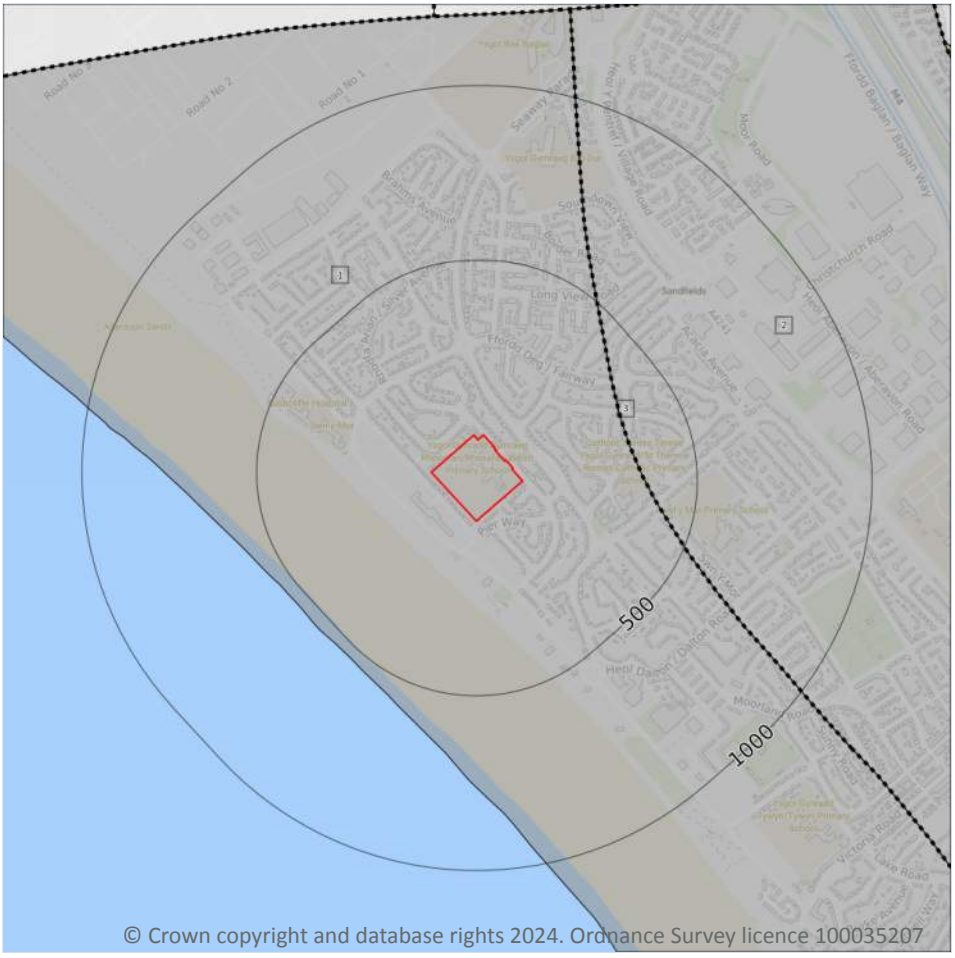
15.7 Landslip permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m	2

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 73 >**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**SWMCM-MDSS**	**SOUTH WALES MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE**	**WESTPHALIAN**
2	323m E	SWMCM-MDSS	SOUTH WALES MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m	1

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Fracture**	**Moderate**	**Low**

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m	1

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 73 >**

ID	Location	Category	Description
3	323m E	FAULT	Fault, inferred, displacement unknown

This data is sourced from the British Geological Survey.

16 Boreholes



16.1 BGS Boreholes

Records within 250m	15

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

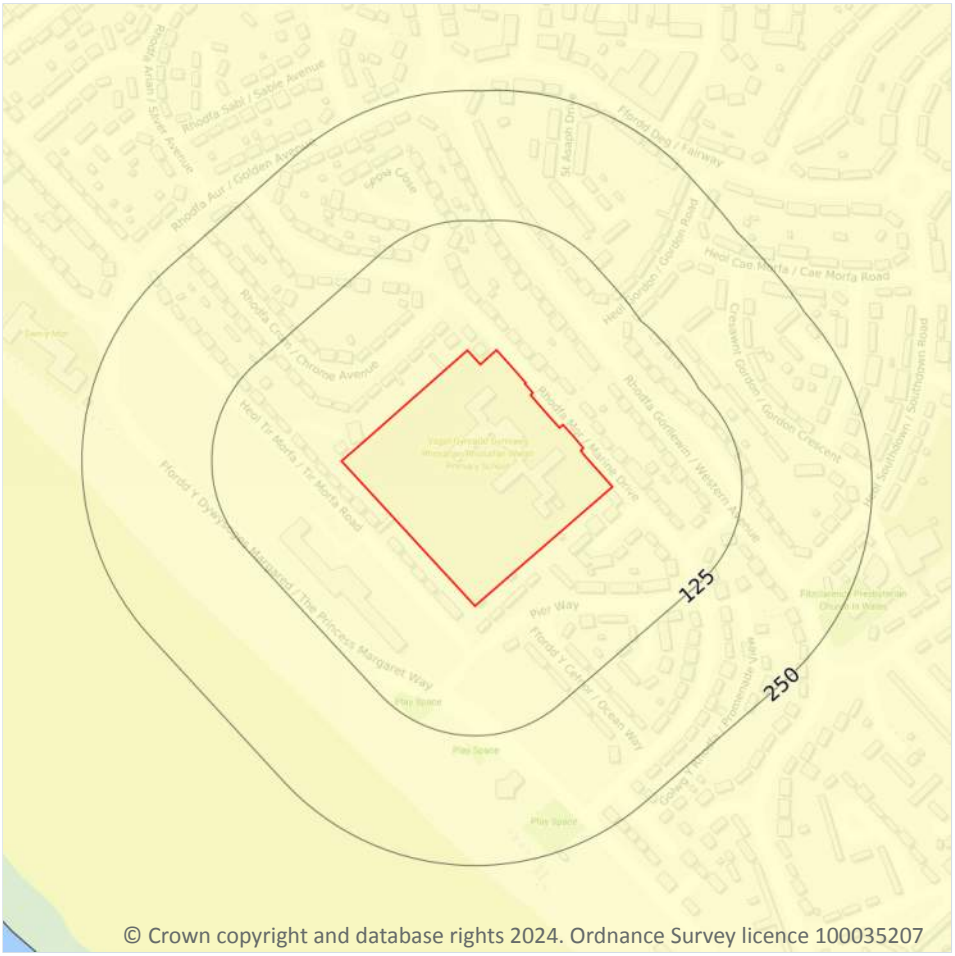
Features are displayed on the Boreholes map on **page 75 >**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	184m SE	274200 190340	MARINE DRIVE TP 26	-	Y	N/A
A	185m NE	274080 190720	ST ASAPHS DRIVE TP 7	-	Y	N/A
A	185m NE	274070 190730	ST ASAPHS DRIVE TP 8	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
A	195m NE	274060 190750	ST ASAPHS DRIVE TP 5	-	Y	N/A
A	198m NE	274050 190760	ST ASAPHS DRIVE TP 2	-	Y	N/A
A	199m NE	274080 190740	ST ASAPHS DRIVE TP 6	-	Y	N/A
B	204m SE	274200 190310	MARINE DRIVE TP 27	-	Y	N/A
A	209m NE	274070 190760	ST ASAPHS DRIVE TP 4	-	Y	N/A
A	211m NE	274060 190770	ST ASAPHS DRIVE TP 3	-	Y	N/A
A	215m N	274050 190780	ST ASAPHS DRIVE TP 1	-	Y	N/A
B	226m SE	274210 190290	MARINE DRIVE TP 28	-	Y	N/A
B	233m SE	274220 190290	MARINE DRIVE TP 25	-	Y	N/A
C	239m SE	274080 190160	MARINE DRIVE TP 7	-	Y	N/A
2	242m SE	274200 190260	MARINE DRIVE TP 23	-	Y	N/A
C	249m SE	274070 190140	MARINE DRIVE TP 11	-	Y	N/A

This data is sourced from the British Geological Survey.

17 Natural ground subsidence - Shrink swell clays



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.1 Shrink swell clays

Records within 50m	1

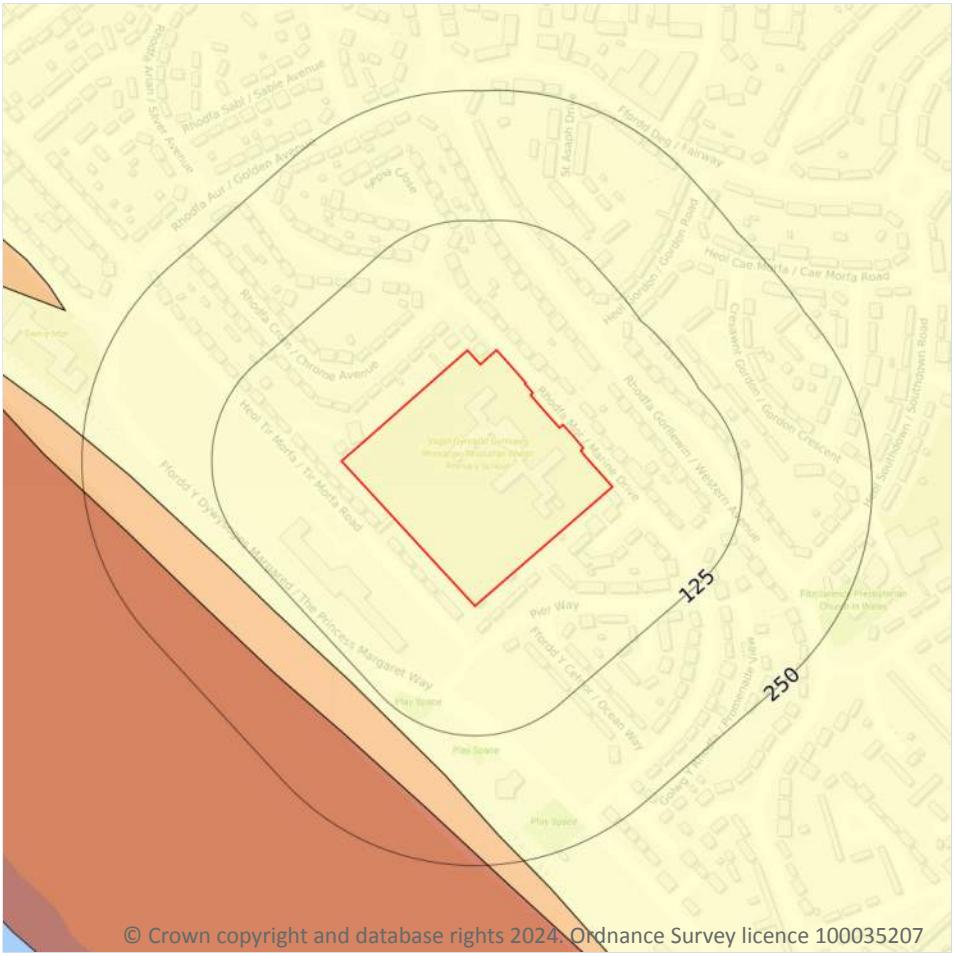
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 77 >**

Location	Hazard rating	Details
On site	**Negligible**	**Ground conditions predominantly non-plastic.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.2 Running sands

Records within 50m	1

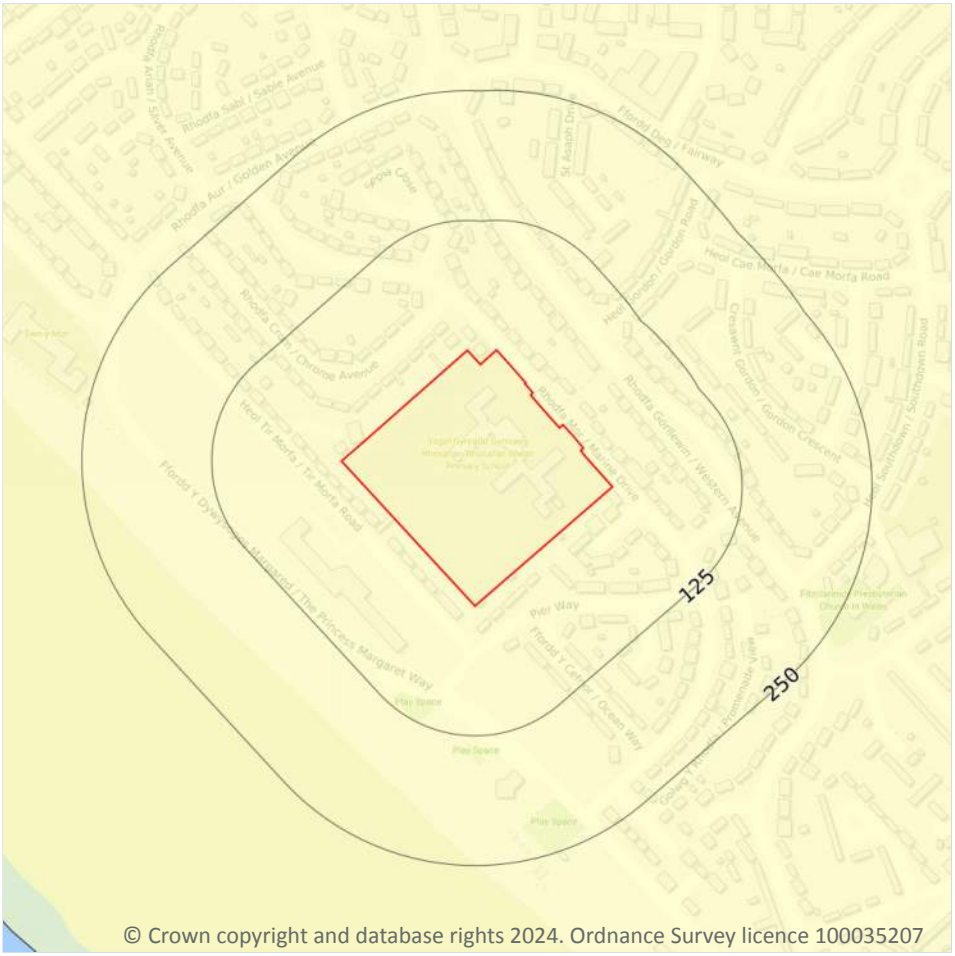
The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 78 >**

Location	Hazard rating	Details
On site	**Negligible**	**Running sand conditions are not thought to occur whatever the position of the water table. No identified constraints on lands use due to running conditions.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.3 Compressible deposits

Records within 50m	1

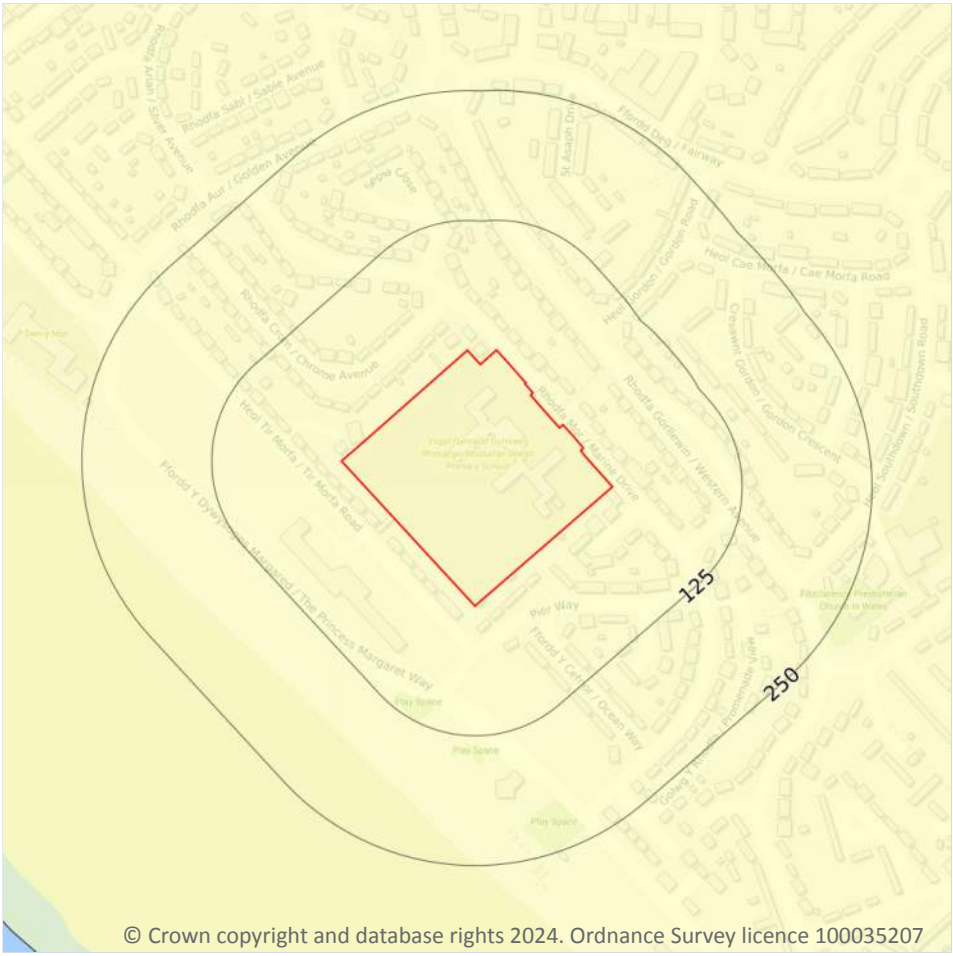
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 79 >**

Location	Hazard rating	Details
On site	**Negligible**	**Compressible strata are not thought to occur.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.4 Collapsible deposits

Records within 50m	**1**

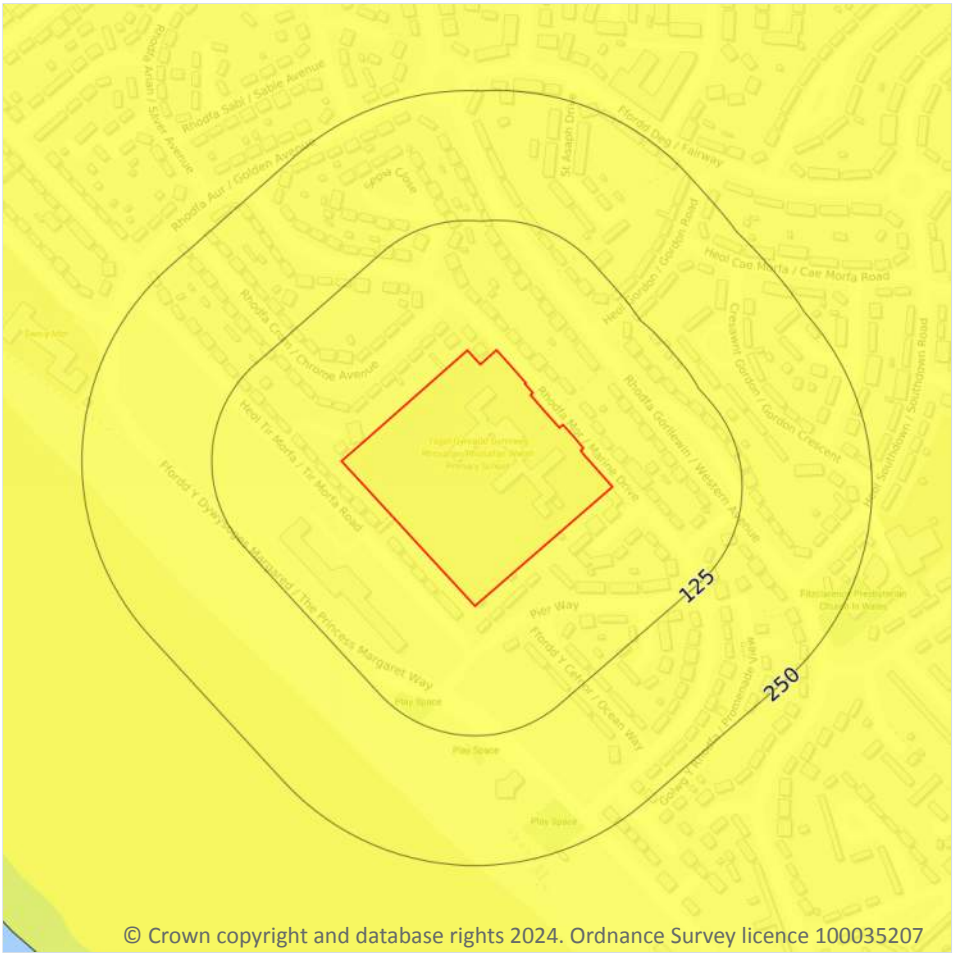
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 80 >**

Location	Hazard rating	Details
On site	**Negligible**	**Deposits with potential to collapse when loaded and saturated are believed not to be present.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.5 Landslides

Records within 50m	1

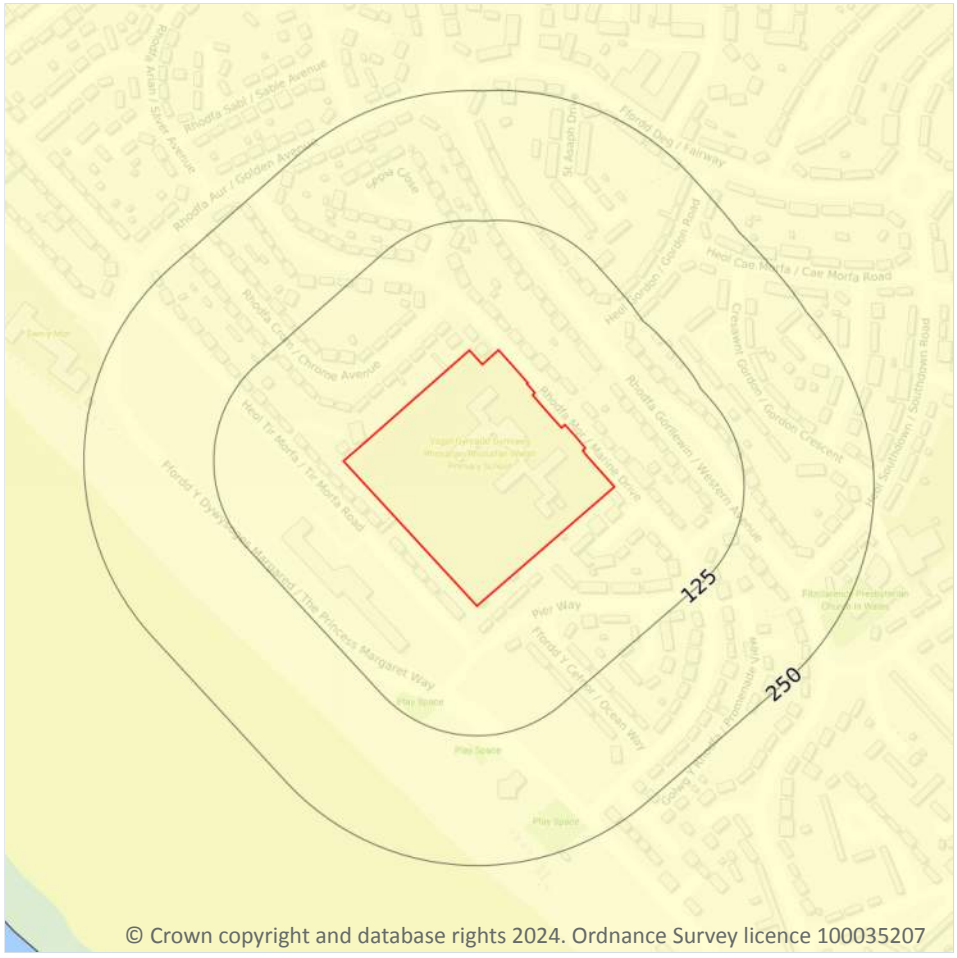
The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on **page 81 >**

Location	Hazard rating	Details
On site	**Very low**	**Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Ground dissolution of soluble rocks



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Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.6 Ground dissolution of soluble rocks

Records within 50m	1

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 82 >**

Location	Hazard rating	Details
On site	**Negligible**	**Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.**

This data is sourced from the British Geological Survey.

18 Mining and ground workings



Site Outline

Search buffers in metres (m)

- BritPits
- Surface ground workings
- Underground workings
- Underground mining extents
- Historical mineral planning areas
- TCA non-coal mining

Non Coal Mining

- Sporadic underground mining of restricted extent possible
- Localised small scale underground mining possible
- Small scale mining possible
- Underground mining known or likely within or in close proximity
- Underground mining known within or in very close proximity

18.1 BritPits

Records within 500m	0

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

This data is sourced from the British Geological Survey.

18.2 Surface ground workings

Records within 250m	2

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

Features are displayed on the Mining and ground workings map on **page 84 >**

ID	Location	Land Use	Year of mapping	Mapping scale
A	157m SW	Unspecified Ground Workings	1947	1:10560
A	157m SW	Unspecified Ground Workings	1921	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.3 Underground workings

Records within 1000m	0

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

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground mining extents

Records within 500m	0

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

This data is sourced from Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	0

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

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	0

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

This data is sourced from the British Geological Survey.

18.7 JPB mining areas

Records on site	0

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

This data is sourced from Johnson Poole and Bloomer.

18.8 The Coal Authority non-coal mining

Records within 500m	0

This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure, and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure prior to any re-use.

This data is sourced from The Coal Authority.

18.9 Researched mining

Records within 500m	0

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

This data is sourced from Groundsure.

18.10 Mining record office plans

Records within 500m	0

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

This data is sourced from Groundsure.

18.11 BGS mine plans

Records within 500m	0

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

This data is sourced from Groundsure.

18.12 Coal mining

Records on site	1

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

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

This data is sourced from the Coal Authority.

18.13 Brine areas

Records on site	0

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

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

18.14 Gypsum areas

Records on site	0

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.15 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

18.16 Clay mining

Records on site	0

Generalised areas that may be affected by kaolin and ball clay extraction.

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

19 Ground cavities and sinkholes

19.1 Natural cavities

Records within 500m	0

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

This data is sourced from Stantec UK Ltd.

19.2 Mining cavities

Records within 1000m	0

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

This data is sourced from Stantec UK Ltd.

19.3 Reported recent incidents

Records within 500m	0

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

This data is sourced from Groundsure.

19.4 Historical incidents

Records within 500m	0

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

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

This data is sourced from Groundsure.

19.5 National karst database

Records within 500m	0

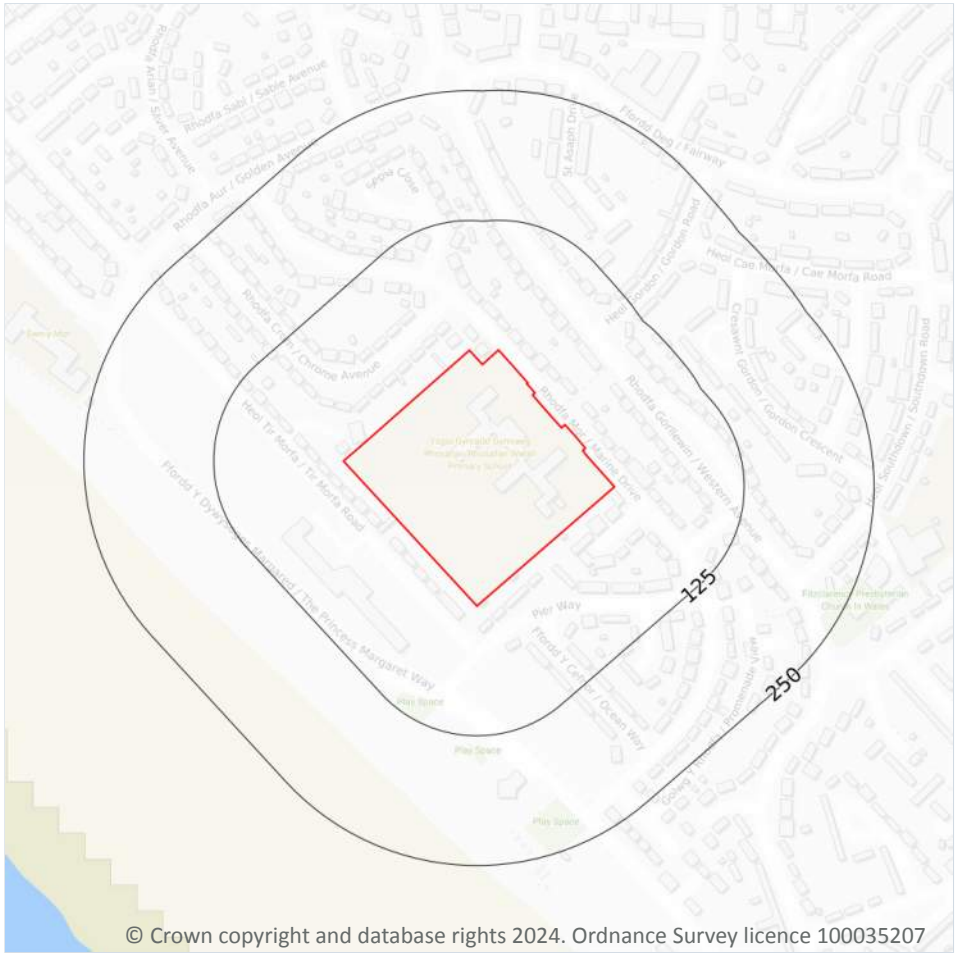
This is a comprehensive database of national karst information gathered from a wide range of sources. BGS have collected data on five main types of karst feature: Sinkholes, stream links, caves, springs, and incidences of associated damage to buildings, roads, bridges and other engineered works.

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

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

This data is sourced from the British Geological Survey.

20 Radon



Site Outline

Search buffers in metres (m)

- Greater than 30%
- Between 10% and 30%
- Between 5% and 10%
- Between 3% and 5%
- Between 1% and 3%
- Less than 1%

20.1 Radon

Records on site	1

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

Features are displayed on the Radon map on **page 91 >**

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

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

21 Soil chemistry

21.1 BGS Estimated Background Soil Chemistry

Records within 50m	4

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

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

This data is sourced from the British Geological Survey.

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m	16

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km^2).

Location	Arsenic (mg/kg)	Bioaccessible Arsenic (mg/kg)	Lead (mg/kg)	Bioaccessible Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Nickel (mg/kg)	Tin (mg/kg)
On site	**17**	**3**	**166**	**114**	**0.7**	**66**	**29**	**25**	**5**
On site	**17**	**3**	**191**	**131**	**0.7**	**64**	**28**	**24**	**5**

Location	Arsenic (mg/kg)	Bioaccessible Arsenic (mg/kg)	Lead (mg/kg)	Bioaccessible Lead (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Nickel (mg/kg)	Tin (mg/kg)
On site	**17**	**3**	**169**	**116**	**0.7**	**66**	**29**	**25**	**5**
On site	**17**	**3**	**194**	**133**	**0.7**	**64**	**28**	**24**	**5**
On site	**18**	**3.2**	**134**	**92**	**0.8**	**72**	**30**	**26**	**5**
On site	**18**	**3.2**	**148**	**102**	**0.8**	**70**	**29**	**26**	**5**
On site	**18**	**3.2**	**131**	**90**	**0.9**	**73**	**30**	**27**	**5**
On site	**18**	**3.2**	**151**	**104**	**0.8**	**69**	**30**	**25**	**6**
On site	**19**	**3.3**	**181**	**124**	**0.8**	**68**	**33**	**25**	**7**
5m SE	16	2.8	220	151	0.6	60	27	23	5
10m N	19	3.3	140	96	0.8	71	30	26	6
12m W	19	3.3	119	82	0.9	76	30	28	5
21m N	19	3.3	117	80	0.9	76	31	28	5
40m E	16	2.8	215	148	0.6	61	27	23	5
44m S	16	2.8	206	142	0.6	62	27	23	5
45m NE	19	3.3	165	113	0.8	68	32	25	6

This data is sourced from the British Geological Survey.

21.3 BGS Measured Urban Soil Chemistry

Records within 50m	**0**

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km^2.

This data is sourced from the British Geological Survey.

22 Railway infrastructure and projects

22.1 Underground railways (London)

Records within 250m	0

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

This data is sourced from publicly available information by Groundsure.

22.2 Underground railways (Non-London)

Records within 250m	0

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

This data is sourced from publicly available information by Groundsure.

22.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

22.4 Historical railway and tunnel features

Records within 250m	0

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

This data is sourced from Ordnance Survey/Groundsure.

22.5 Royal Mail tunnels

Records within 250m	0

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

This data is sourced from Groundsure/the Postal Museum.

22.6 Historical railways

Records within 250m	0

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

This data is sourced from OpenStreetMap.

22.7 Railways

Records within 250m	0

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

This data is sourced from Ordnance Survey and OpenStreetMap.

22.8 Crossrail 1

Records within 500m	0

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

This data is sourced from publicly available information by Groundsure.

22.9 Crossrail 2

Records within 500m	0

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

This data is sourced from publicly available information by Groundsure.

22.10 HS2

Records within 500m	0

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

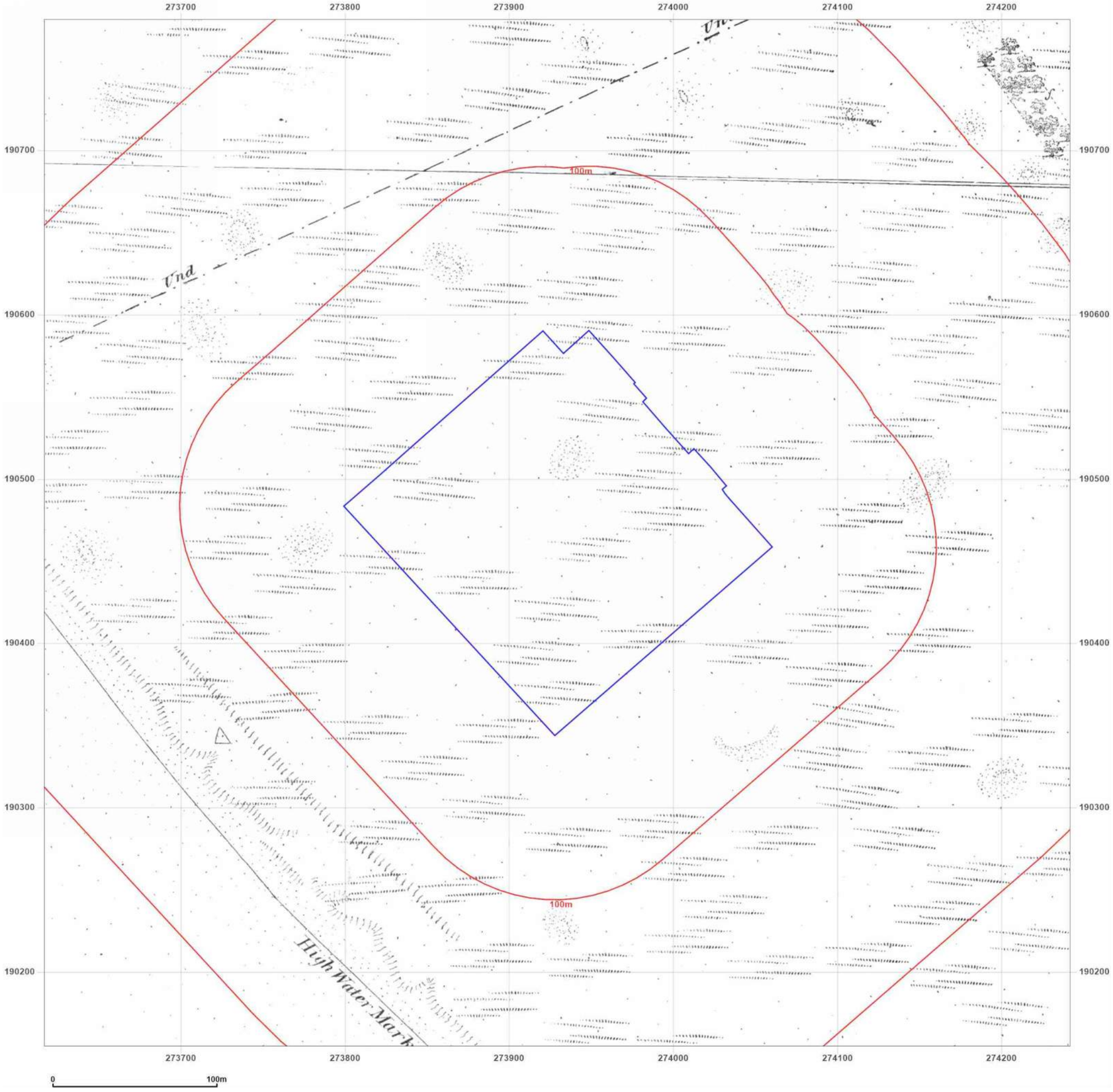
This data is sourced from HS2 ltd.

Data providers

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

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Site Details:

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Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: County Series

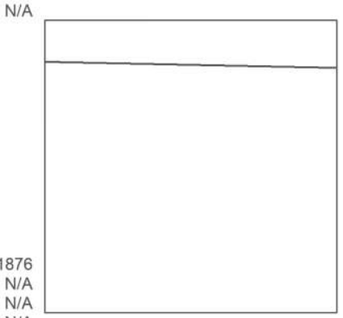
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Surveyed 1876
Revised N/A
Edition N/A
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Levelled N/A

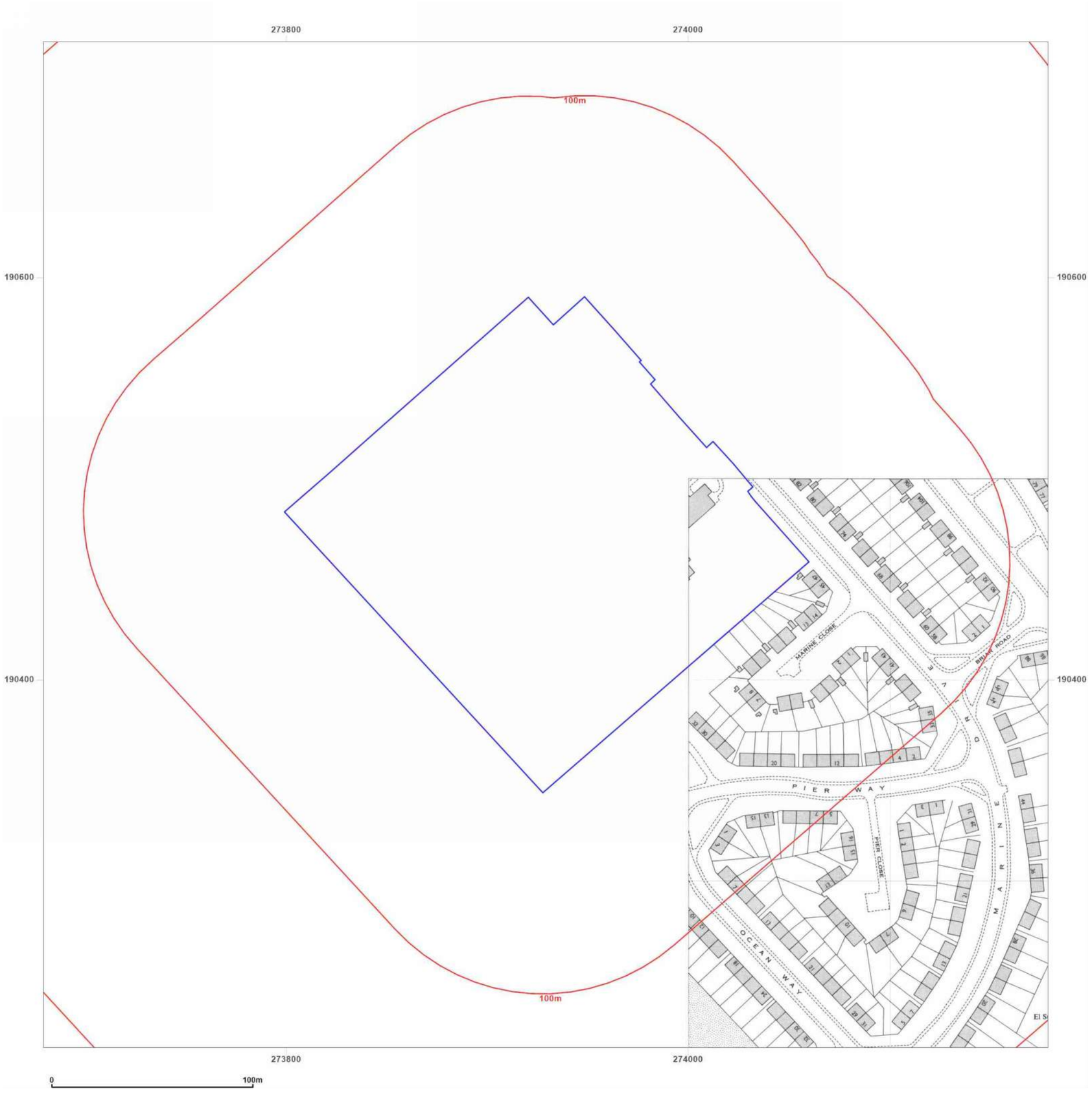
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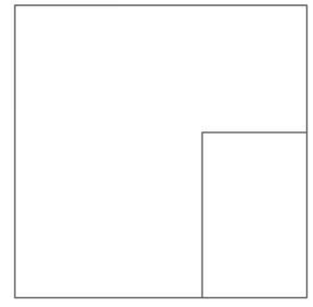
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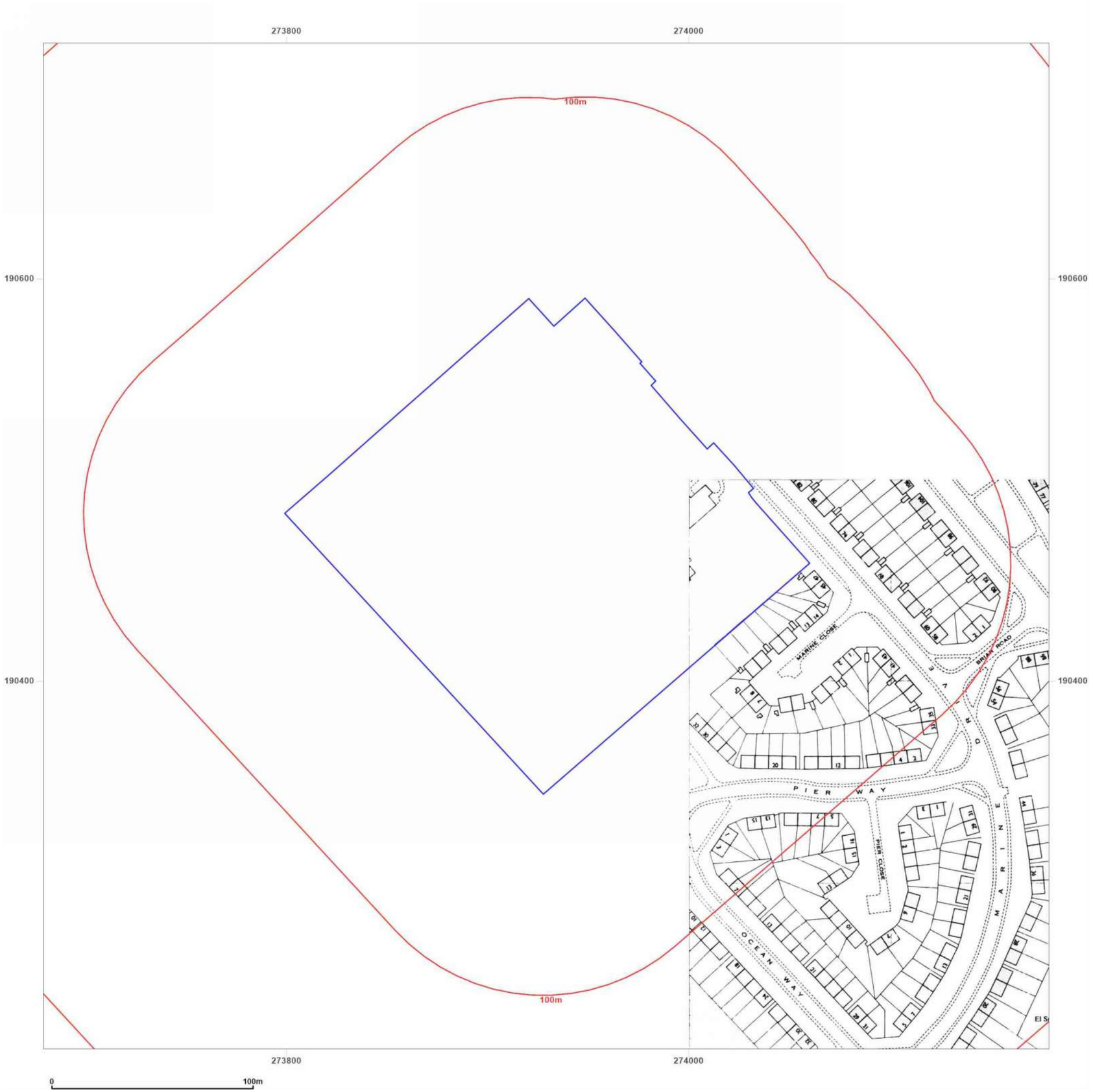
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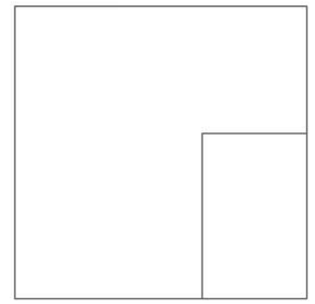
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Map date: **1957**
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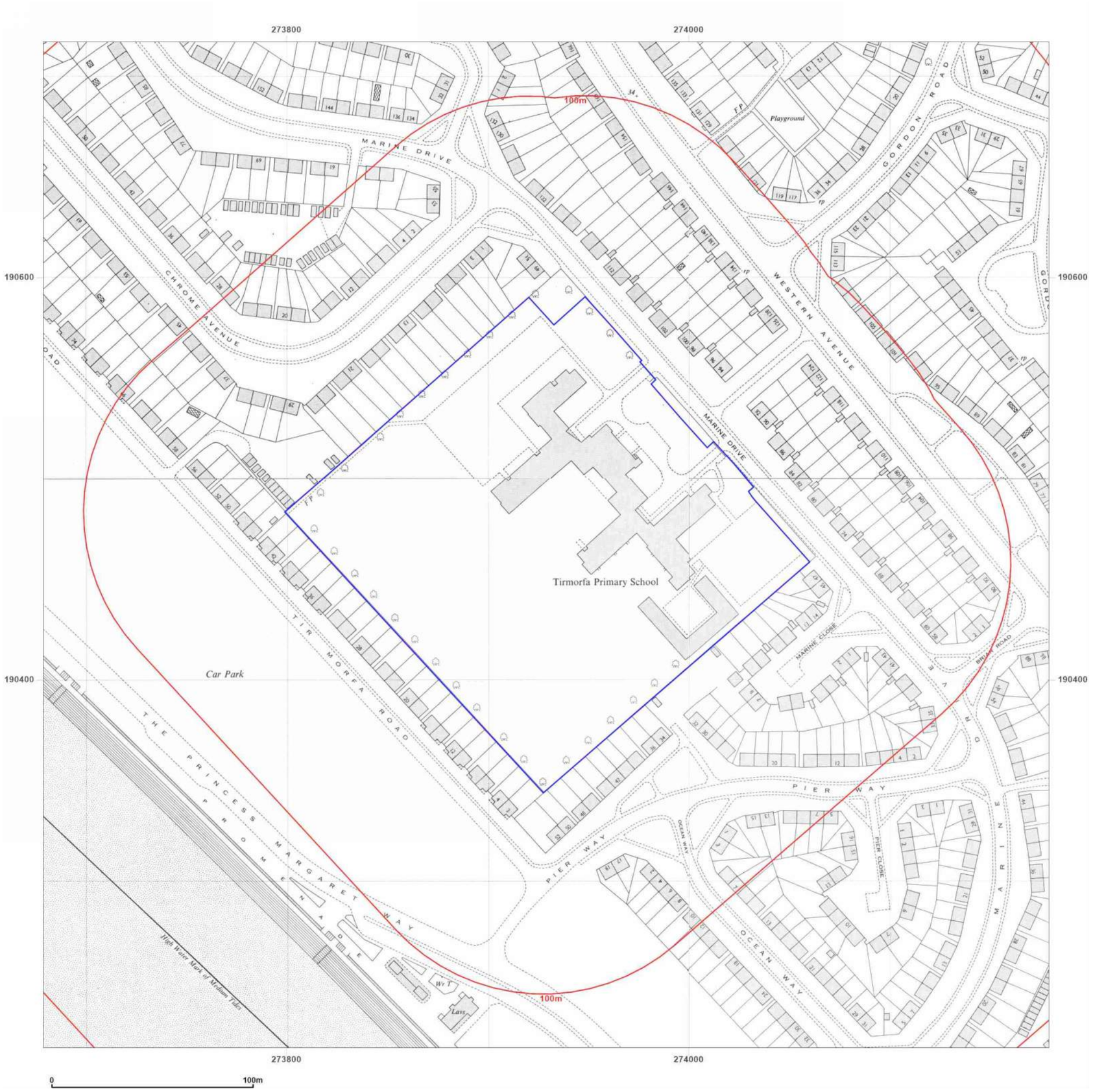
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Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1963-1965**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed 1962 Revised 1962 Edition N/A Copyright 1963 Levelled 1949	Surveyed 1956 Revised 1962 Edition N/A Copyright 1963 Levelled 1957

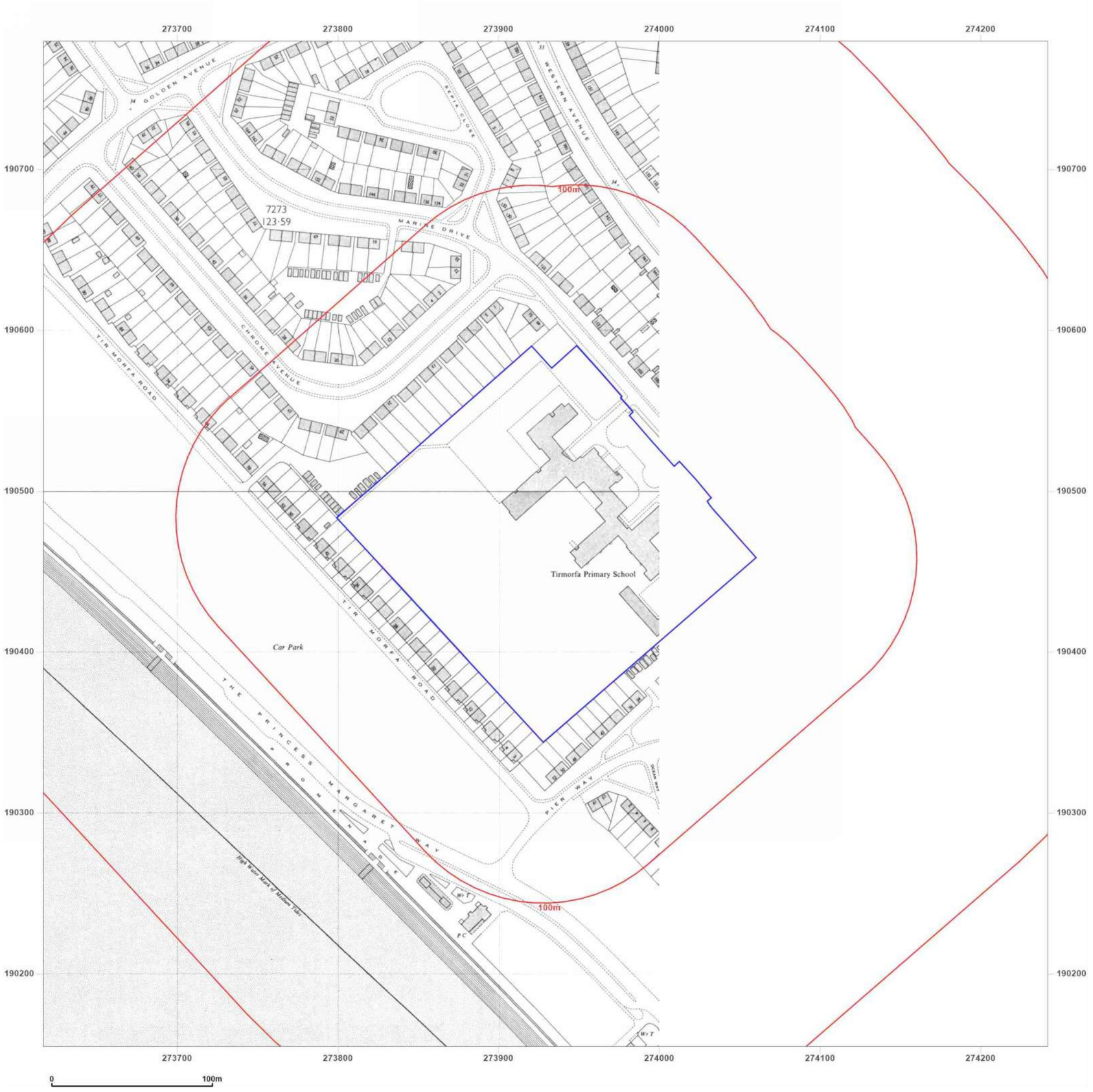
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Grid Ref: 273929, 190467

Map Name: National Grid

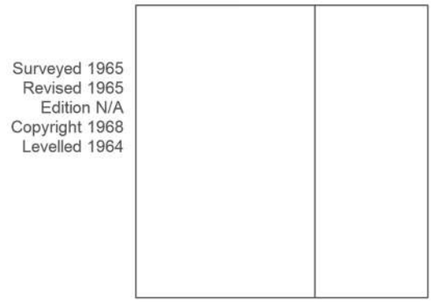
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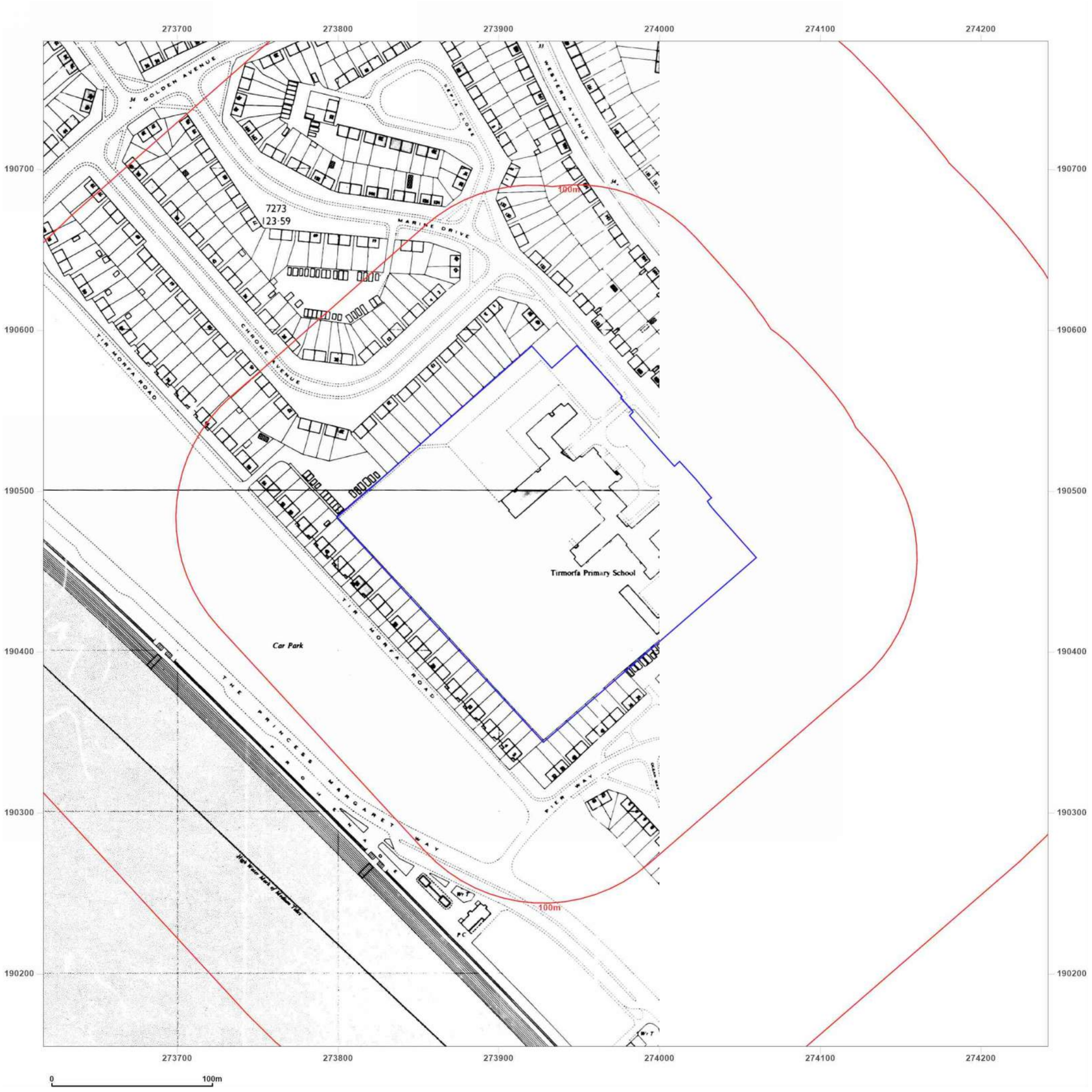
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Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1968**
Scale: 1:2,500
Printed at: 1:2,500

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

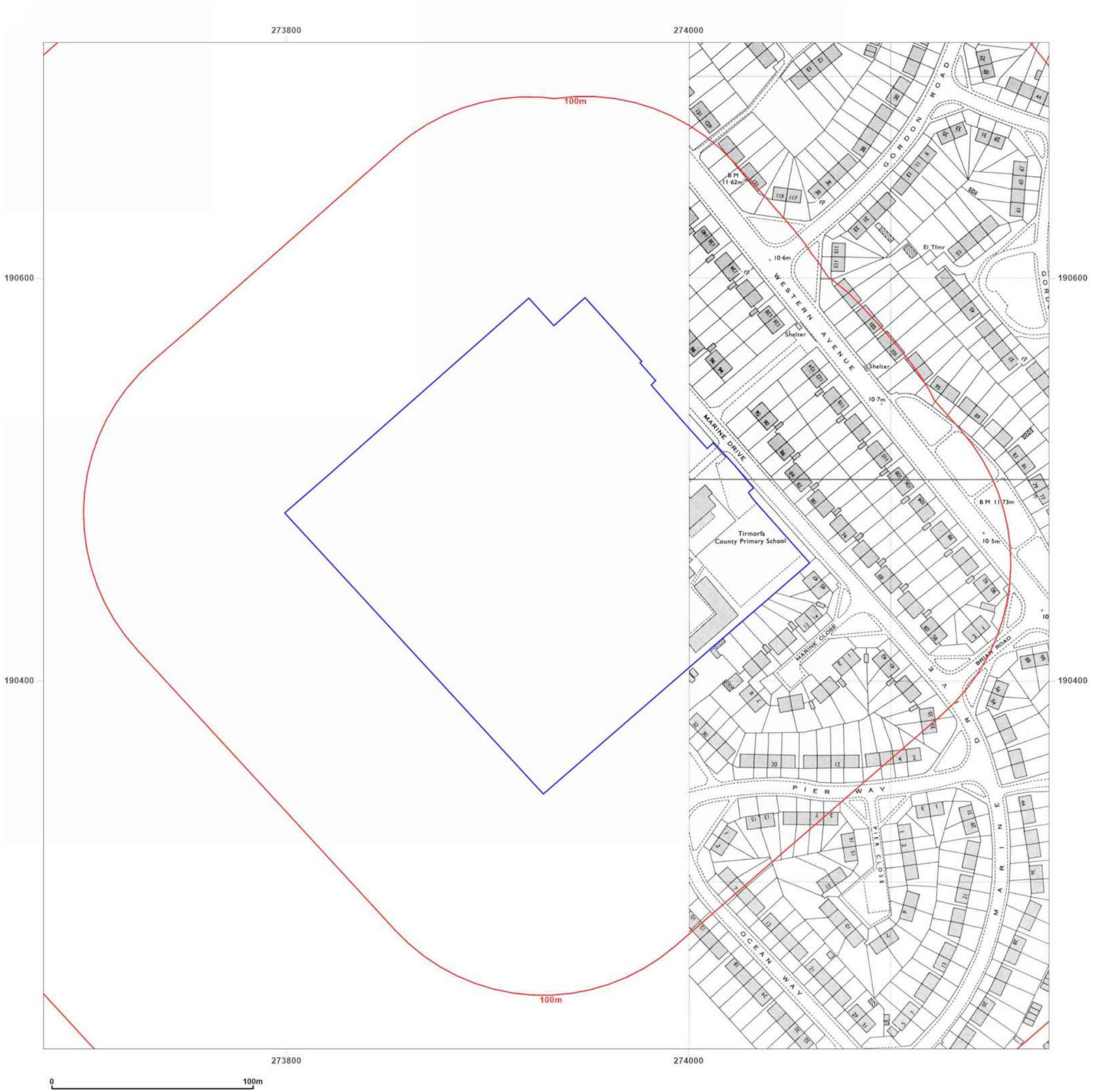
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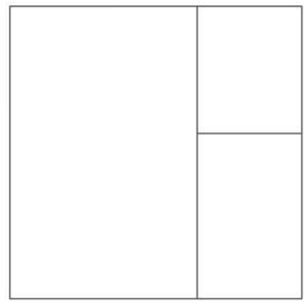
Site Details:

RHOSAFAN WELSH PRIMARY SCHOOL, MARINE DRIVE, SANDFIELDS, NEATH PORT TALBOT, SA12 7NN

Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1976**
Scale: 1:1,250
Printed at: 1:2,000

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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1993**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
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Surveyed N/A
Revised N/A
Edition N/A
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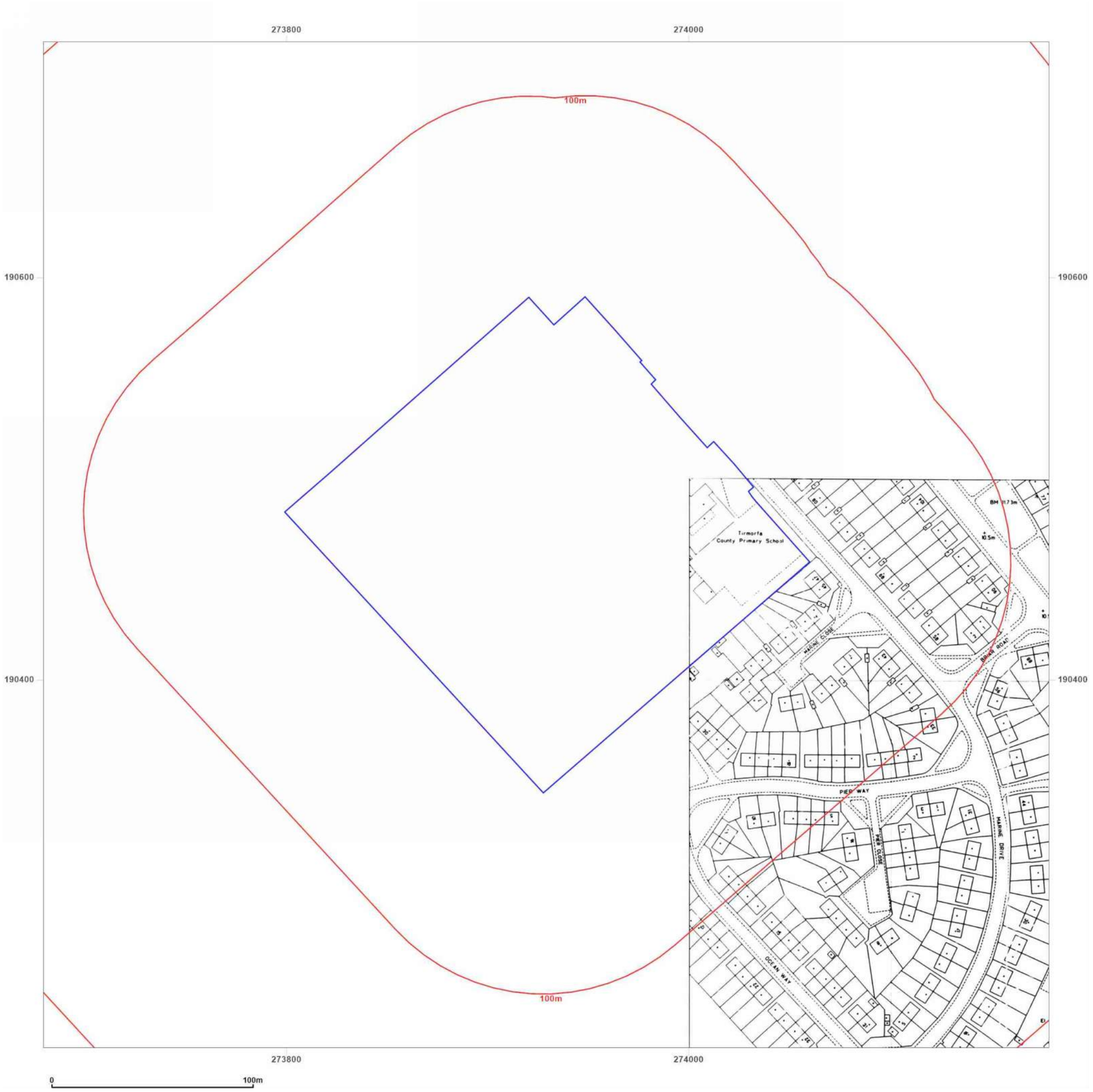
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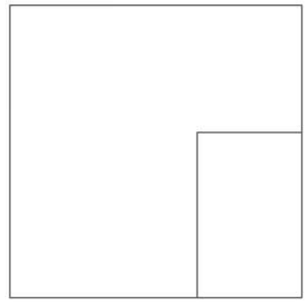
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1993**
Scale: 1:1,250
Printed at: 1:2,000

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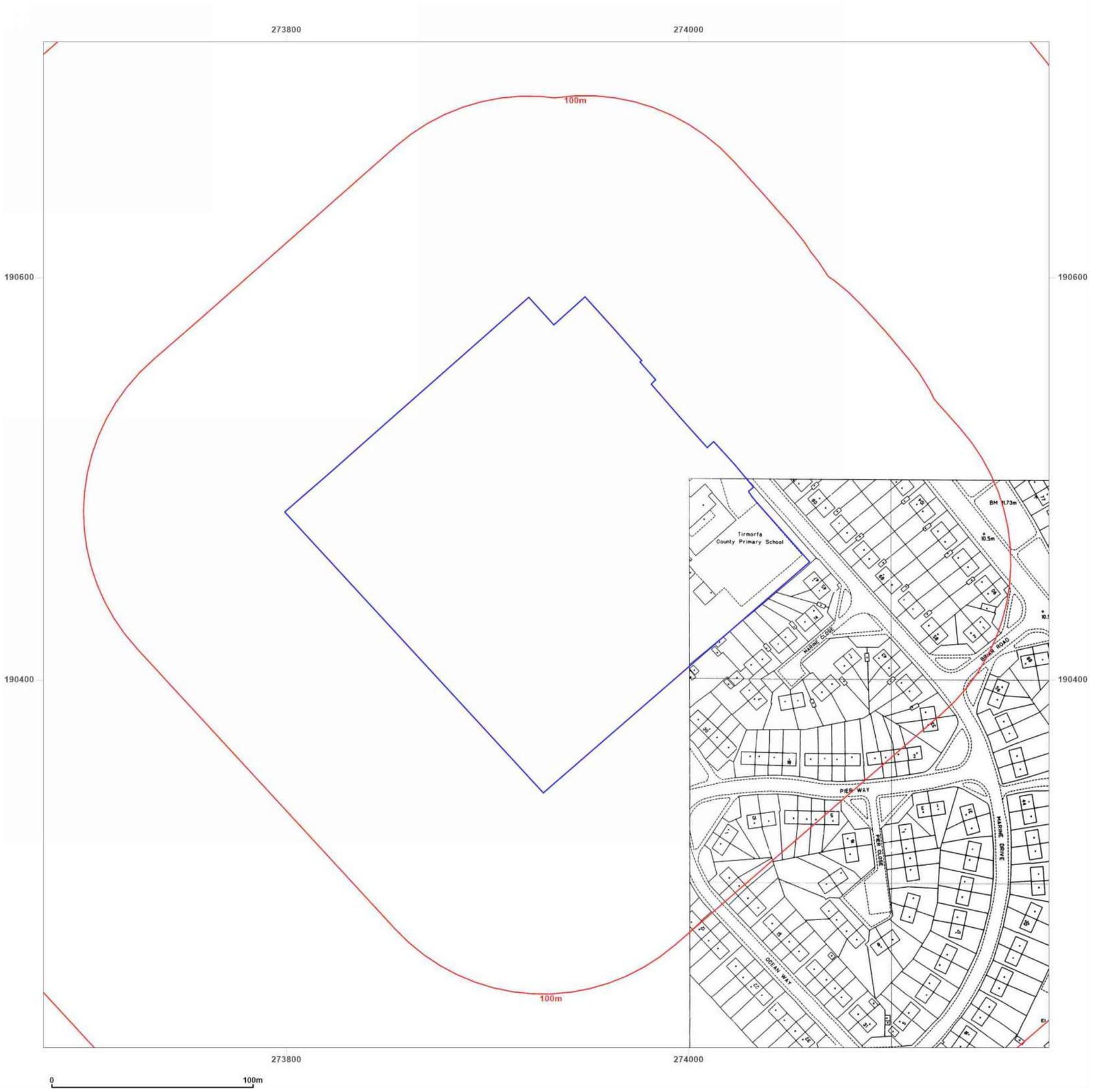
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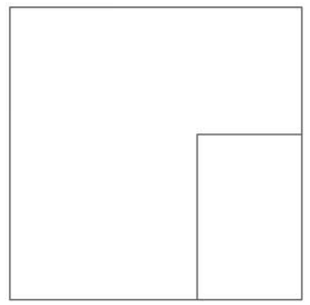
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Client Ref: 7016582
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Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1993**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

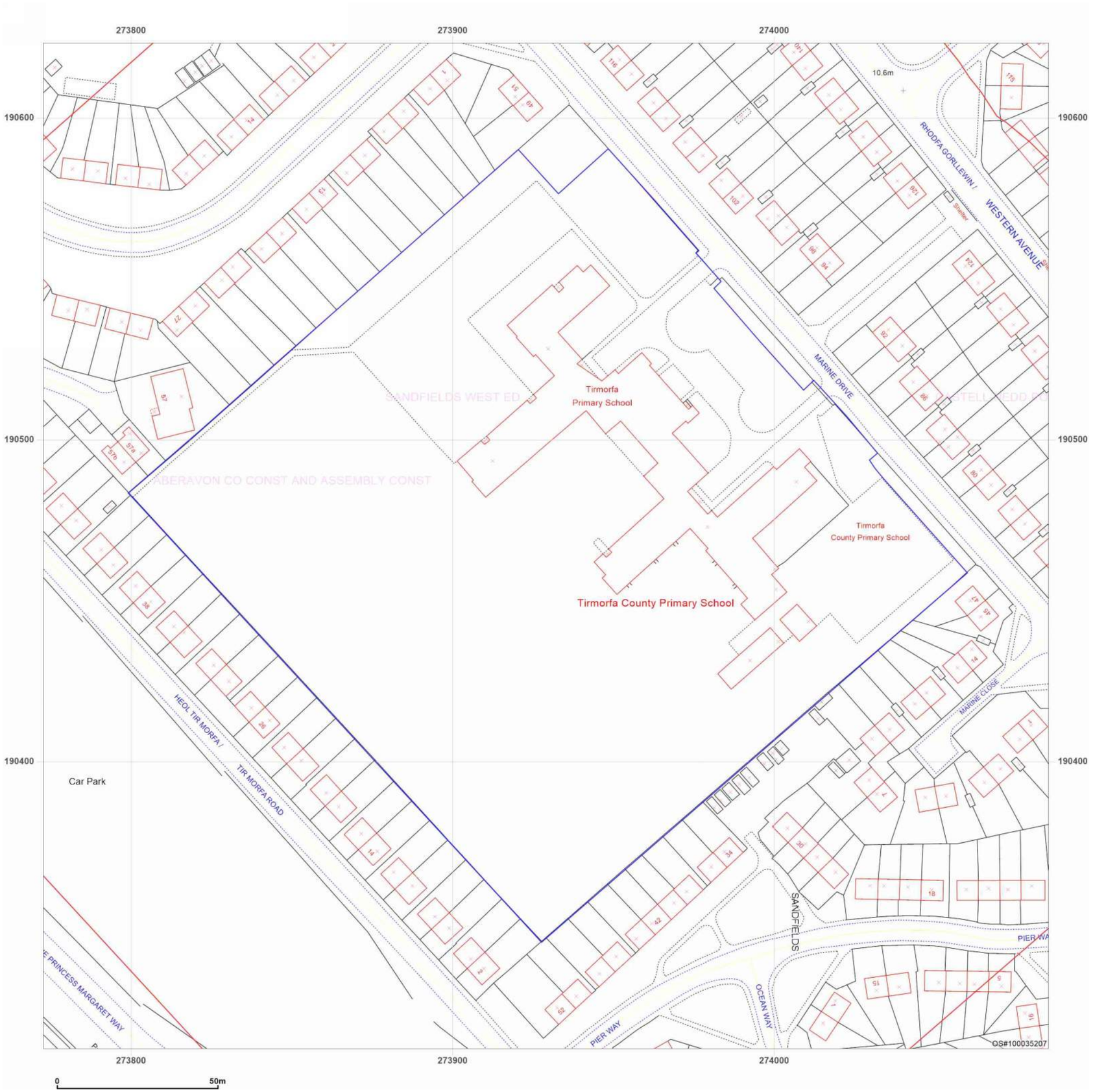
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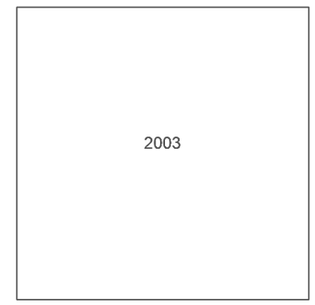
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RHOSAFAN WELSH PRIMARY SCHOOL, MARINE DRIVE, SANDFIELDS, NEATH PORT TALBOT, SA12 7NN

Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

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

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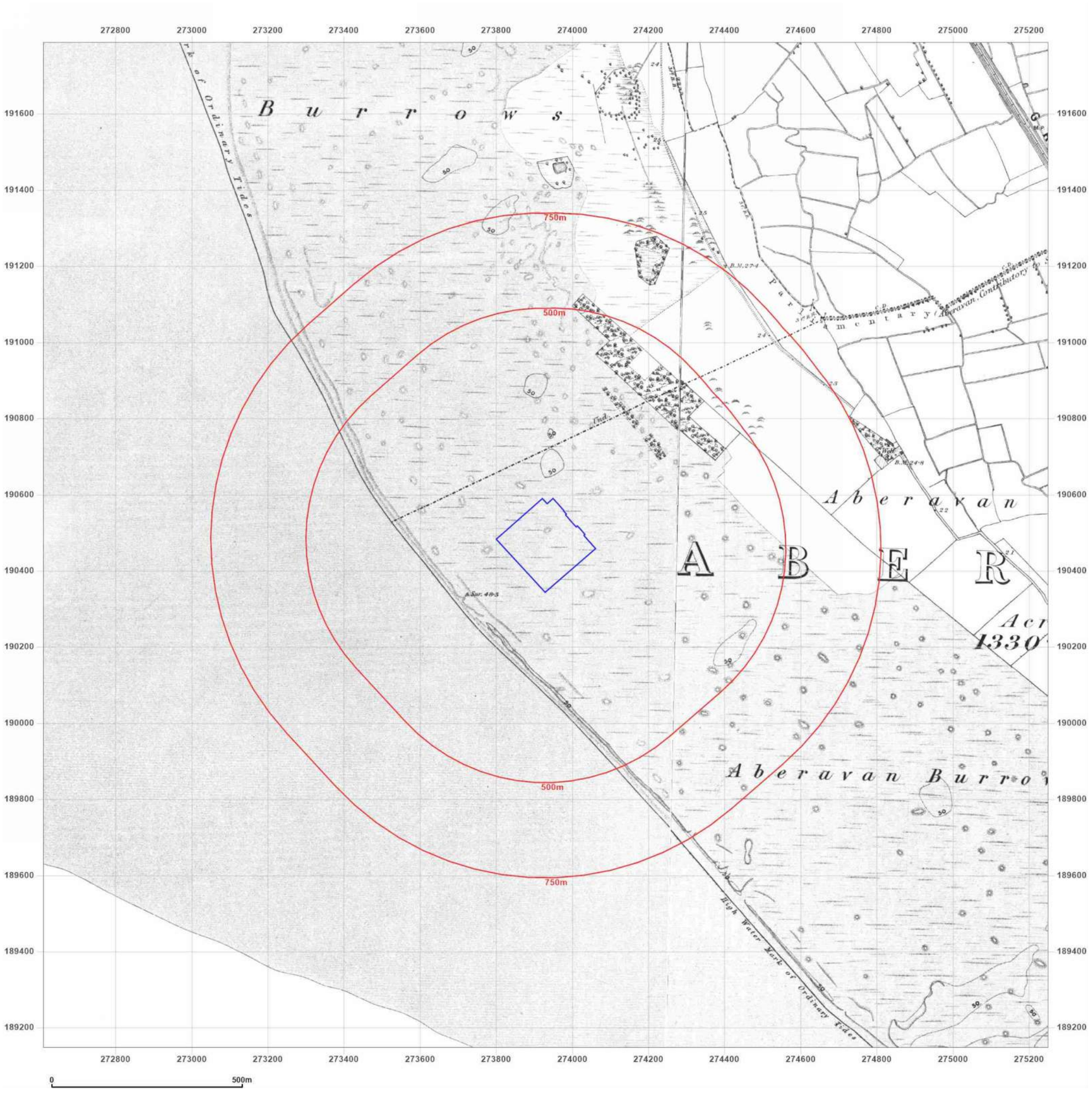
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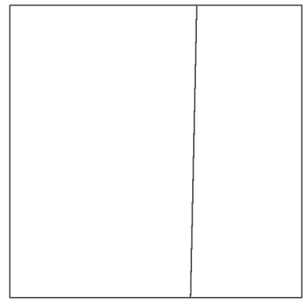
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Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: County Series
Map date: **1884**
Scale: 1:10,560
Printed at: 1:10,560

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Surveyed N/A
Revised N/A
Edition 1884
Copyright N/A
Levelled N/A

Surveyed 1877
Revised N/A
Edition 1884
Copyright N/A
Levelled N/A



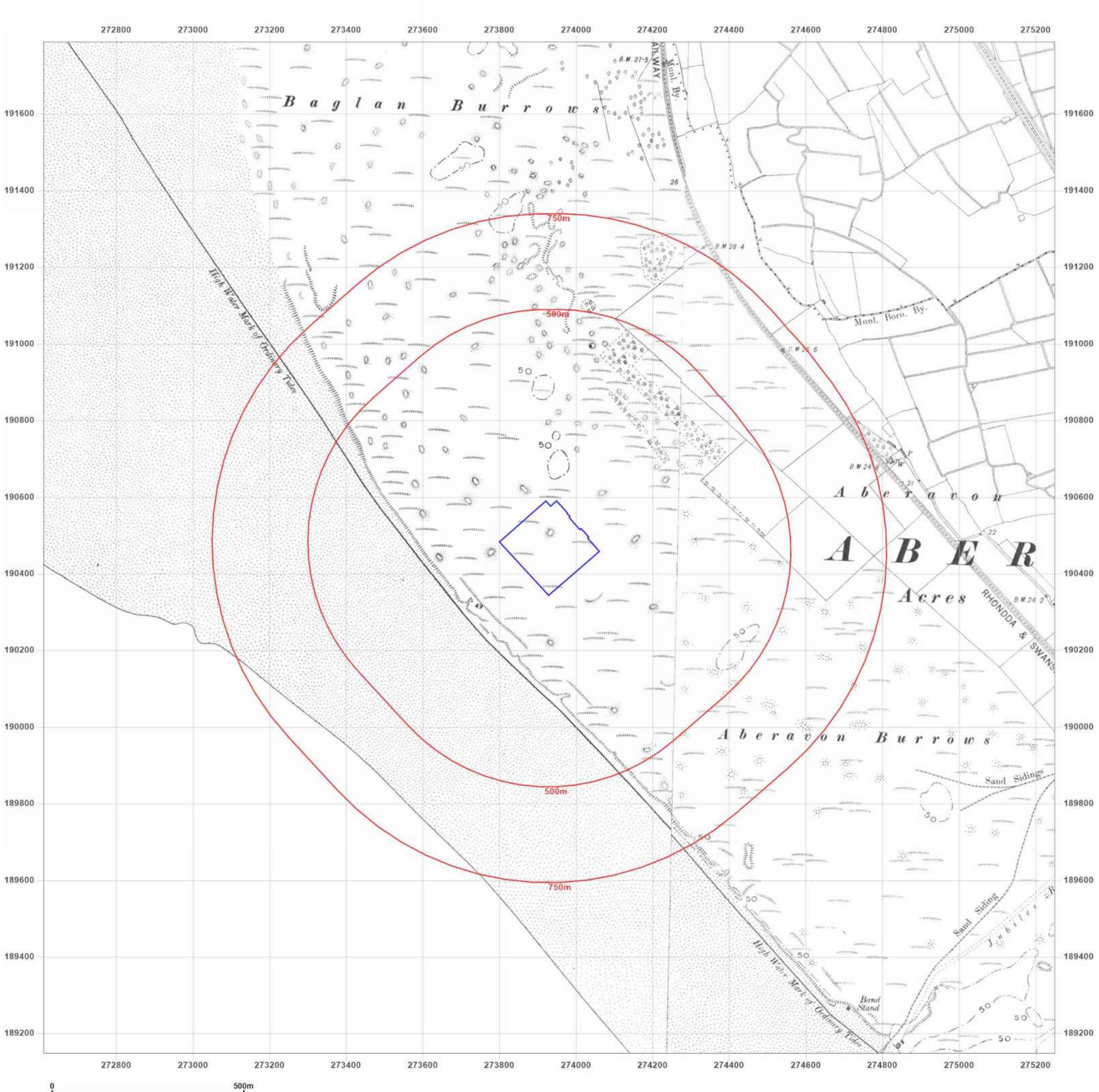
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: County Series

Map date: **1897**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1877
Revised 1897
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1876
Revised 1897
Edition N/A
Copyright N/A
Levelled N/A

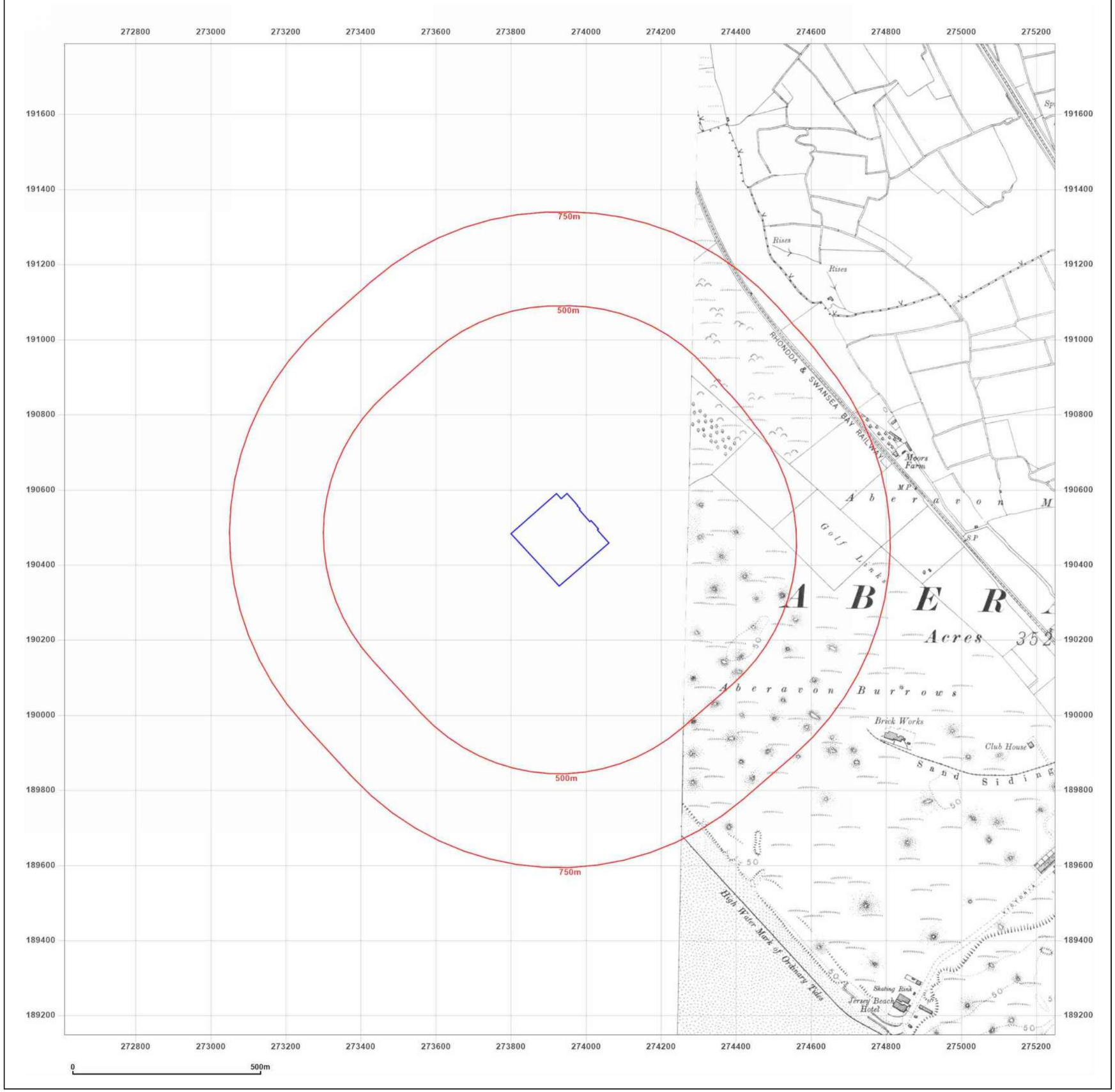
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

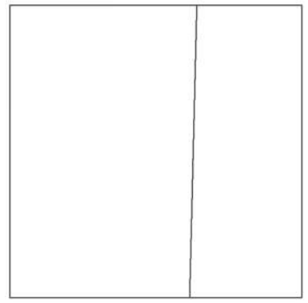
Map Name: County Series

Map date: **1914**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1875
Revised 1914
Edition N/A
Copyright N/A
Levelled N/A

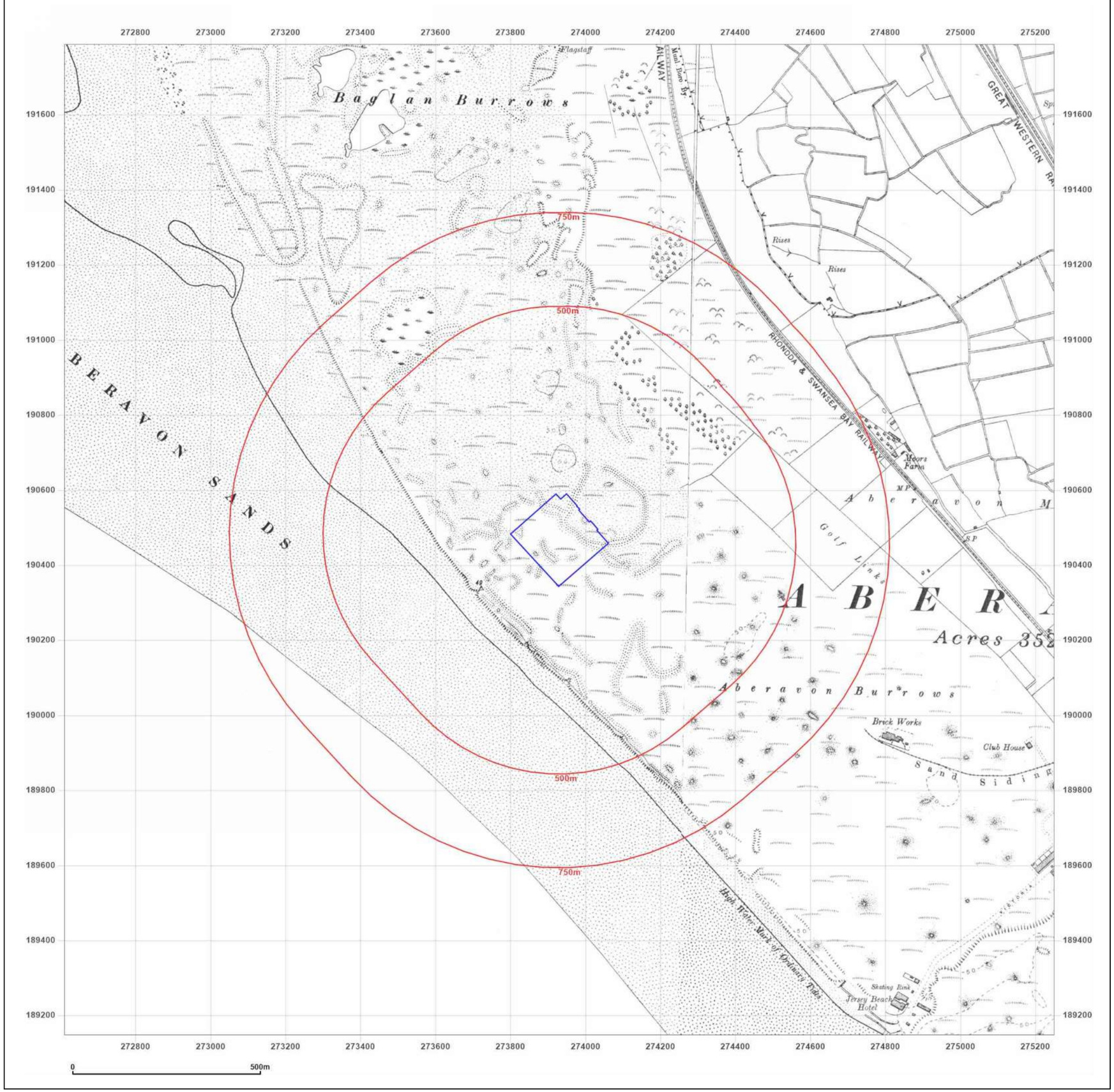
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: County Series

Map date: **1921**

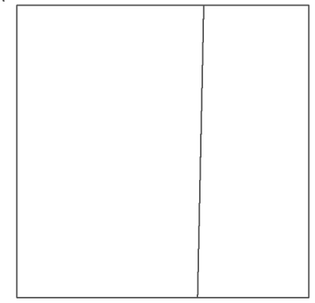
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Printed at: 1:10,560

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Surveyed 1877
Revised 1921
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1921
Edition N/A
Copyright N/A
Levelled N/A



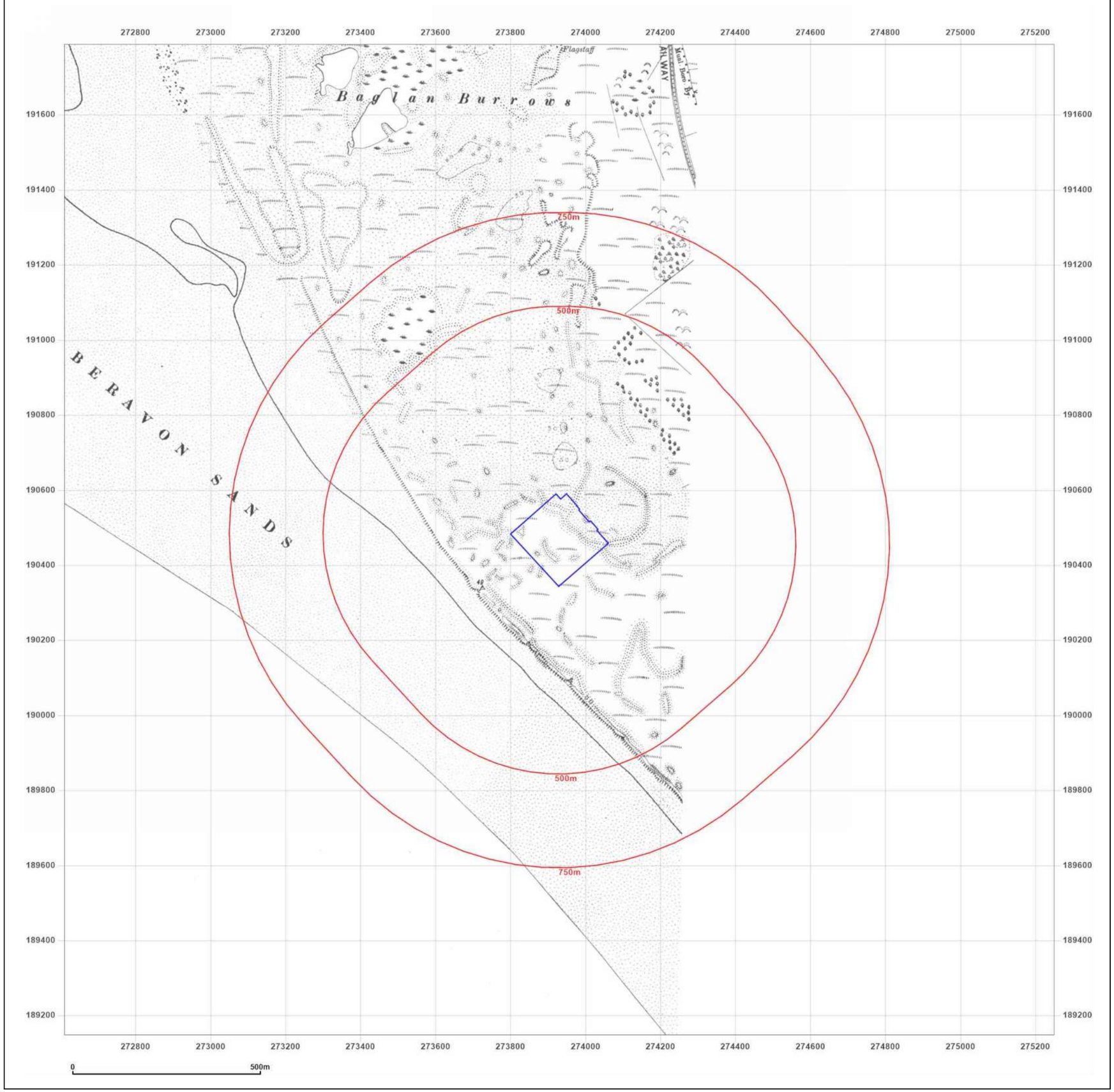
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Client Ref: 7016582
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Grid Ref: 273929, 190467

Map Name: County Series

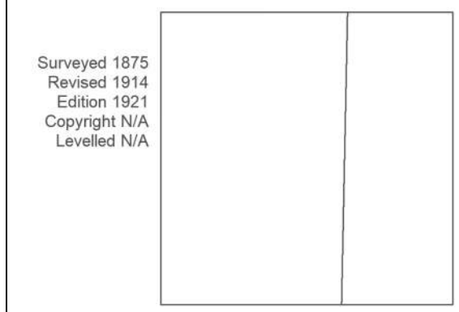
Map date: **1921**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1875
Revised 1914
Edition 1921
Copyright N/A
Levelled N/A



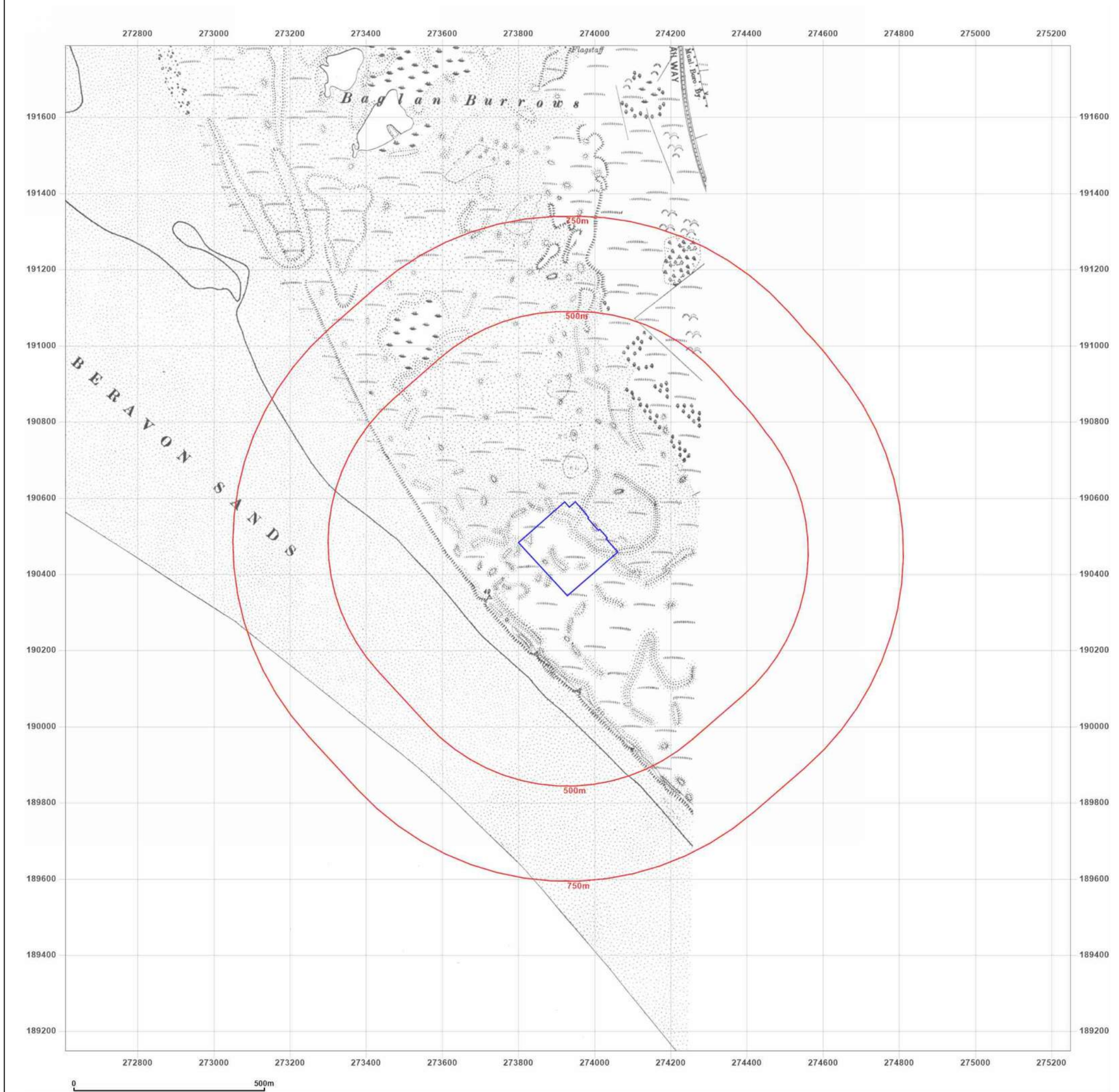
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: County Series

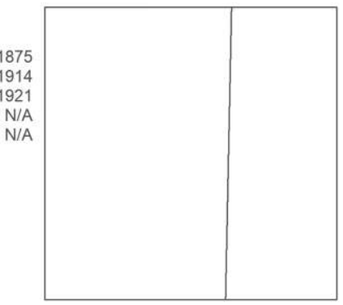
Map date: **1921**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1875
Revised 1914
Edition 1921
Copyright N/A
Levelled N/A



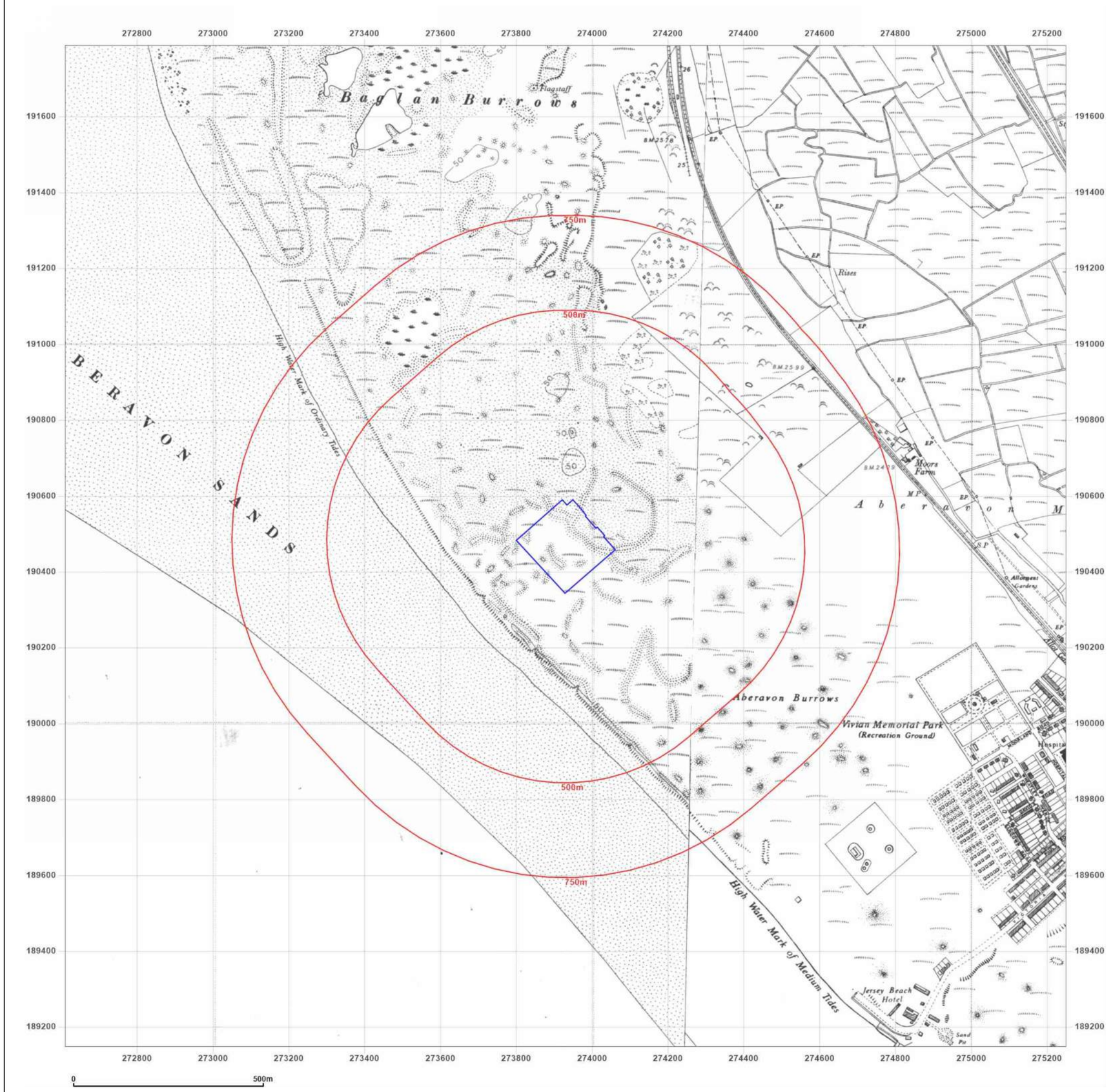
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: County Series

Map date: **1947**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1875
Revised 1947
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1947
Edition N/A
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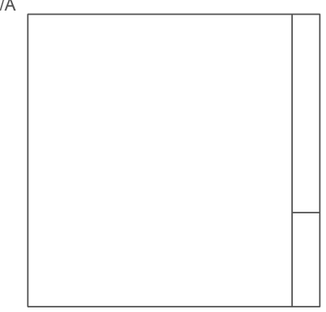
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Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: Provisional
Map date: **1957-1962**
Scale: 1:10,560
Printed at: 1:10,560

N
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Surveyed 1962
Revised 1962
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A



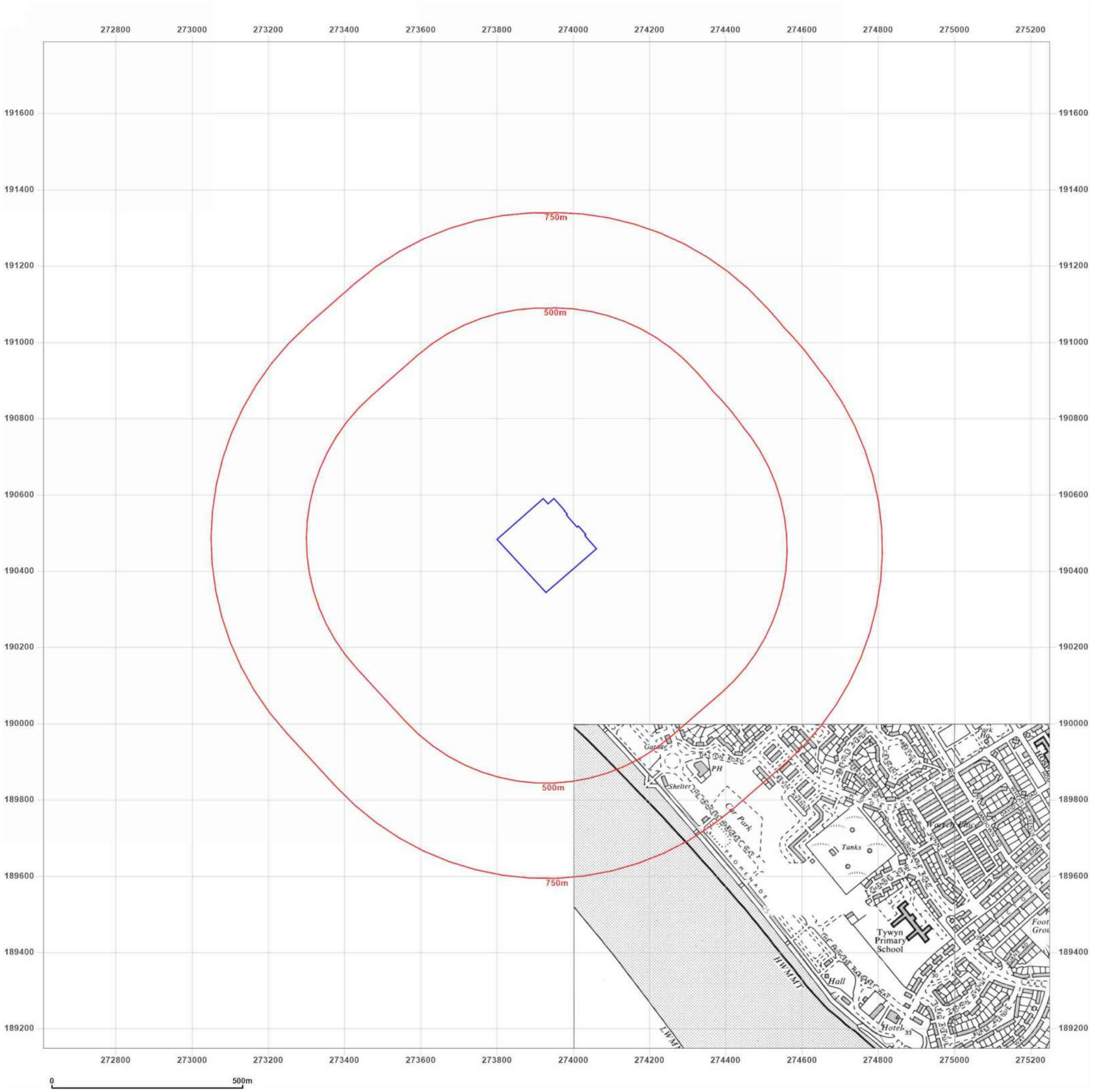
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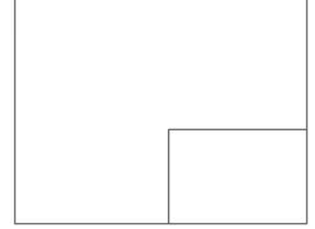
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: Provisional
Map date: **1965**
Scale: 1:10,560
Printed at: 1:10,560

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Surveyed 1965
Revised 1965
Edition N/A
Copyright N/A
Levelled N/A

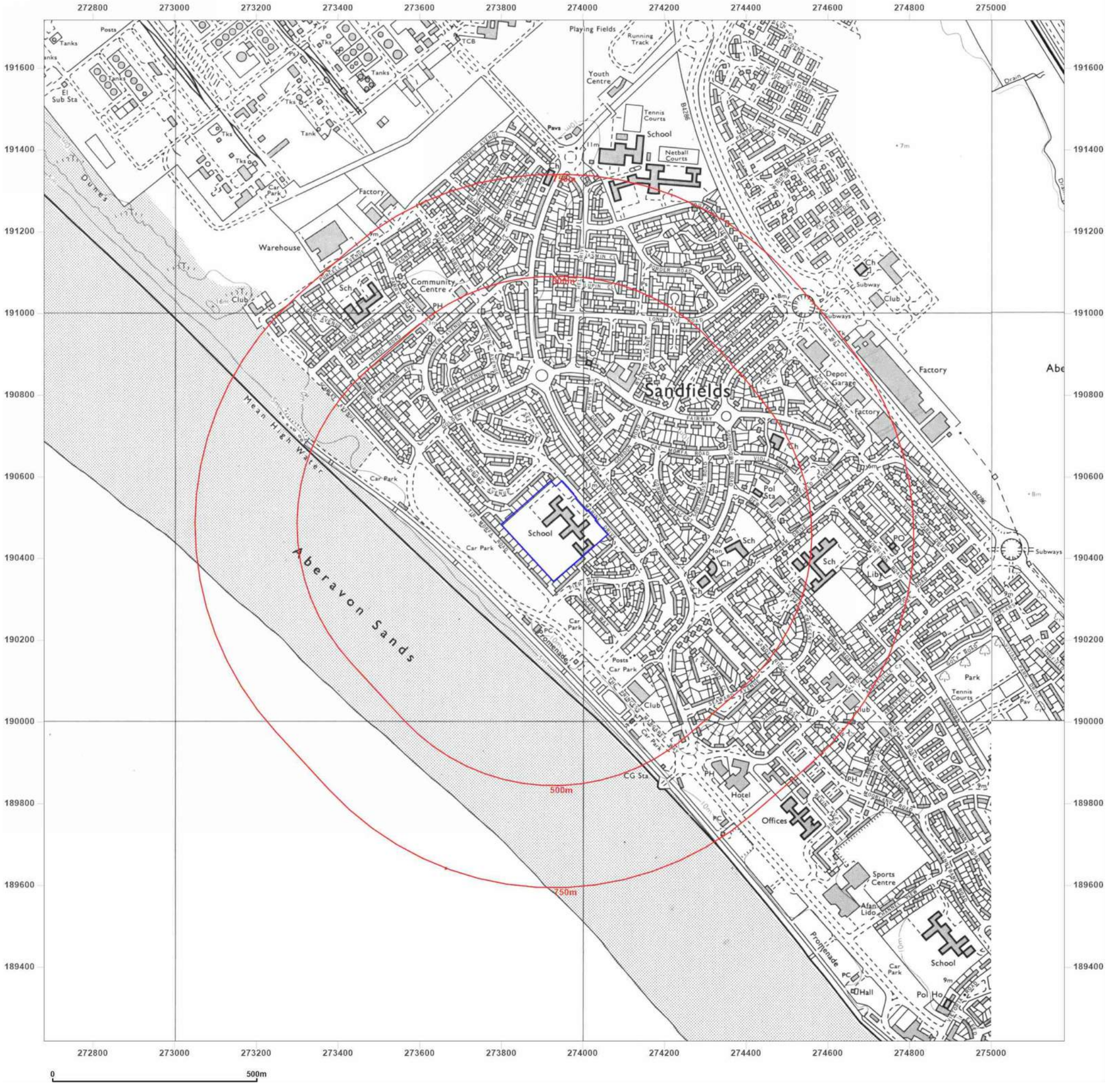
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid

Map date: **1980**

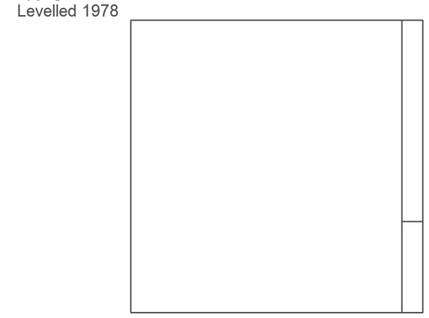
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Printed at: 1:10,000

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Surveyed 1977
Revised 1979
Edition N/A
Copyright 1980
Levelled 1978

Surveyed 1977
Revised 1979
Edition N/A
Copyright 1980
Levelled 1978



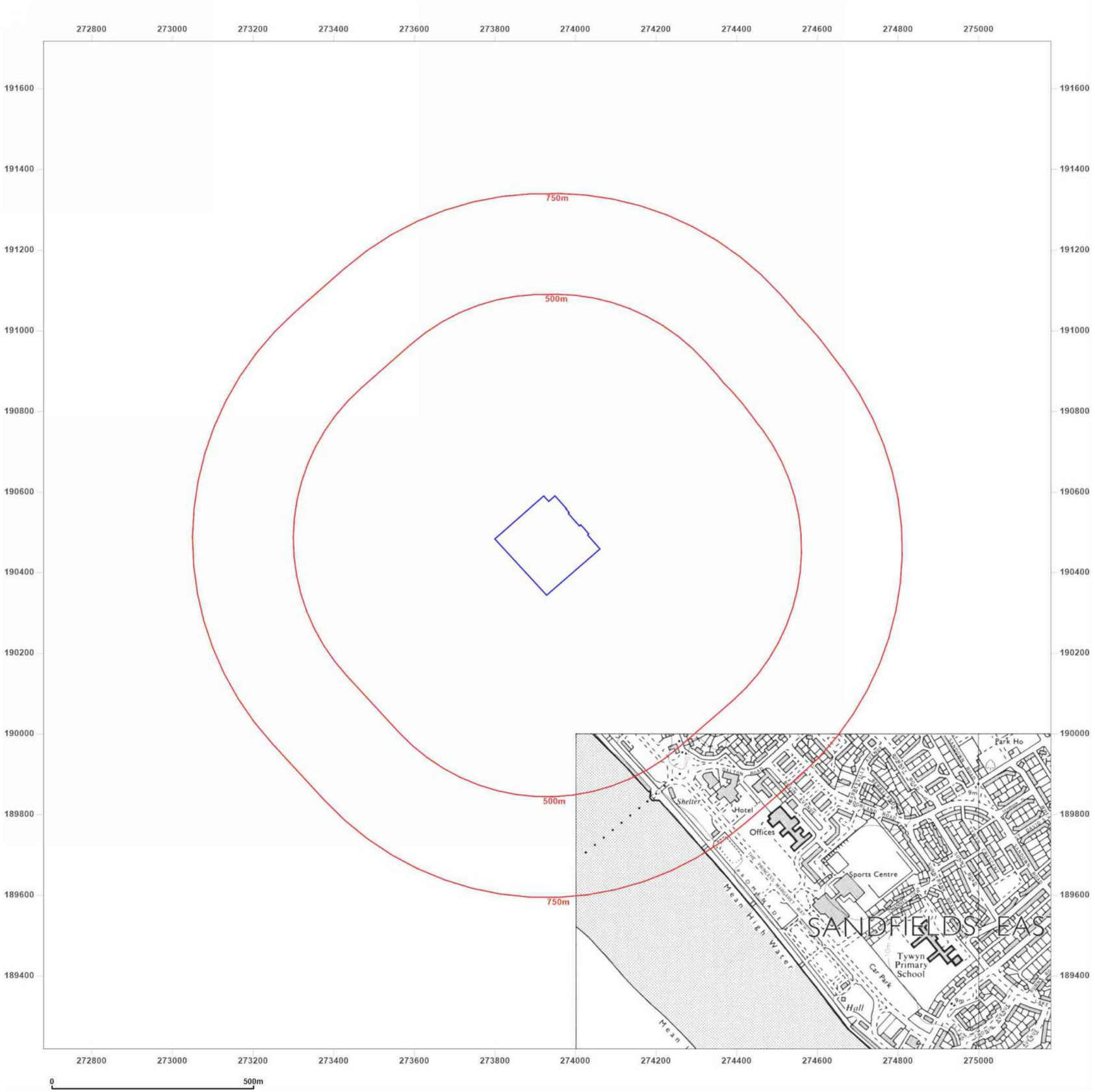
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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1982**
Scale: 1:10,000
Printed at: 1:10,000

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Surveyed 1977
Revised 1982
Edition N/A
Copyright 1982
Levelled 1978

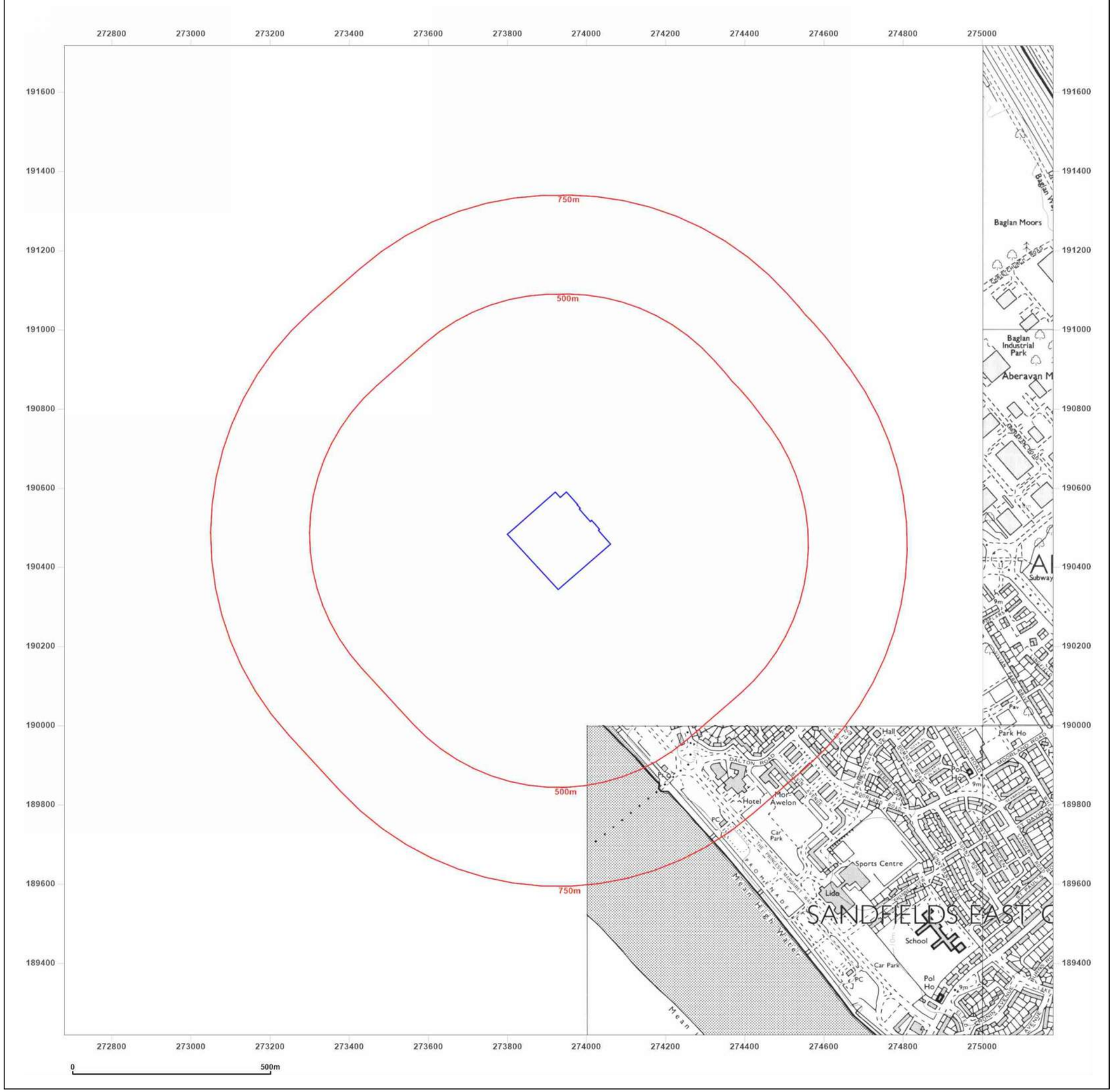
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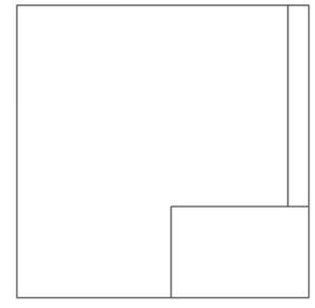
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RHOSAFAN WELSH PRIMARY SCHOOL, MARINE DRIVE, SANDFIELDS, NEATH PORT TALBOT, SA12 7NN

Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **1993-1995**
Scale: 1:10,000
Printed at: 1:10,000

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Site Details:

RHOSAFAN WELSH PRIMARY SCHOOL, MARINE DRIVE, SANDFIELDS, NEATH PORT TALBOT, SA12 7NN

Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid

Map date: **2001**

Scale: 1:10,000

Printed at: 1:10,000

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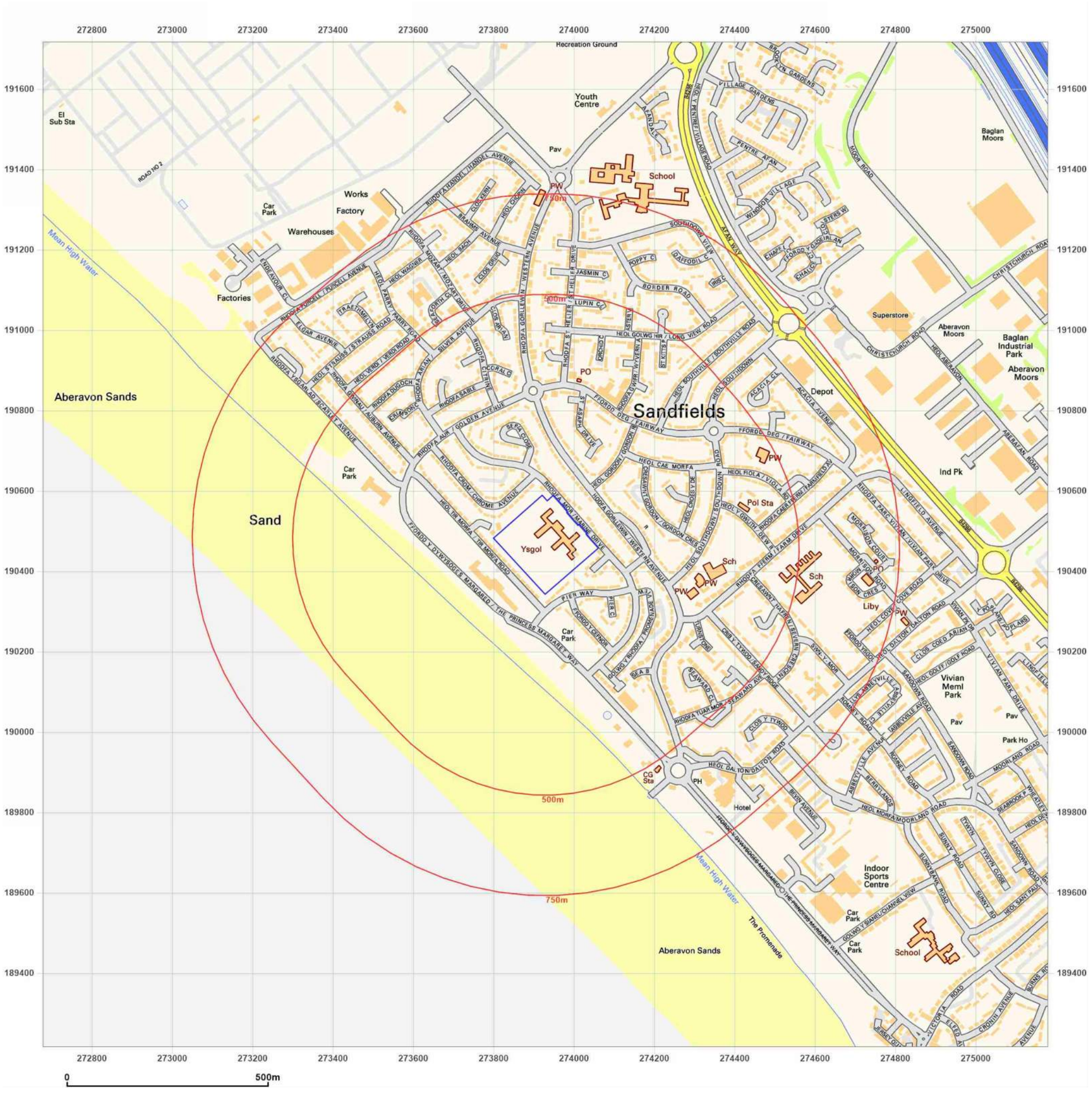
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Groundsure INSIGHTS

Site Details:

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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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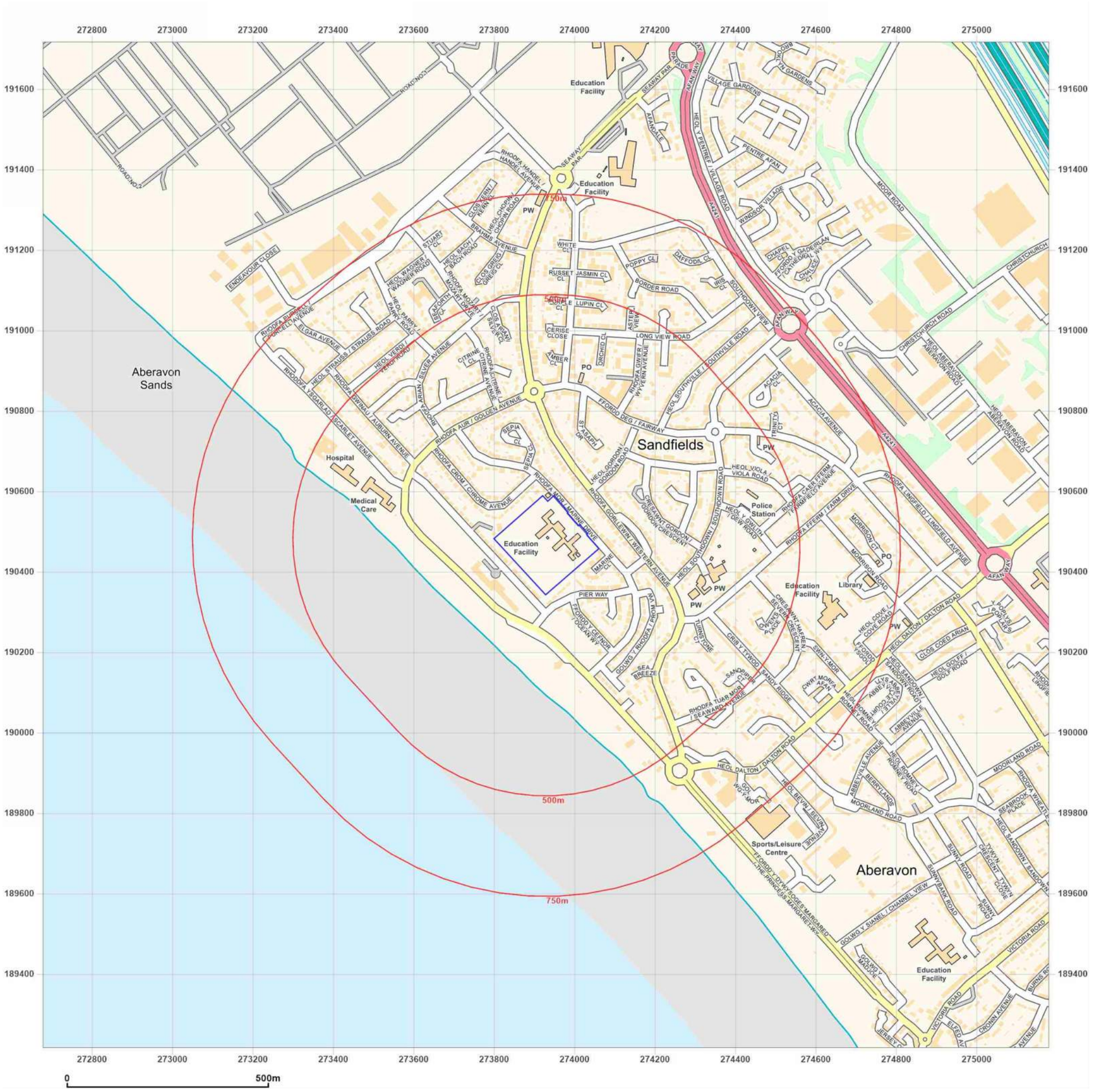
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Groundsure INSIGHTS

Site Details:

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Client Ref: 7016582
Report Ref: GS-LVP-Q38-QHI-UAQ
Grid Ref: 273929, 190467

Map Name: National Grid
Map date: **2024**
Scale: 1:10,000
Printed at: 1:10,000

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Map legend available at:
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APPENDIX C: EXPLORATORY HOLE LOGS

TETRA TECH

Project: YGG_Rhosafan

Location: Port Talbot

Client: Morgan Sindall

Location Details

Easting: 273930.30 Northing: 190467.28

Level: 10.92mAOD Depth: 10.00m

Logger: SP Type: CP

Inclination: 90°

Status

DRAFT

Borehole Number

BH01

Sheet 1 of 1

Method, Plant and Crew

From (m)	To (m)	Type	Plant Used	Crew
0.00	10.00	Cable Percussion		MM

Diameter

Depth (m)	Diam (mm)
10.00	200

Casing

Depth(m)	Diam (mm)
10.00	200

Drilling Progress by Time

Date	Time	Depth (m)	Casing (m)	Water (m)
14/08	11:00	0.00	0.00	
14/08	17:00	6.70	7.00	5.45
15/08	08:00	6.70	7.00	8.4
15/08	08:20	6.70	7.00	6.7
15/08	14:00	10.00	10.00	6.7

Scale: 1:50

Checked By: PV

Approved By: SR

Start Date: 14/08/2024

Finish Date: 15/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.		0.20	10.72			0.20 - 1.20	B1	
Medium dense light brown and yellowish brown fine to coarse SAND.						0.50	ES1	
						1.20	B3	SPT(S) 1.20m, N=16 (1,2/2,4,5,5)
						1.20 - 1.65	D1	
						1.20 - 2.20	B2	
						1.50	ES2	
						2.20 - 2.65	D2	SPT(S) 2.20m, N=16 (3,4/3,4,4,5)
						2.20 - 3.20	B3	
						2.50	ES3	
						3.20 - 3.65	D3	SPT(S) 3.20m, N=21 (2,4/5,5,5,6)
						3.20 - 4.20	B4	
						4.20 - 4.65	D4	SPT(S) 4.20m, N=24 (3,3/5,6,6,7)
						4.20 - 5.20	B5	
						4.50	ES4	
						5.20 - 5.65	D5	SPT(S) 5.20m, N=27 (4,4/6,7,7,7)
						5.20 - 6.70	B6	
				▼		6.70 - 7.15	D6	SPT(S) 6.70m, N=21 (3,4/4,5,5,7)
						6.70 - 8.20	B7	
						8.20 - 8.40	B8	SPT(C) 8.20m, N=29 (4,5/7,7,7,8)
				▼				
Medium dense greyish brown locally silty fine to coarse SAND.		8.40	2.52			8.40 - 10.00	B9	SPT(C) 8.40m, N=21 (3,3/5,4,6,6)
EOH at 10.00m - Required depth.		10.00	0.92			10.00 - 10.45	D7	SPT(S) 10.00m, N=8 (1,1/2,1,2,3)

Observations / Remarks

Chiselling

From (m)	To (m)	Time (mins)

Water Added

From (m)	To (m)

Hammer Information

Serial No.	Energy Ratio %
AP2	76

Groundwater

Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks
6.70	-	-	0	0.00	
8.40	-	-	0	0.00	

Project Number

784-B068544

TETRA TECH

Project: YGG_Rhosafan

Location: Port Talbot

Client: Morgan Sindall

Location Details

Easting: 273864.17 Northing: 190477.76

Level: 11.10mAOD Depth: 10.00m

Logger: SP Type: CP

Inclination: 90°

Status

DRAFT

Borehole Number

BH02

Sheet 1 of 1

Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time				
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)
0.00	10.00	Cable Percussion		MM	10.00	200	10.00	200	13/08 13/08 14/08 14/08	08:00 17:00 08:00 10:00	0.00 8.00 8.00 10.00	0.00 8.00 8.00 8.00	 6.3 5.32 5.32

Scale: 1:50

Checked By: PV

Approved By: SR

Start Date: 13/08/2024

Finish Date: 14/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.								
		0.30	10.80			0.30 - 1.00 0.40	B1 ES1	
Medium dense light brown and yellowish brown fine to coarse SAND.						1.00 1.00 - 1.20 1.20 - 1.65 1.20 - 2.20	ES2 B2 D1 B3	SPT(S) 1.20m, N=22 (2,4/4,6,7,5)
						2.00 2.20 2.20 - 2.65 2.20 - 3.20	ES3 B6 D2 B4	SPT(S) 2.20m, N=26 (1,5/5,7,7,7)
						3.00 3.20 - 3.65 3.20 - 4.20	ES4 D3 B5	SPT(S) 3.20m, N=27 (3,5/7,6,7,7)
						4.20 - 4.65 4.20 - 5.20	D4 B6	SPT(S) 4.20m, N=27 (4,6/8,6,6,7)
				▼		5.20 - 5.65 5.20 - 6.70	D5 B7	SPT(S) 5.20m, N=50 (7,9/18,14,15,3)
@5.50m bgl: Very dense.								
						6.70 - 7.15 6.70 - 8.20	D6 B8	SPT(S) 6.70m, N=20 (2,2/3,5,6,6)
@8.20-10.0m bgl: Dense.						8.20 - 10.00 8.20 - 8.65	B9 D7	SPT(S) 8.20m, N=38 (4,4/8,10,10,10)
EOH at 10.00m - Required depth.		10.00	1.10			10.00 - 10.45	D8	SPT(S) 10.00m, N=37 (5,7/8,10,9,10)

Observations / Remarks

Chiselling

From (m)	To (m)	Time (mins)

Water Added

From (m)	To (m)

Hammer Information

Serial No.	Energy Ratio %
AP2	76

Groundwater

Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks
5.32	-	-	0	0.00	

Project Number

784-B068544

TETRA TECH

Project: YGG_Rhosafan

Location: Port Talbot

Client: Morgan Sindall

Location Details

Easting: 273892.32 Northing: 190445.41

Level: 11.13mAOD Depth: 10.00m

Logger: SP Type: CP

Inclination: 90°

Status

DRAFT

Borehole Number

BH03

Sheet 1 of 1

Method, Plant and Crew

From (m)	To (m)	Type	Plant Used	Crew
0.00	10.00	Cable Percussion		MM

Diameter

Depth (m)	Diam (mm)
10.00	200

Casing

Depth(m)	Diam (mm)
10.00	200

Drilling Progress by Time

Date	Time	Depth (m)	Casing (m)	Water (m)
15/08	15:00	0.00	0.00	
15/08	17:00	2.20	2.20	
16/08	08:00	2.20	2.20	
16/08	16:40	10.00	10.00	8.7
16/08	17:00	10.00	10.00	5.8

Scale: 1:50

Checked By: PV

Approved By: SR

Start Date: 15/08/2024

Finish Date: 19/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.		0.20	10.93			0.30 - 1.20	B1	
MADE GROUND: Greyish brown and locally black gravelly slightly clayey locally clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular sandstone, mudstone, coal, slag and clinker.						0.50	ES1	
		0.60	10.53					
Medium dense light brown and yellowish brown fine to coarse SAND.						1.20	B3	SPT(S) 1.20m, N=19 (1,2/4,5,4,6)
						1.20 - 1.65	D1	
						1.20 - 2.20	B2	
						1.50	ES2	
						2.20 - 2.65	D2	SPT(S) 2.20m, N=13 (2,2/2,3,4,4)
						2.20 - 3.20	B3	
						2.50	ES3	
				▼		3.20 - 3.65	D3	SPT(S) 3.20m, N=15 (1,0/4,3,4,4)
						3.20 - 4.20	B4	
						4.20 - 4.65	D4	SPT(S) 4.20m, N=24 (4,5/5,6,6,7)
						4.20 - 5.20	B5	
						5.20 - 5.65	D5	SPT(S) 5.20m, N=22 (2,3/4,6,6,6)
						5.20 - 6.70	B6	
						5.50	ES4	
				▼				
						6.70 - 7.15	D6	SPT(S) 6.70m, N=25 (2,4/5,5,7,8)
						6.70 - 8.20	B7	
						8.20 - 8.70	B8	SPT(C) 8.20m, N=18 (3,2/3,4,5,6)
Dense greyish brown locally silty fine to coarse SAND.		8.60	2.53	▼		8.70 - 10.00	B9	SPT(S) 8.70m, N=38 (4,3/7,9,10,12)
						8.70 - 9.15	D7	
EOH at 10.00m - Required depth.		10.00	1.13					SPT(C) 10.00m, N=36 (5,6/8,9,9,10)

Observations / Remarks

Chiselling

From (m)	To (m)	Time (mins)

Water Added

From (m)	To (m)

Hammer Information

Serial No.	Energy Ratio %
AP2	76

Groundwater

Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks
2.90	-	-	0	0.00	
5.80	-	-	0	0.00	
8.70	-	-	0	0.00	

Project Number

784-B068544

TETRA TECH

Project: YGG_Rhosafan

Location: Port Talbot

Client: Morgan Sindall

Location Details

Easting: 273926.41 Northing: 190408.05

Level: 11.14mAOD Depth: 10.00m

Logger: SP Type: CP

Inclination: 90°

Status

DRAFT

Borehole Number

BH04

Sheet 1 of 1

Method, Plant and Crew				
From (m)	To (m)	Type	Plant Used	Crew
0.00	10.00	Cable Percussion		MM

Diameter	
Depth (m)	Diam (mm)
10.00	200

Casing	
Depth(m)	Diam (mm)
10.00	200

Drilling Progress by Time				
Date	Time	Depth (m)	Casing (m)	Water (m)
19/08	09:30	0.00	0.00	
19/08	16:30	8.20	8.00	5.7
20/08	08:00	8.20	8.00	
20/08	09:00	8.20	8.00	3.2
20/08	12:00	10.00	8.00	3.2

Scale: 1:50

Checked By: PV

Approved By: SR

Start Date: 19/08/2024

Finish Date: 20/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.		0.20	10.94			0.20 - 0.60	B1	
MADE GROUND: Black slightly sandy clayey fine to coarse angular to subangular GRAVEL of mudstone, coal, slag and clinker. Sand is fine to coarse.		0.40	10.74			0.40	ES1	
Medium dense light brown and yellowish brown fine to coarse SAND.						0.60 - 1.20	B2	
						1.20 - 1.65	D1	SPT(S) 1.20m, N=22 (2,3/5,6,5,6)
						1.20 - 2.20	B3	
						1.50	ES2	
						2.20	B6	SPT(S) 2.20m, N=16 (1,1/2,4,4,6)
						2.20 - 2.65	D2	
						2.20 - 3.20	B4	
						2.50	ES3	
@3.20m bgl: Dense.				▼		3.20 - 3.65	D3	SPT(S) 3.20m, N=30 (3,5/7,7,8,8)
						3.20 - 4.20	B5	
						3.50	ES4	
						4.20 - 4.65	D4	SPT(S) 4.20m, N=25 (4,5/5,6,6,8)
						4.20 - 5.20	B6	
@5.20m bgl: Dense.						5.20 - 5.65	D5	SPT(S) 5.20m, N=47 (3,2/6,14,13,14)
						5.20 - 6.70	B7	
@6.70m bgl: Very dense.						6.70 - 7.15	D6	SPT(S) 6.70m, N=50 (5,12/50 for 225mm)
						6.70 - 8.20	B8	
						8.20 - 8.65	D7	SPT(S) 8.20m, N=18 (2,3/3,4,5,6)
						8.20 - 8.70	B9	
Medium dense greyish brown fine to coarse SAND.		8.60	2.54			8.70 - 10.00	B10	SPT(S) 8.70m, N=17 (2,3/3,3,5,6)
						8.70 - 9.15	D8	
Medium dense greyish brown locally silty fine to coarse SAND.		9.60	1.54					
EOH at 10.00m - Required depth.		10.00	1.14			10.00 - 10.45	D9	SPT(S) 10.00m, N=25 (4,4/3,8,6,8)

Observations / Remarks

Chiselling

From (m)	To (m)	Time (mins)

Water Added

From (m)	To (m)

Hammer Information

Serial No.	Energy Ratio %
AP2	76

Groundwater

Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks
3.20	-	-	0	0.00	

Project Number

784-B068544

TETRA TECH

Project: YGG_Rhosafan	Location Details	Status	Pit Number
Location: Port Talbot	Easting: 273998.89 Northing: 190512.30	DRAFT	SA01
Client: Morgan Sindall	Level: 10.58mAOD Depth: 1.50m		Sheet 1 of 1
	Logger: TR Type: TP		

Hole Information

Pit Dimensions: 1.40m × 0.60m

Orientation: 90°
Shoring: None
Stability: Unstable
Plant: JCB 3CX

Groundwater

Strike (m)	Rose To (m)	After (mins)	Remarks

Scale: 1:25
Checked By: PV
Approved By: SR
Start Date: 14/08/2024
Finish Date: 14/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown sandy CLAY with frequent rootlets. Sand is fine to coarse.						0.10	ES1	
MADE GROUND: Brown gravelly slightly clayey fine to coarse SAND. Gravel is fine to coarse angular to subangular mudstone, brick and sandstone.		0.20	10.38			0.30	ES2	
Light brown and yellowish brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded sandstone, quartz and shell fragments.		0.35	10.24			0.35 - 1.50	B1	
						0.80	ES3	
EOH at 1.50m - Required depth.		1.50	9.09					

Observations / Remarks

1. Trial pit machine excavated to 1.50m bgl. 2. No groundwater was encountered. 3. Soakaway test undertaken at 2.00mbgl in accordance with BRE 365. Refer to soakaway sheets for results. 4. Fencing erected around pits for full duration of soakaway testing. 5. Upon completion exploratory hole backfilled with arisings.

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Project Number

784-B068544

TETRA TECH

Project: YGG_Rhosafan	Location Details	Status	Pit Number
Location: Port Talbot	Easting: 273953.31 Northing: 190544.75	DRAFT	SA02
Client: Morgan Sindall	Level: 10.91mAOD Depth: 1.50m		Sheet 1 of 1
	Logger: TR Type: TP		

Hole Information

Pit Dimensions: 1.70m × 0.60m

Orientation: 180°
Shoring: None
Stability: Unstable
Plant: JCB 3CX

Groundwater

Strike (m)	Rose To (m)	After (mins)	Remarks

Scale: 1:25
Checked By: PV
Approved By: SR
Start Date: 12/08/2024
Finish Date: 12/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft dark brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.						0.20 0.20	B1 ES1	
		0.20	10.71					
Light brownish yellow fine to coarse SAND.						0.50	ES2	
						1.20	ES3	
EOH at 1.50m - Required depth.		1.50	9.41					

Observations / Remarks

1. Trial pit machine excavated to 1.50m bgl. 2. No groundwater was encountered. 3. Soakaway test undertaken at 2.00mbgl in accordance with BRE 365. Refer to soakaway sheets for results. 4. Fencing erected around pits for full duration of soakaway testing. 5. Upon completion exploratory hole backfilled with arisings.

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Project Number

784-B068544

TETRA TECH

Project: YGG_Rhosafan	Location Details	Status	Pit Number
Location: Port Talbot	Easting: 273903.20 Northing: 190570.53	DRAFT	SA03
Client: Morgan Sindall	Level: 10.70mAOD Depth: 1.50m		Sheet 1 of 1
	Logger: SP Type: TP		

Hole Information

Pit Dimensions: 1.80m × 0.60m

Orientation: 90°
Shoring: None
Stability: Unstable
Plant: JCB 3CX

Groundwater

Strike (m)	Rose To (m)	After (mins)	Remarks

Scale: 1:25
Checked By: PV
Approved By: SR
Start Date: 12/08/2024
Finish Date: 12/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.						0.10	ES1	
MADE GROUND: Light brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular mudstone, brick, coal, slag and clinker.		0.25	10.45			0.25 - 0.60	B1	
						0.50	ES2	
MADE GROUND: Firm black slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular mudstone, coal, slag and clinker.		0.60	10.10			0.70	ES3	
Light brown and yellowish brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded sandstone, quartz and shell fragments.		0.75	9.95			0.75 - 1.50	B2	
						1.20	ES4	
EOH at 1.50m - Required depth.		1.50	9.20					

Observations / Remarks

1. Trial pit machine excavated to 1.50m bgl. 2. No groundwater was encountered. 3. Soakaway test undertaken at 2.00mbgl in accordance with BRE 365. Refer to soakaway sheets for results. 4. Fencing erected around pits for full duration of soakaway testing. 5. Upon completion exploratory hole backfilled with arisings.

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029 2082 9200

Project Number

784-B068544

TETRA TECH

Project: YGG_Rhosafan	Location Details	Status	Pit Number
Location: Port Talbot	Easting: 273879.14 Northing: 190550.36	DRAFT	SA04
Client: Morgan Sindall	Level: 10.70mAOD Depth: 1.50m		Sheet 1 of 1
	Logger: TR Type: TP		

Hole Information

Pit Dimensions: 1.75m × 0.60m

Orientation: 90°
Shoring: None
Stability: Unstable
Plant: JCB 3CX

Groundwater

Strike (m)	Rose To (m)	After (mins)	Remarks

Scale: 1:25
Checked By: PV
Approved By: SR
Start Date: 12/08/2024
Finish Date: 12/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown mottled light brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.		0.20	10.50			0.20	ES1	
Yellowish brown fine to coarse SAND.						0.50	ES2	
						1.20	ES3	
EOH at 1.50m - Required depth.		1.50	9.20					

Observations / Remarks

1. Trial pit machine excavated to 1.50m bgl. 2. No groundwater was encountered. 3. Soakaway test undertaken at 2.00mbgl in accordance with BRE 365. Refer to soakaway sheets for results. 4. Fencing erected around pits for full duration of soakaway testing. 5. Upon completion exploratory hole backfilled with arisings.

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Project Number
784-B068544

TETRA TECH

Project: YGG_Rhosafan
Location: Port Talbot
Client: Morgan Sindall

Location Details
Easting: 273847.07 Northing: 190506.97
Level: 10.82mAOD Depth: 1.50m
Logger: TR Type: TP

Status: DRAFT

Pit Number: SA05

Sheet 1 of 1

Hole Information

Pit Dimensions: 1.70m x 0.60m
Orientation: 180°
Shoring: None
Stability: Unstable
Plant: JCB 3CX

Groundwater

Strike (m)	Rose To (m)	After (mins)	Remarks

Scale: 1:25
Checked By: PV
Approved By: SR
Start Date: 12/08/2024
Finish Date: 12/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown slightly gravelly sandy CLAY with frequent rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subangular brick, sandstone and mudstone.		0.20	10.62			0.20 - 0.70	B1	
MADE GROUND: Brown and greyish yellow gravelly fine to coarse SAND with low cobble and boulder content. Gravel is fine to coarse angular to subangular brick, coal, mudstone, slag and sandstone. Cobbles and boulders are angular to subangular brick and concrete.						0.30	ES1	
MADE GROUND: Black sandy slightly clayey fine to coarse angular to subangular GRAVEL of mudstone, coal, slag, and clinker. Sand is fine to coarse.		0.70	10.12			0.70	ES2	
Yellowish brown fine to coarse SAND.		0.75	10.07			0.75 - 1.50	B2	
						1.20	ES3	
EOH at 1.50m - Required depth.		1.50	9.32					

Observations / Remarks

1. Trial pit machine excavated to 1.50m bgl. 2. No groundwater was encountered. 3. Soakaway test undertaken at 2.00mbgl in accordance with BRE 365. Refer to soakaway sheets for results. 4. Fencing erected around pits for full duration of soakaway testing. 5. Upon completion exploratory hole backfilled with arisings.

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Project Number: 784-B068544

TETRA TECH

Project: YGG_Rhosafan
Location: Port Talbot
Client: Morgan Sindall

Location Details
Easting: 273825.60 Northing: 190482.57
Level: 10.80mAOD Depth: 1.50m
Logger: TR Type: TP

Status: DRAFT

Pit Number: SA06

Sheet 1 of 1

Hole Information

Pit Dimensions: 1.50m x 0.60m
Orientation: 90°
Shoring: None
Stability: Unstable
Plant: JCB 3CX

Groundwater

Strike (m)	Rose To (m)	After (mins)	Remarks

Scale: 1:25
Checked By: PV
Approved By: SR
Start Date: 12/08/2024
Finish Date: 12/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown sandy CLAY with frequent rootlets.								
MADE GROUND: Firm black slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subangular coal, brick, slag, clinker and mudstone.		0.25	10.55			0.25 - 0.35 0.30 0.35 - 1.20	B1 ES1 B2	
Yellowish brown fine to coarse SAND.		0.35	10.45			0.70 1.20	ES2 ES3	
EOH at 1.50m - Required depth.		1.50	9.30					

Observations / Remarks

1. Trial pit machine excavated to 1.50m bgl. 2. No groundwater was encountered. 3. Soakaway test undertaken at 2.00mbgl in accordance with BRE 365. Refer to soakaway sheets for results. 4. Fencing erected around pits for full duration of soakaway testing. 5. Upon completion exploratory hole backfilled with arisings.

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Project Number: 784-B068544

TETRA TECH	Project: <* * B 5 K¥D I D Q Location: 3 R U W 7 D O E R W Client: 0 R U J D Q 6 L Q G D O O	Location Details Easting: 273860.32 Northing: 190452.82 Level: 10.93mAOD Depth: 1.70m Logger: TR Type: TP	Status DRAFT

Pit Number: 6 $ ^

Sheet 1 of 1

Hole Information

Pit Dimensions: 1.30m × 0.60m

Orientation: 90°
Shoring: None
Stability: Unstable
Plant: JCB 3CX

Groundwater

Strike (m)	Rose To (m)	After (mins)	Remarks

Scale: 1:25
Checked By: PV
Approved By: SR
Start Date: 13/08/2024
Finish Date: 13/08/2024

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
MADE GROUND: Soft brown sandy CLAY with frequent rootlets. Sand is fine to coarse.								
MADE GROUND: Brown silty fine to coarse SAND.		0.20	10.73			0.20	ES1	
MADE GROUND: Black sandy slightly clayey fine to coarse angular to subangular GRAVEL of coal, mudstone, slag and clinker. Sand is fine to coarse.		0.40	10.53			0.45 - 1.50	B1	
Yellowish brown fine to coarse SAND.		0.45	10.48			0.50	ES2	
						1.20	ES3	
EOH at 1.70m - Required depth.		1.70	9.23					

Observations / Remarks

1. Trial pit machine excavated to 1.70m bgl. 2. No groundwater was encountered. 3. Soakaway test undertaken at 2.00mbgl in accordance with BRE 365. Refer to soakaway sheets for results. 4. Fencing erected around pits for full duration of soakaway testing. 5. Upon completion exploratory hole backfilled with arisings.

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Project Number

^ · % ˇ · ˇ

APPENDIX D: TRL PROBE TEST RESULTS

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Environmental Consultancy
Ground Engineering Services

PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
FIGURE No.:	SA01

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48\text{-}1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

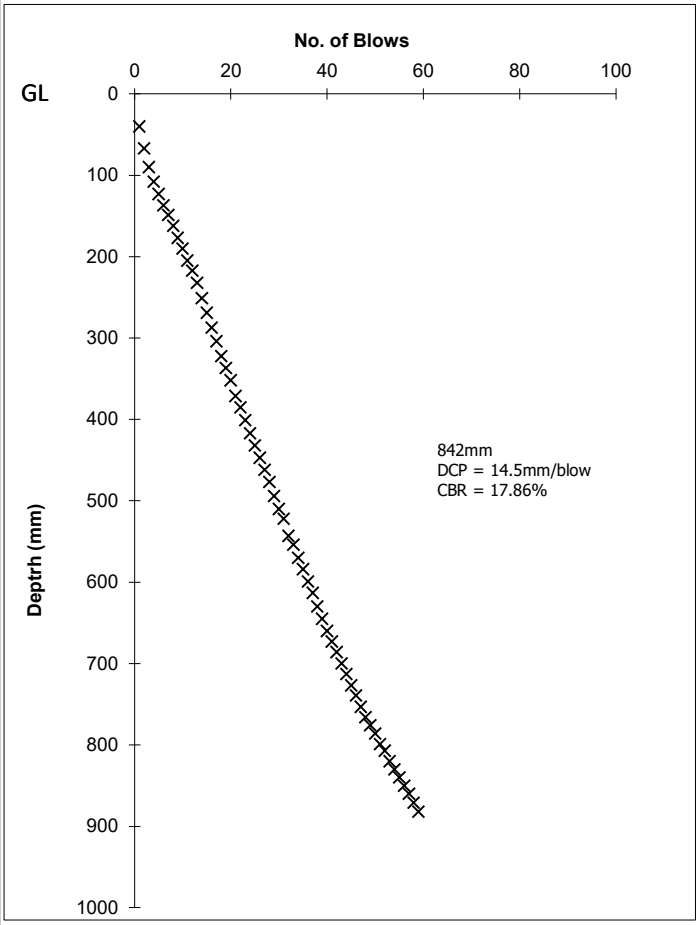
Reference: 1 Position: SA01 Date: 15 August 2024

Test started at: 0 m below ground level

Zero Reading: 53 mm

Zero reading = start depth below ground surface

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
40	1	93	40				
27	2	120	67				
23	3	143	90				
18	4	161	108				
15	5	176	123				
14	6	190	137				
12	7	202	149				
13	8	215	162				
15	9	230	177				
13	10	243	190				
15	11	258	205				
12	12	270	217				
15	13	285	232				
19	14	304	251				
18	15	322	269				
18	16	340	287				
17	17	357	304				
18	18	375	322				
15	19	390	337				
15	20	405	352				
19	21	424	371				
14	22	438	385				
16	23	454	401				
16	24	470	417				
15	25	485	432				
15	26	500	447				
15	27	515	462				
15	28	530	477				
17	29	547	494				
16	30	563	510				
12	31	575	522				
21	32	596	543				
11	33	607	554				
16	34	623	570				
14	35	637	584				
15	36	652	599				
14	37	666	613				
17	38	683	630				
15	39	698	645				
15	40	713	660				
13	41	726	673				
13	42	739	686				
14	43	753	700				
13	44	766	713				
14	45	780	727				
12	46	792	739				
14	47	806	753				
13	48	819	766				
10	49	829	776				
10	50	839	786				
13	51	852	799				
8	52	860	807				
13	53	873	820				
10	54	883	830				
10	55	893	840				
10	56	903	850				
10	57	913	860				
11	58	924	871				
11	59	935	882				



Data compiled by: TR

Data checked by: JC

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Environmental Consultancy
Ground Engineering Services

PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
FIGURE No.:	SA02

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

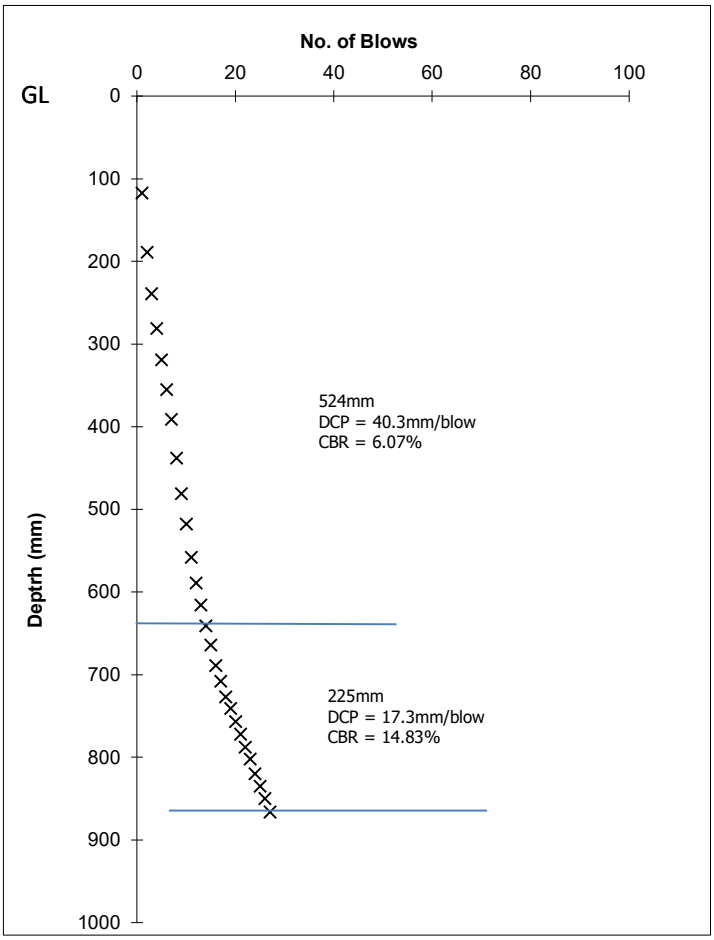
Reference: 1 Position: SA02 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
117	1	191	117				
72	2	263	189				
50	3	313	239				
42	4	355	281				
38	5	393	319				
36	6	429	355				
36	7	465	391				
47	8	512	438				
43	9	555	481				
37	10	592	518				
40	11	632	558				
31	12	663	589				
27	13	690	616				
25	14	715	641				
23	15	738	664				
25	16	763	689				
19	17	782	708				
19	18	801	727				
14	19	815	741				
16	20	831	757				
15	21	846	772				
16	22	862	788				
14	23	876	802				
18	24	894	820				
15	25	909	835				
15	26	924	850				
16	27	940	866				

Test started at: 0 m below ground level

Zero Reading: 74 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA03

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48\text{-}1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

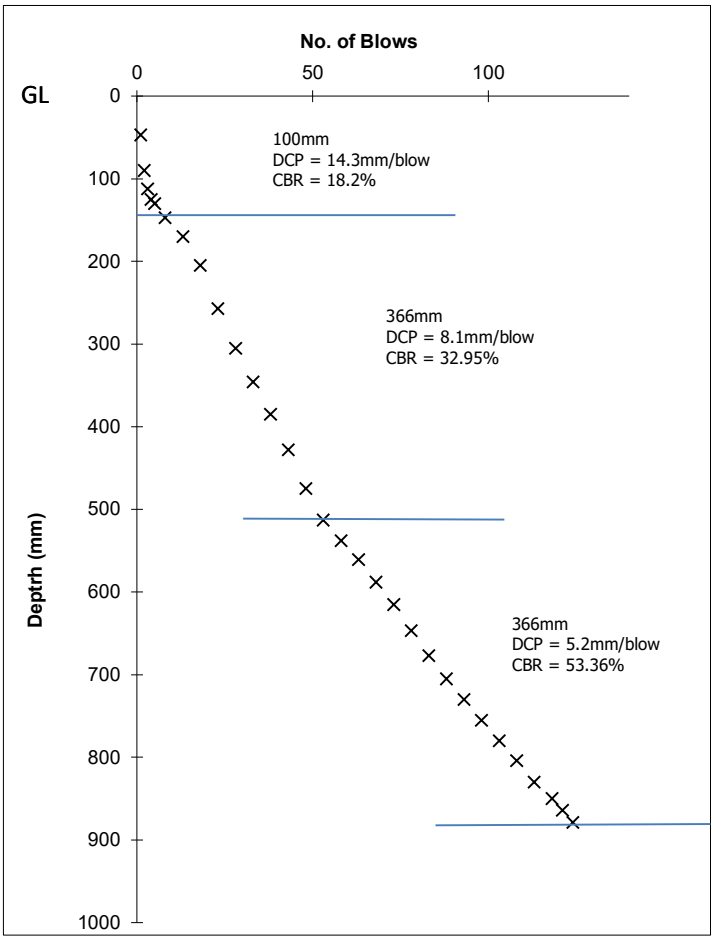
Reference: 1 Position: SA03 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
47	1	97	47				
43	2	140	90				
22	3	162	112				
13	4	175	125				
5	5	180	130				
17	8	197	147				
23	13	220	170				
35	18	255	205				
52	23	307	257				
48	28	355	305				
41	33	396	346				
39	38	435	385				
43	43	478	428				
47	48	525	475				
38	53	563	513				
25	58	588	538				
23	63	611	561				
27	68	638	588				
27	73	665	615				
32	78	697	647				
30	83	727	677				
28	88	755	705				
25	93	780	730				
25	98	805	755				
25	103	830	780				
24	108	854	804				
26	113	880	830				
20	118	900	850				
14	121	914	864				
15	124	929	879				

Test started at: 0 m below ground level

Zero Reading: 50 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA04

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

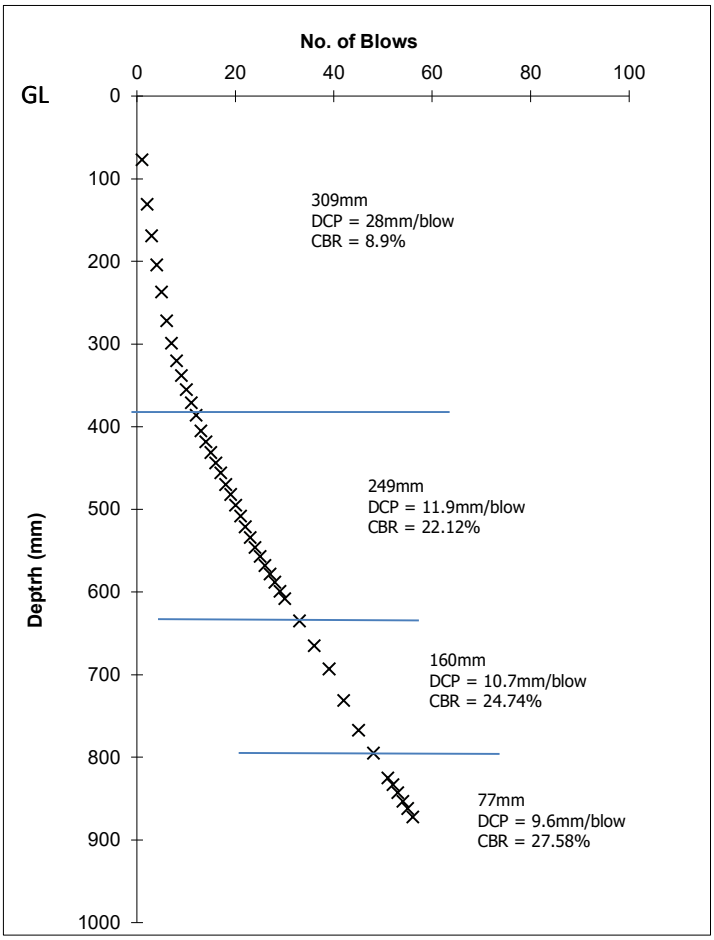
Reference: 1 Position: SA04 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
77	1	141	77				
54	2	195	131				
38	3	233	169				
35	4	268	204				
33	5	301	237				
35	6	336	272				
27	7	363	299				
21	8	384	320				
18	9	402	338				
17	10	419	355				
16	11	435	371				
15	12	450	386				
19	13	469	405				
13	14	482	418				
13	15	495	431				
13	16	508	444				
12	17	520	456				
14	18	534	470				
12	19	546	482				
13	20	559	495				
13	21	572	508				
13	22	585	521				
13	23	598	534				
12	24	610	546				
11	25	621	557				
11	26	632	568				
10	27	642	578				
10	28	652	588				
11	29	663	599				
9	30	672	608				
27	33	699	635				
30	36	729	665				
28	39	757	693				
38	42	795	731				
36	45	831	767				
28	48	859	795				
30	51	889	825				
8	52	897	833				
10	53	907	843				
10	54	917	853				
9	55	926	862				
10	56	936	872				

Test started at: 0 m below ground level

Zero Reading: 64 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA05

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

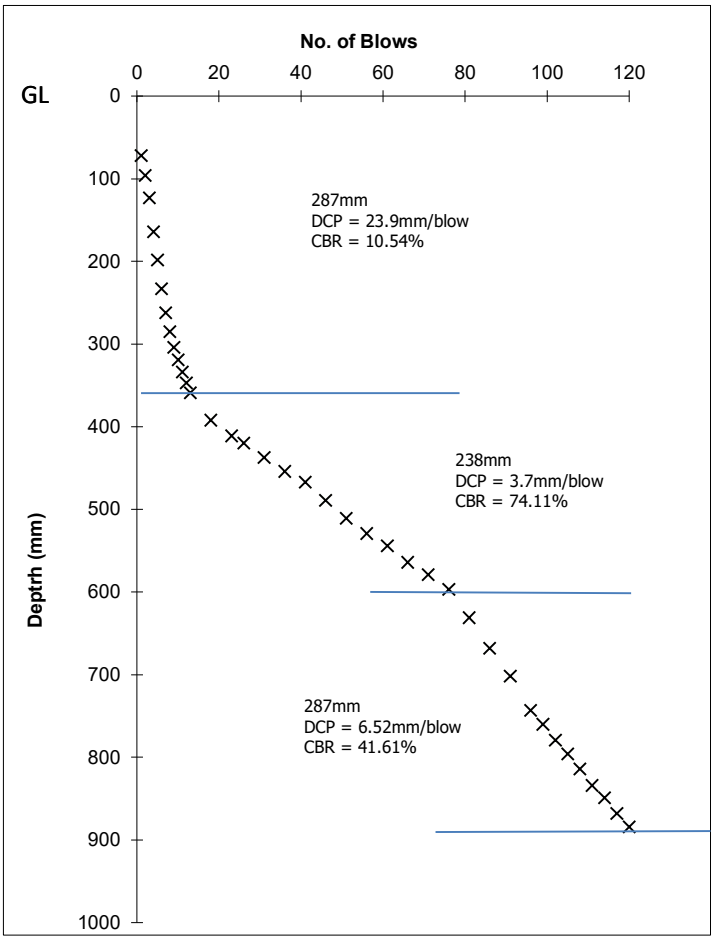
Reference: 1 Position: SA05 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
72	1	128	72				
24	2	152	96				
27	3	179	123				
41	4	220	164				
34	5	254	198				
35	6	289	233				
29	7	318	262				
23	8	341	285				
19	9	360	304				
15	10	375	319				
15	11	390	334				
13	12	403	347				
12	13	415	359				
33	18	448	392				
19	23	467	411				
9	26	476	420				
17	31	493	437				
17	36	510	454				
13	41	523	467				
22	46	545	489				
22	51	567	511				
18	56	585	529				
15	61	600	544				
20	66	620	564				
15	71	635	579				
18	76	653	597				
34	81	687	631				
37	86	724	668				
34	91	758	702				
41	96	799	743				
17	99	816	760				
19	102	835	779				
17	105	852	796				
18	108	870	814				
20	111	890	834				
15	114	905	849				
19	117	924	868				
16	120	940	884				

Test started at: 0 m below ground level

Zero Reading: 56 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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Ground Engineering Services

PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA06

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

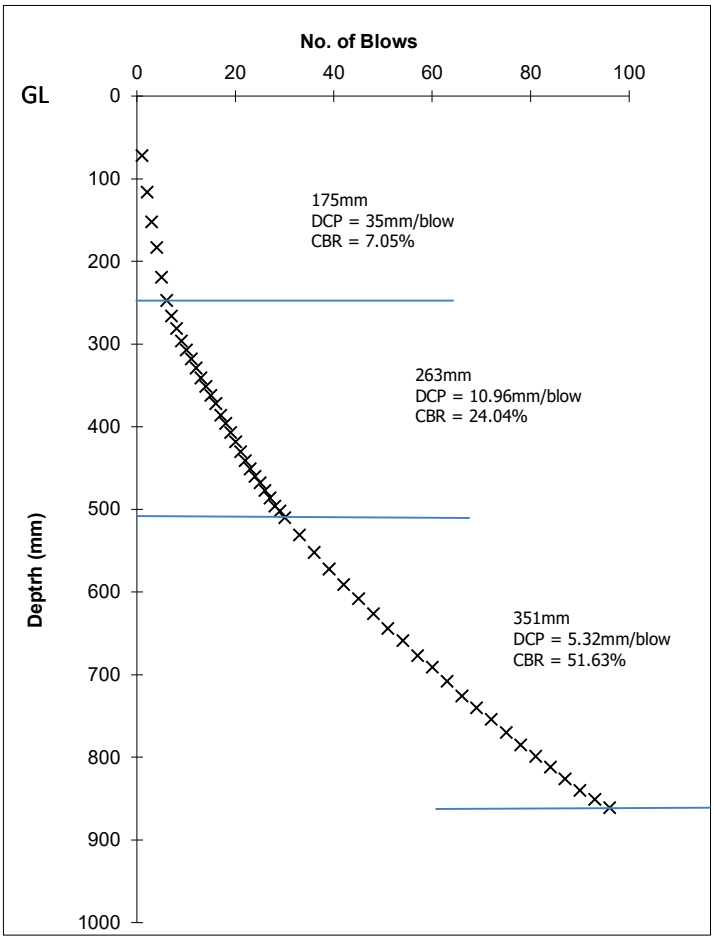
Reference: 1 Position: SA06 Date: 15 August 2024

Test started at: 0 m below ground level

Zero Reading: 63 mm

Zero reading = start depth below ground surface

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
72	1	135	72				
44	2	179	116				
36	3	215	152				
31	4	246	183				
36	5	282	219				
28	6	310	247				
19	7	329	266				
15	8	344	281				
15	9	359	296				
11	10	370	307				
11	11	381	318				
11	12	392	329				
12	13	404	341				
10	14	414	351				
11	15	425	362				
10	16	435	372				
14	17	449	386				
10	18	459	396				
11	19	470	407				
11	20	481	418				
12	21	493	430				
11	22	504	441				
10	23	514	451				
9	24	523	460				
8	25	531	468				
9	26	540	477				
9	27	549	486				
10	28	559	496				
6	29	565	502				
8	30	573	510				
21	33	594	531				
21	36	615	552				
20	39	635	572				
19	42	654	591				
17	45	671	608				
18	48	689	626				
18	51	707	644				
15	54	722	659				
18	57	740	677				
14	60	754	691				
17	63	771	708				
18	66	789	726				
14	69	803	740				
14	72	817	754				
16	75	833	770				
15	78	848	785				
14	81	862	799				
13	84	875	812				
14	87	889	826				
14	90	903	840				
11	93	914	851				
10	96	924	861				



Data compiled by: TR
Data checked by: JC

Tetra Tech Environment

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Ground Engineering Services

PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA07

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

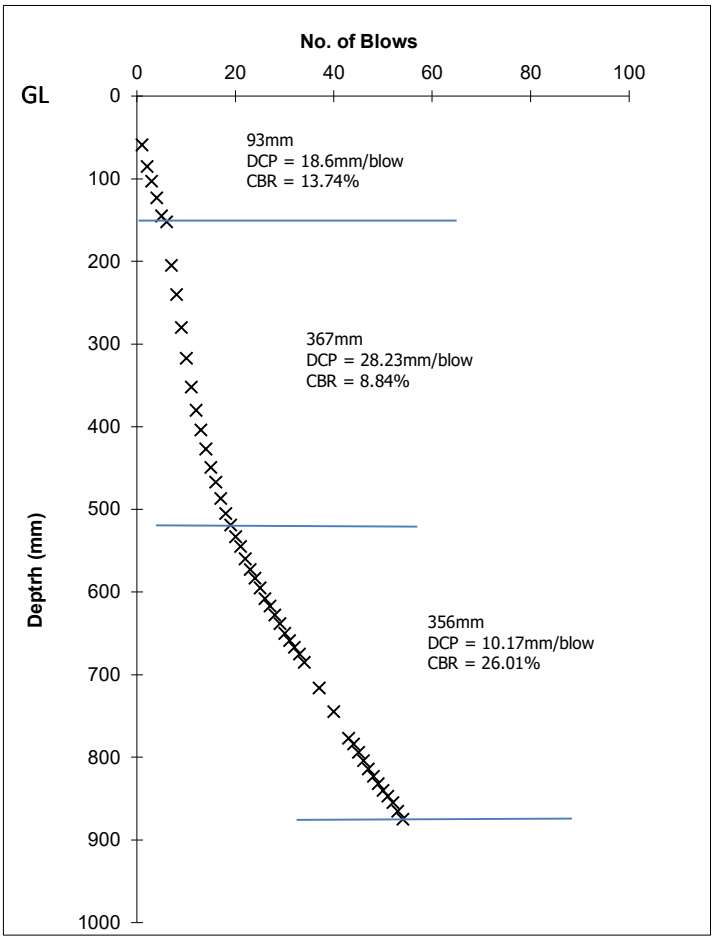
Reference: 1 Position: SA07 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
59	1	109	59				
26	2	135	85				
18	3	153	103				
20	4	173	123				
22	5	195	145				
7	6	202	152				
53	7	255	205				
35	8	290	240				
40	9	330	280				
37	10	367	317				
35	11	402	352				
28	12	430	380				
24	13	454	404				
23	14	477	427				
22	15	499	449				
18	16	517	467				
20	17	537	487				
18	18	555	505				
14	19	569	519				
14	20	583	533				
12	21	595	545				
15	22	610	560				
13	23	623	573				
10	24	633	583				
12	25	645	595				
13	26	658	608				
9	27	667	617				
11	28	678	628				
10	29	688	638				
12	30	700	650				
9	31	709	659				
8	32	717	667				
8	33	725	675				
10	34	735	685				
31	37	766	716				
29	40	795	745				
32	43	827	777				
7	44	834	784				
10	45	844	794				
10	46	854	804				
10	47	864	814				
9	48	873	823				
9	49	882	832				
8	50	890	840				
7	51	897	847				
8	52	905	855				
10	53	915	865				
10	54	925	875				

Test started at: 0 m below ground level

Zero Reading: 50 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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Ground Engineering Services

PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA08

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

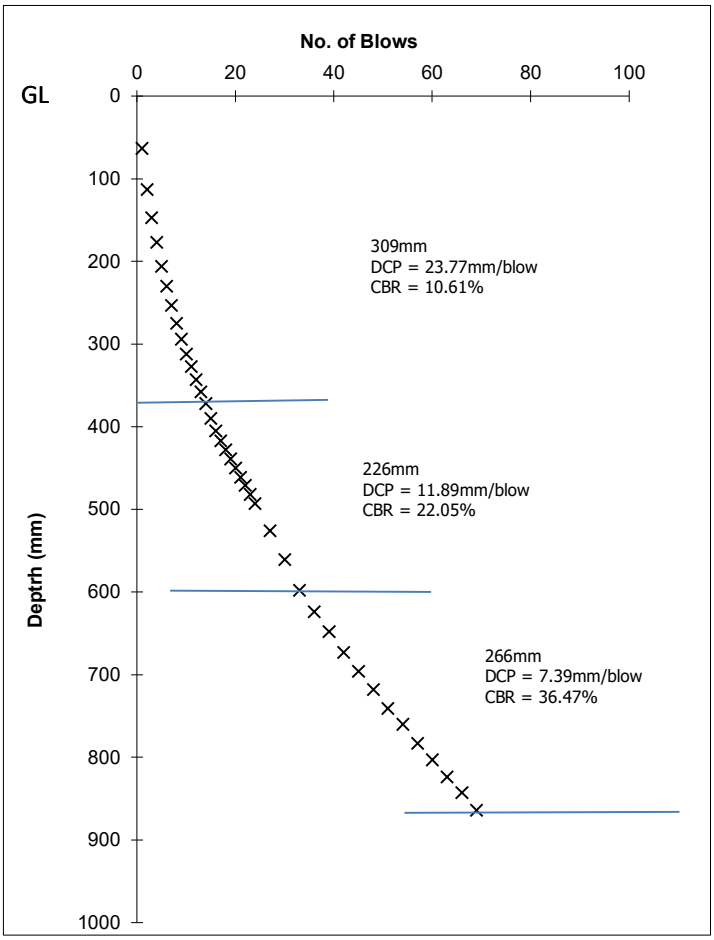
Reference: 1 Position: SA08 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
63	1	130	63				
50	2	180	113				
34	3	214	147				
30	4	244	177				
29	5	273	206				
24	6	297	230				
23	7	320	253				
22	8	342	275				
19	9	361	294				
18	10	379	312				
15	11	394	327				
16	12	410	343				
15	13	425	358				
14	14	439	372				
18	15	457	390				
15	16	472	405				
12	17	484	417				
11	18	495	428				
11	19	506	439				
11	20	517	450				
11	21	528	461				
10	22	538	471				
11	23	549	482				
11	24	560	493				
33	27	593	526				
35	30	628	561				
37	33	665	598				
26	36	691	624				
24	39	715	648				
25	42	740	673				
23	45	763	696				
22	48	785	718				
23	51	808	741				
19	54	827	760				
23	57	850	783				
20	60	870	803				
21	63	891	824				
19	66	910	843				
21	69	931	864				

Test started at: 0 m below ground level

Zero Reading: 67 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA09

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48\text{-}1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

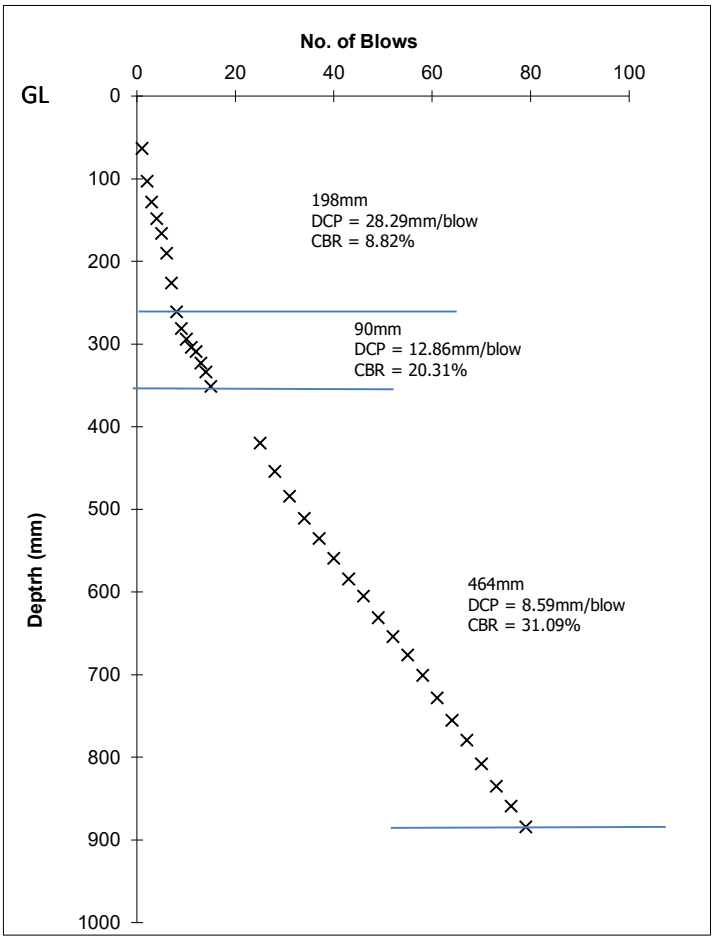
Reference: 1 Position: SA09 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
63	1	122	63				
40	2	162	103				
25	3	187	128				
20	4	207	148				
18	5	225	166				
24	6	249	190				
36	7	285	226				
35	8	320	261				
20	9	340	281				
13	10	353	294				
10	11	363	304				
5	12	368	309				
14	13	382	323				
11	14	393	334				
17	15	410	351				
69	25	479	420				
34	28	513	454				
30	31	543	484				
27	34	570	511				
24	37	594	535				
24	40	618	559				
25	43	643	584				
21	46	664	605				
26	49	690	631				
23	52	713	654				
22	55	735	676				
25	58	760	701				
27	61	787	728				
27	64	814	755				
24	67	838	779				
29	70	867	808				
27	73	894	835				
24	76	918	859				
25	79	943	884				

Test started at: 0 m below ground level

Zero Reading: 59 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA10

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

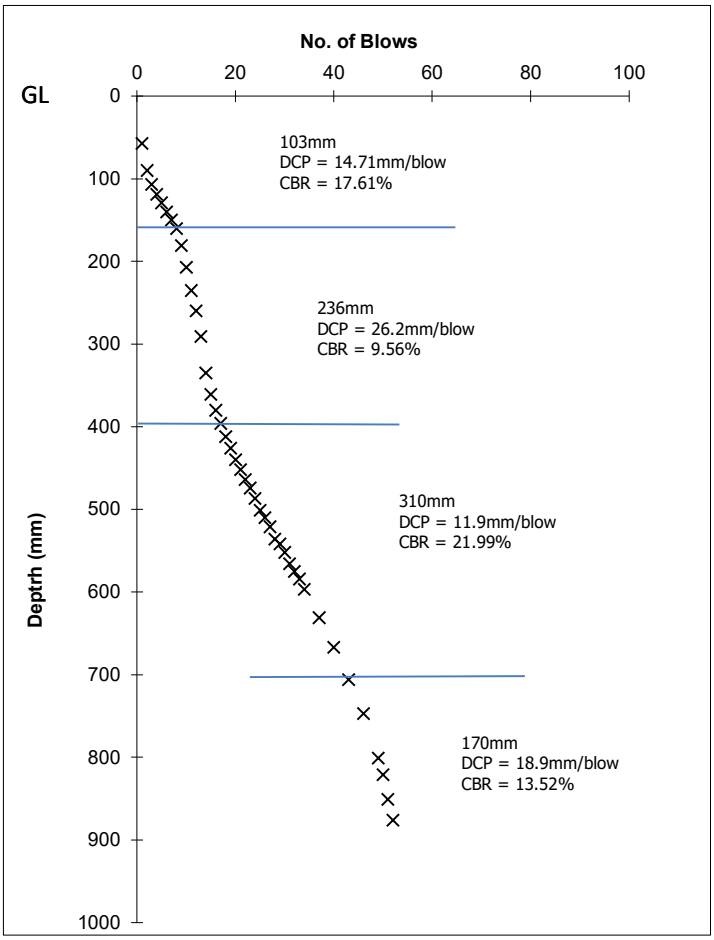
Reference: 1 Position: SA10 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
57	1	110	57				
33	2	143	90				
17	3	160	107				
12	4	172	119				
10	5	182	129				
11	6	193	140				
10	7	203	150				
10	8	213	160				
21	9	234	181				
26	10	260	207				
28	11	288	235				
25	12	313	260				
31	13	344	291				
44	14	388	335				
26	15	414	361				
19	16	433	380				
16	17	449	396				
16	18	465	412				
14	19	479	426				
14	20	493	440				
12	21	505	452				
12	22	517	464				
10	23	527	474				
13	24	540	487				
14	25	554	501				
9	26	563	510				
11	27	574	521				
15	28	589	536				
6	29	595	542				
10	30	605	552				
14	31	619	566				
9	32	628	575				
9	33	637	584				
13	34	650	597				
34	37	684	631				
36	40	720	667				
39	43	759	706				
41	46	800	747				
54	49	854	801				
20	50	874	821				
30	51	904	851				
25	52	929	876				

Test started at: 0 m below ground level

Zero Reading: 53 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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Ground Engineering Services

PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA11

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48\text{-}1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

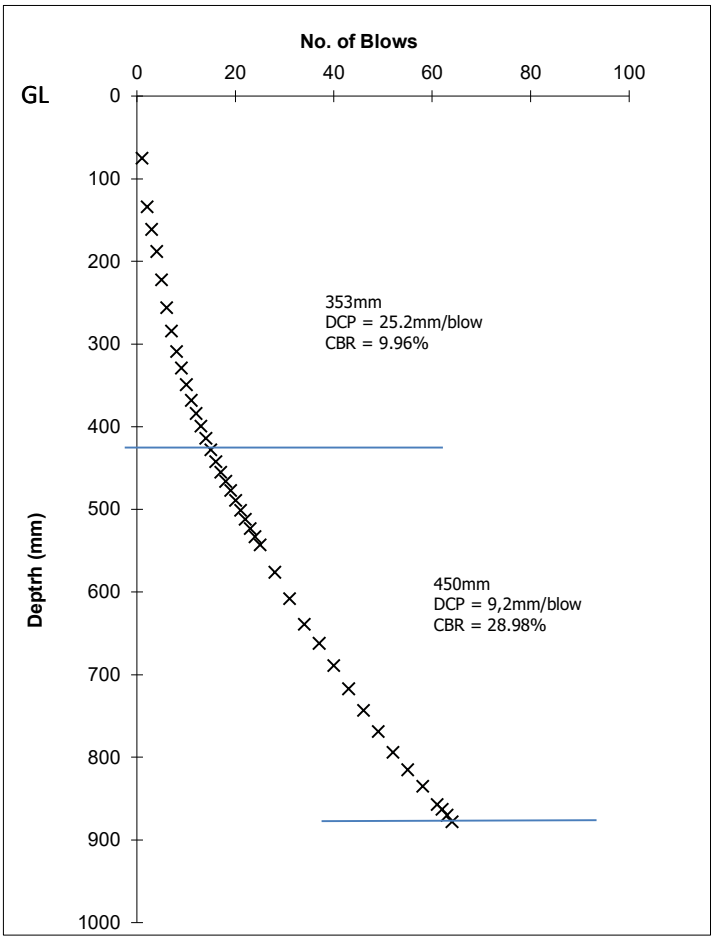
Reference: 1 Position: SA11 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
75	1	126	75				
59	2	185	134				
27	3	212	161				
27	4	239	188				
34	5	273	222				
34	6	307	256				
28	7	335	284				
25	8	360	309				
20	9	380	329				
20	10	400	349				
19	11	419	368				
16	12	435	384				
15	13	450	399				
15	14	465	414				
14	15	479	428				
14	16	493	442				
13	17	506	455				
11	18	517	466				
11	19	528	477				
12	20	540	489				
12	21	552	501				
11	22	563	512				
11	23	574	523				
10	24	584	533				
10	25	594	543				
33	28	627	576				
32	31	659	608				
31	34	690	639				
23	37	713	662				
27	40	740	689				
28	43	768	717				
26	46	794	743				
26	49	820	769				
25	52	845	794				
21	55	866	815				
20	58	886	835				
22	61	908	857				
6	62	914	863				
7	63	921	870				
8	64	929	878				

Test started at: 0 m below ground level

Zero Reading: 51 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	SA12

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48\text{-}1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

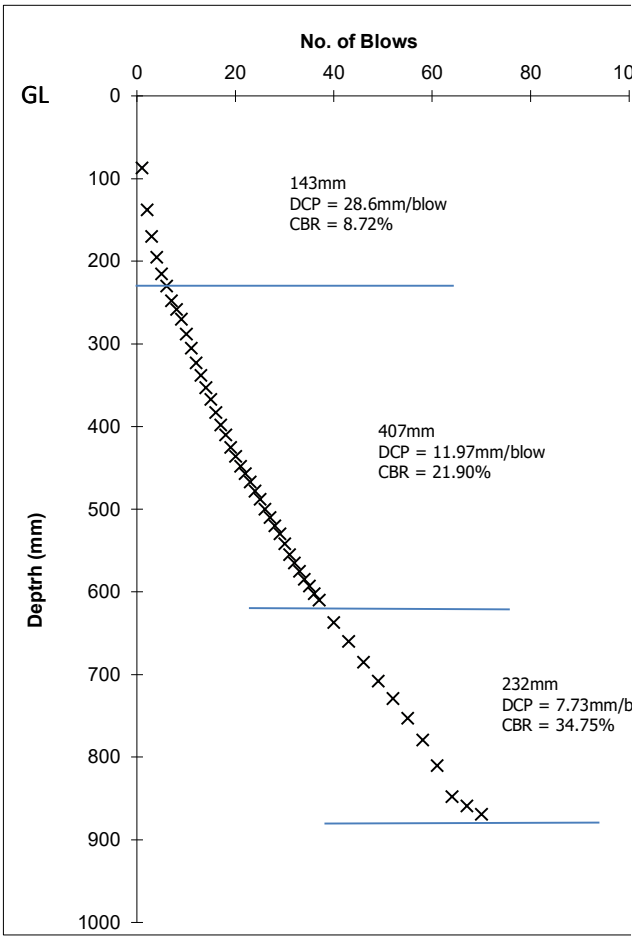
Reference: 1 Position: SA12 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
87	1	142	87				
51	2	193	138				
32	3	225	170				
25	4	250	195				
20	5	270	215				
15	6	285	230				
18	7	303	248				
10	8	313	258				
12	9	325	270				
18	10	343	288				
17	11	360	305				
18	12	378	323				
15	13	393	338				
15	14	408	353				
14	15	422	367				
16	16	438	383				
15	17	453	398				
12	18	465	410				
15	19	480	425				
11	20	491	436				
12	21	503	448				
9	22	512	457				
10	23	522	467				
11	24	533	478				
10	25	543	488				
12	26	555	500				
10	27	565	510				
10	28	575	520				
10	29	585	530				
12	30	597	542				
13	31	610	555				
10	32	620	565				
10	33	630	575				
10	34	640	585				
8	35	648	593				
9	36	657	602				
8	37	665	610				
27	40	692	637				
23	43	715	660				
25	46	740	685				
23	49	763	708				
21	52	784	729				
24	55	808	753				
26	58	834	779				
31	61	865	810				
38	64	903	848				
11	67	914	859				
10	70	924	869				

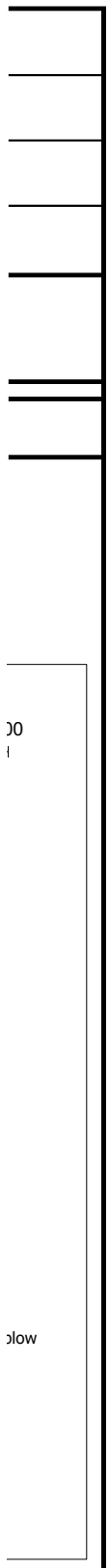
Test started at: 0 m below ground level

Zero Reading: 55 mm

Zero reading = start depth below ground surface



Data compiled by:
Data checked by:


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TR
JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	TP01

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

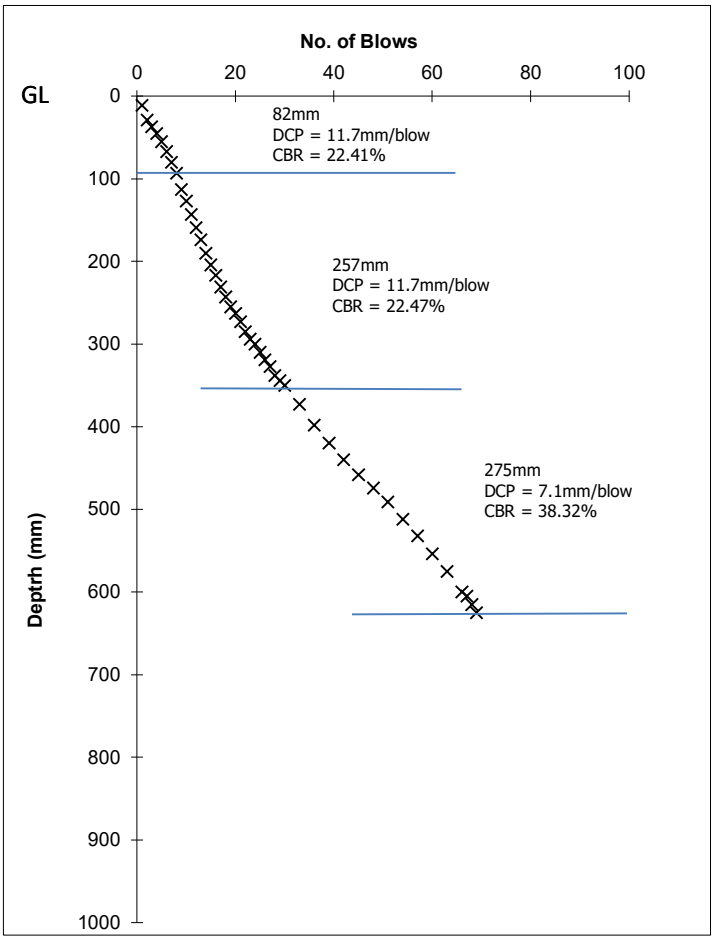
Reference: 1 Position: TP01 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
11	1	321	11				
18	2	339	29				
8	3	347	37				
8	4	355	45				
10	5	365	55				
12	6	377	67				
13	7	390	80				
13	8	403	93				
20	9	423	113				
14	10	437	127				
16	11	453	143				
16	12	469	159				
15	13	484	174				
16	14	500	190				
14	15	514	204				
13	16	527	217				
14	17	541	231				
12	18	553	243				
12	19	565	255				
8	20	573	263				
10	21	583	273				
12	22	595	285				
9	23	604	294				
6	24	610	300				
10	25	620	310				
9	26	629	319				
8	27	637	327				
11	28	648	338				
6	29	654	344				
6	30	660	350				
23	33	683	373				
25	36	708	398				
22	39	730	420				
20	42	750	440				
18	45	768	458				
16	48	784	474				
17	51	801	491				
21	54	822	512				
20	57	842	532				
22	60	864	554				
21	63	885	575				
25	66	910	600				
5	67	915	605				
10	68	925	615				
10	69	935	625				

Test started at: 0 m below ground level

Zero Reading: 310 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	TP02

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

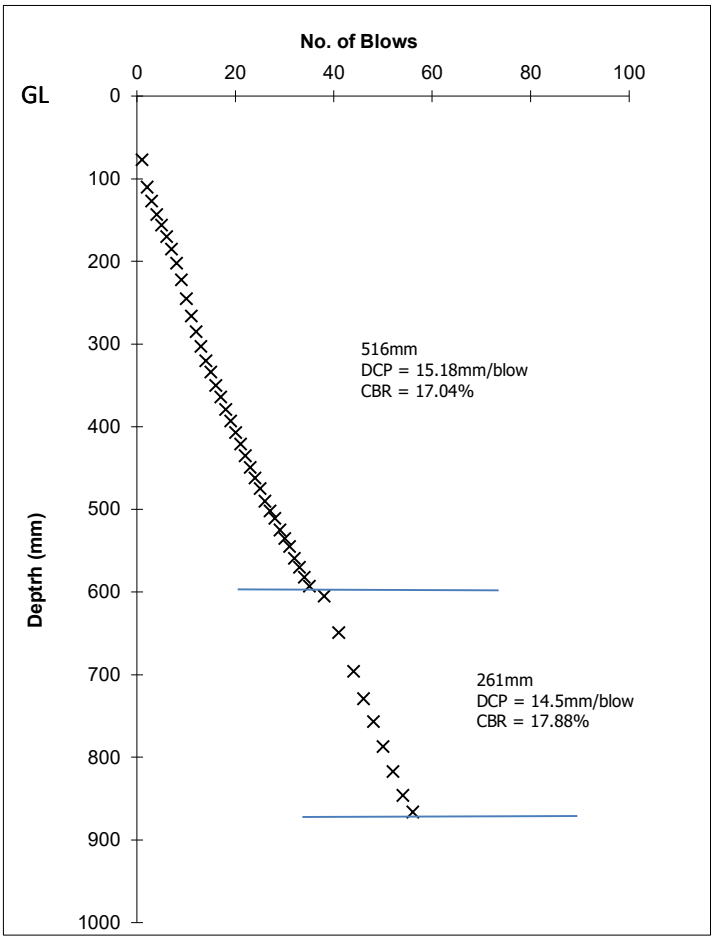
Reference: 1 Position: TP02 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
77	1	140	77				
33	2	173	110				
17	3	190	127				
16	4	206	143				
13	5	219	156				
14	6	233	170				
15	7	248	185				
17	8	265	202				
20	9	285	222				
23	10	308	245				
21	11	329	266				
19	12	348	285				
18	13	366	303				
17	14	383	320				
14	15	397	334				
16	16	413	350				
14	17	427	364				
15	18	442	379				
14	19	456	393				
14	20	470	407				
14	21	484	421				
14	22	498	435				
14	23	512	449				
13	24	525	462				
13	25	538	475				
15	26	553	490				
12	27	565	502				
9	28	574	511				
14	29	588	525				
10	30	598	535				
10	31	608	545				
14	32	622	559				
11	33	633	570				
12	34	645	582				
11	35	656	593				
12	38	668	605				
44	41	712	649				
47	44	759	696				
33	46	792	729				
28	48	820	757				
30	50	850	787				
30	52	880	817				
29	54	909	846				
20	44	929	866				

Test started at: 0 m below ground level

Zero Reading: 63 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	TP03

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

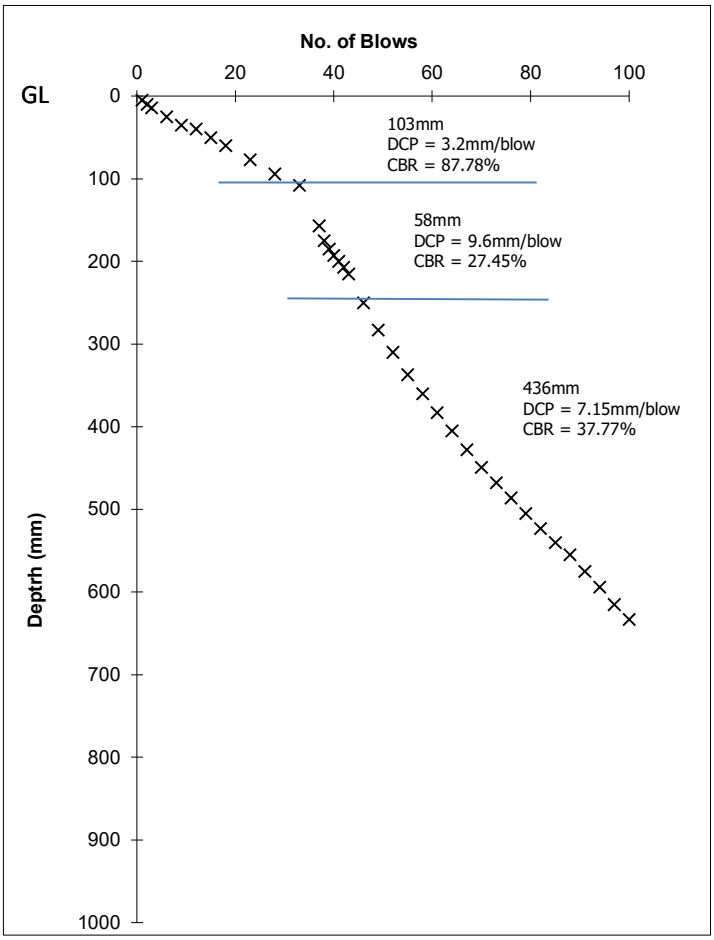
Reference: 1 Position: TP03 Date: 15 August 2024

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
5	1	255	5				
5	2	260	10				
4	3	264	14				
11	6	275	25				
10	9	285	35				
5	12	290	40				
10	15	300	50				
10	18	310	60				
17	23	327	77				
17	28	344	94				
14	33	358	108				
49	37	407	157				
18	38	425	175				
10	39	435	185				
8	40	443	193				
7	41	450	200				
7	42	457	207				
8	43	465	215				
35	46	500	250				
33	49	533	283				
27	52	560	310				
27	55	587	337				
23	58	610	360				
23	61	633	383				
22	64	655	405				
23	67	678	428				
21	70	699	449				
19	73	718	468				
18	76	736	486				
19	79	755	505				
18	82	773	523				
17	85	790	540				
15	88	805	555				
20	91	825	575				
19	94	844	594				
21	97	865	615				
18	100	883	633				
21	103	904	654				
21	106	925	675				
11	107	936	686				

Test started at: 0 m below ground level

Zero Reading: 250 mm

Zero reading = start depth below ground surface



Data compiled by: TR
Data checked by: JC

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Ground Engineering Services

PROJECT No.:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindall
FIGURE No.:	TP04

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

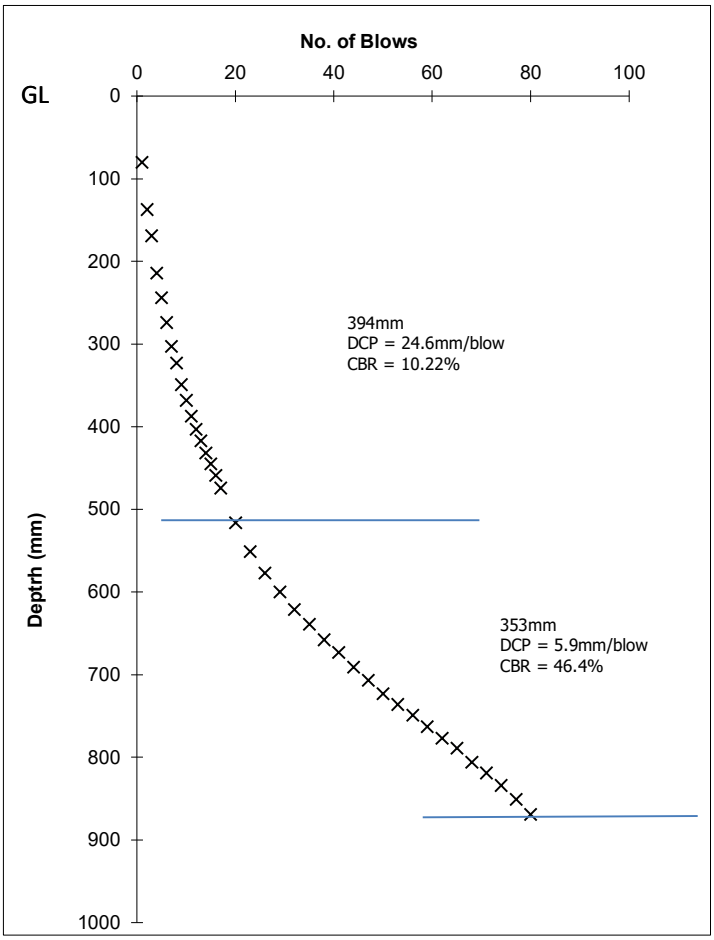
Reference: 1 Position: TP04 Date: 15 August 2024

Test started at: 0 m below ground level

Zero Reading: 61 mm

Zero reading = start depth below ground surface

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
80	1	141	80				
57	2	198	137				
32	3	230	169				
45	4	275	214				
30	5	305	244				
30	6	335	274				
29	7	364	303				
20	8	384	323				
26	9	410	349				
19	10	429	368				
19	11	448	387				
16	12	464	403				
14	13	478	417				
15	14	493	432				
13	15	506	445				
14	16	520	459				
15	17	535	474				
42	20	577	516				
35	23	612	551				
26	26	638	577				
23	29	661	600				
21	32	682	621				
18	35	700	639				
19	38	719	658				
15	41	734	673				
18	44	752	691				
16	47	768	707				
16	50	784	723				
13	53	797	736				
13	56	810	749				
14	59	824	763				
14	62	838	777				
12	65	850	789				
17	68	867	806				
13	71	880	819				
15	74	895	834				
17	77	912	851				
18	80	930	869				



Data compiled by: TR
Data checked by: JC

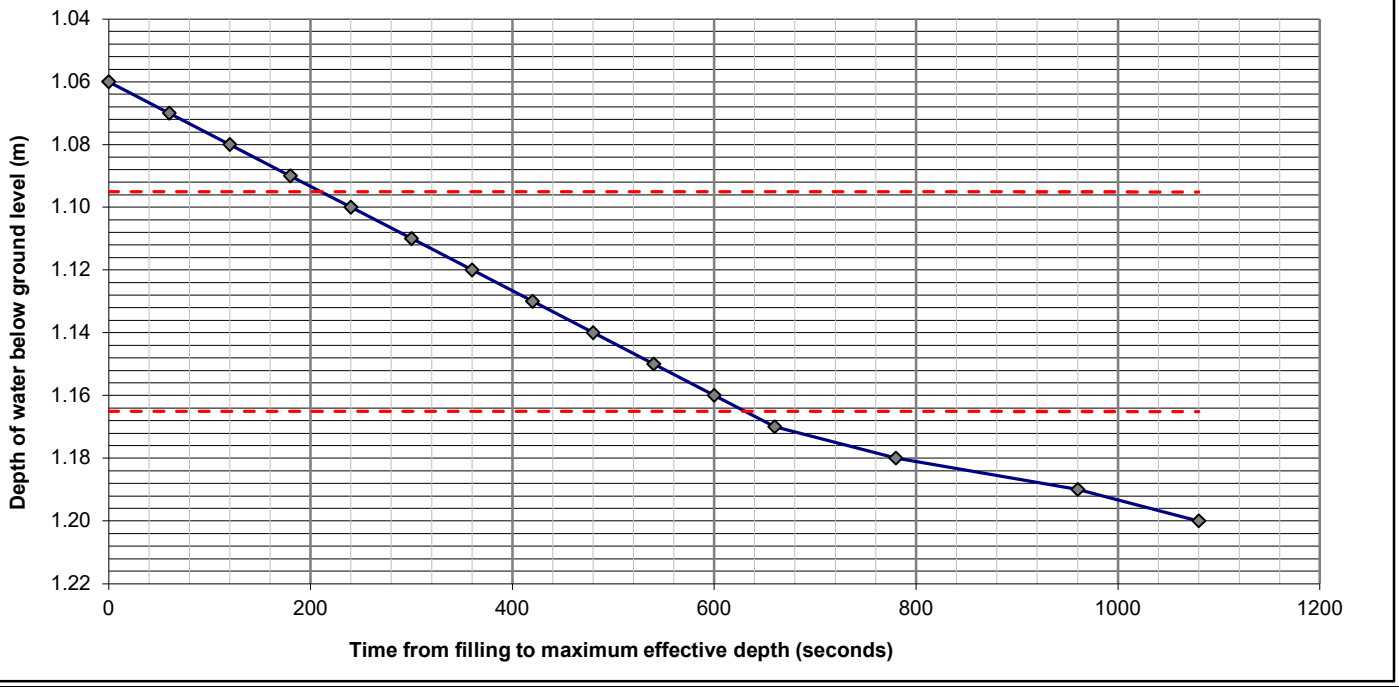
APPENDIX E: SOIL INFILTRATION TEST

Tetra Tech
Atlantic House, Greenwood Close, Gate Business Park,
Pontprennau, Cardiff, CF23 8RD
Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA01
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.060
60	1.00	1.070
120	2.00	1.080
180	3.00	1.090
240	4.00	1.100
300	5.00	1.110
360	6.00	1.120
420	7.00	1.130
480	8.00	1.140
540	9.00	1.150
600	10.00	1.160
660	11.00	1.170
780	13.00	1.180
960	16.00	1.190
1080	18.00	1.200

PIT LENGTH (m):	1.40
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.20

Pit construction
Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.12
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.06
Effective depth of Pit	(m)	0.14
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.12
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.11
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.06
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.12
Time at 75% effective depth (p_{75})	(s)	210
Time at 25% effective depth (p_{25})	(s)	630
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	420

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.25E-04**

WATER INPUT:	I	300

GEOLOGY OF TEST SECTION:
SAND

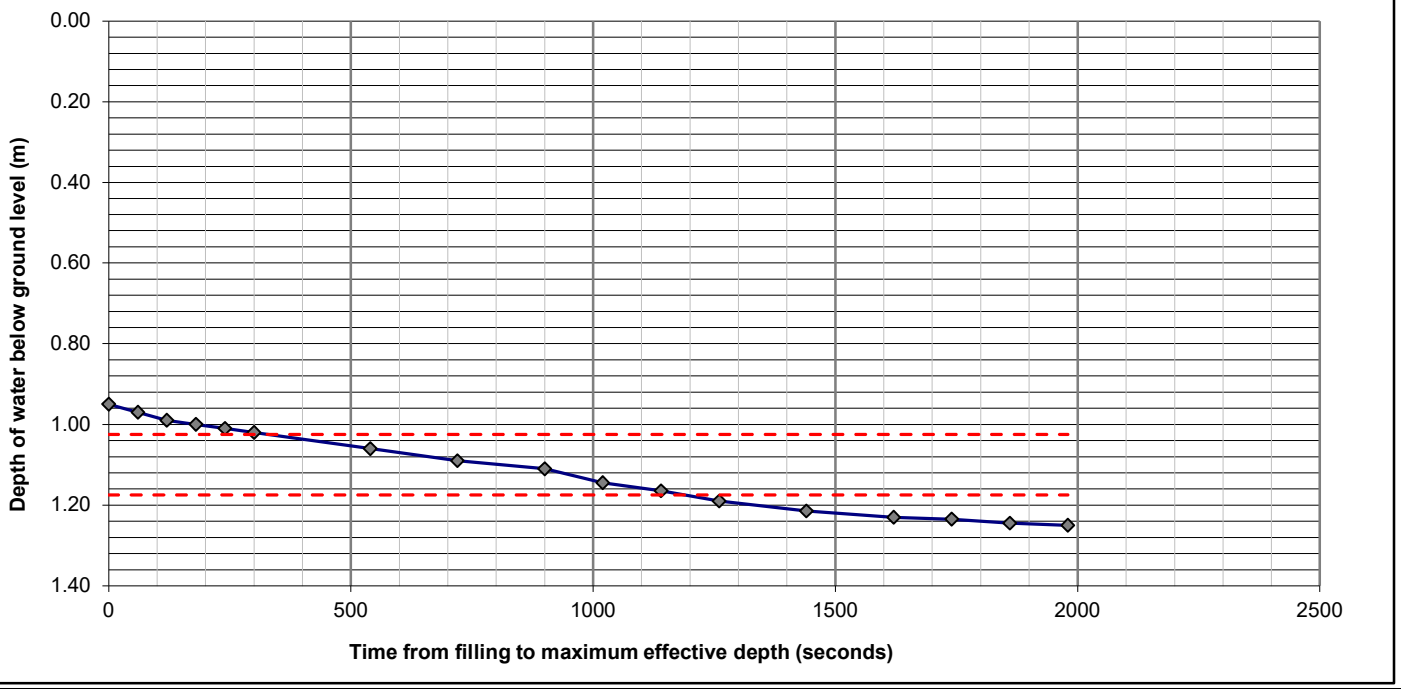
Compiled by: TR
Checked by: JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA01
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.950
60	1.00	0.970
120	2.00	0.990
180	3.00	1.000
240	4.00	1.010
300	5.00	1.020
540	9.00	1.060
720	12.00	1.090
900	15.00	1.110
1020	17.00	1.145
1140	19.00	1.165
1260	21.00	1.190
1440	24.00	1.215
1620	27.00	1.230
1740	29.00	1.235
1860	31.00	1.245
1980	33.00	1.250

PIT LENGTH (m):	1.40	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.25	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.25
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.13
Effective depth of Pit	(m)	0.30
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.25
Level of water in pit at 75% effective depth (p_{75})	(m)	0.08
Level of water in pit at 25% effective depth (p_{25})	(m)	0.23
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.13
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.44
Time at 75% effective depth (p_{75})	(s)	330
Time at 25% effective depth (p_{25})	(s)	1188
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	858

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.02E-04**

WATER INPUT:	I	300

GEOLOGY OF TEST SECTION:

SAND

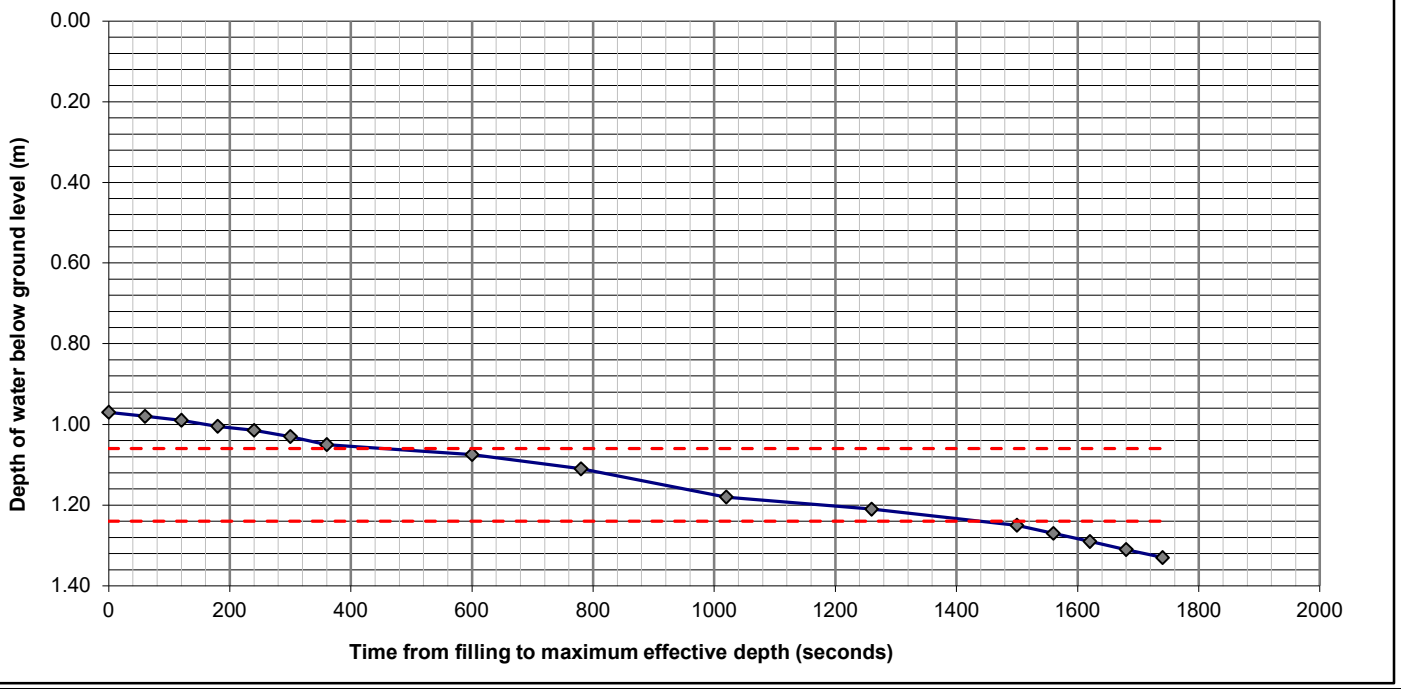
Compiled by:	TR
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA01
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.970
60	1.00	0.980
120	2.00	0.990
180	3.00	1.005
240	4.00	1.015
300	5.00	1.030
360	6.00	1.050
600	10.00	1.075
780	13.00	1.110
1020	17.00	1.180
1260	21.00	1.210
1500	25.00	1.250
1560	26.00	1.270
1620	27.00	1.290
1680	28.00	1.310
1740	29.00	1.330

PIT LENGTH (m):	1.40	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.33	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.30
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.15
Effective depth of Pit	(m)	0.36
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.30
Level of water in pit at 75% effective depth (p_{75})	(m)	0.09
Level of water in pit at 25% effective depth (p_{25})	(m)	0.27
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.15
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.56
Time at 75% effective depth (p_{75})	(s)	456
Time at 25% effective depth (p_{25})	(s)	1440
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	984

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**9.85E-05**

WATER INPUT:	I	300

GEOLOGY OF TEST SECTION:

SAND

Compiled by:	TR
Checked by:	JC

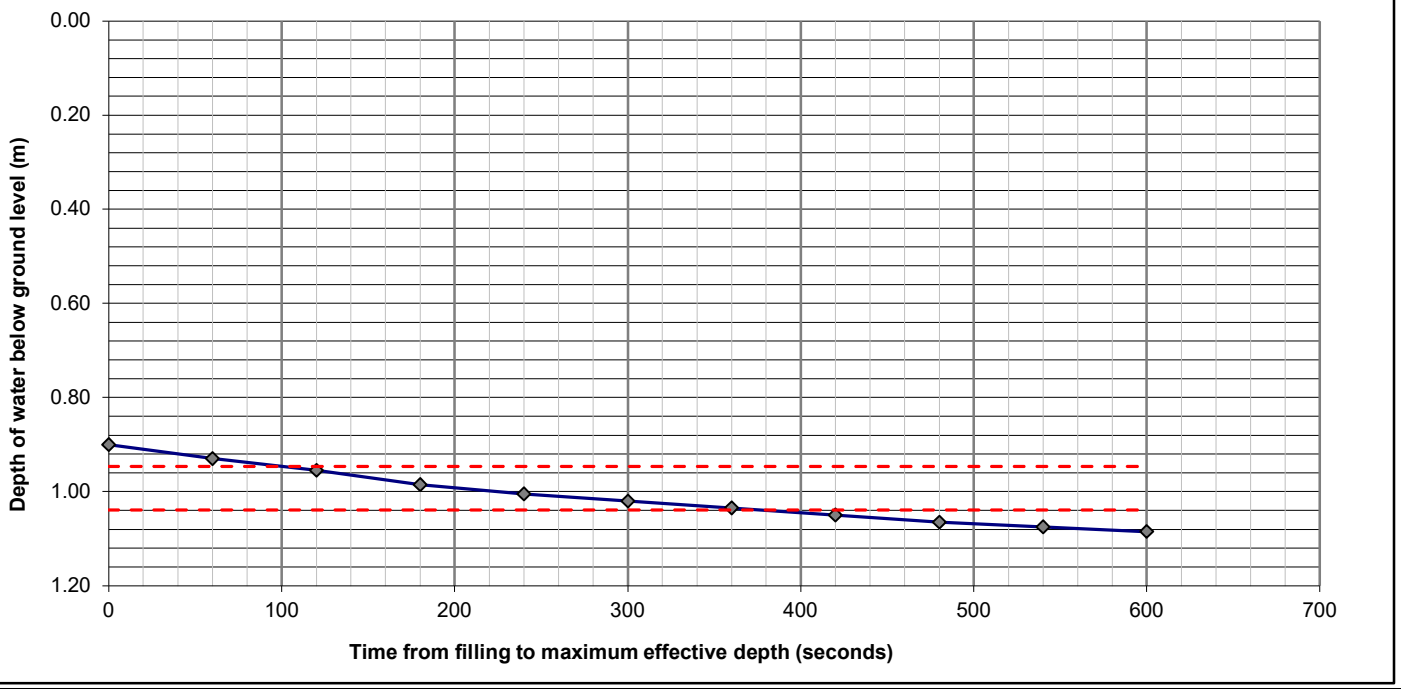
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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA02
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.900
60	1.00	0.930
120	2.00	0.955
180	3.00	0.985
240	4.00	1.005
300	5.00	1.020
360	6.00	1.035
420	7.00	1.050
480	8.00	1.065
540	9.00	1.075
600	10.00	1.085

PIT LENGTH (m):	1.70	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.09	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.19
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.09
Effective depth of Pit	(m)	0.19
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.19
Level of water in pit at 75% effective depth (p_{75})	(m)	0.05
Level of water in pit at 25% effective depth (p_{25})	(m)	0.14
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.09
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.45
Time at 75% effective depth (p_{75})	(s)	99
Time at 25% effective depth (p_{25})	(s)	375
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	276

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**2.37E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

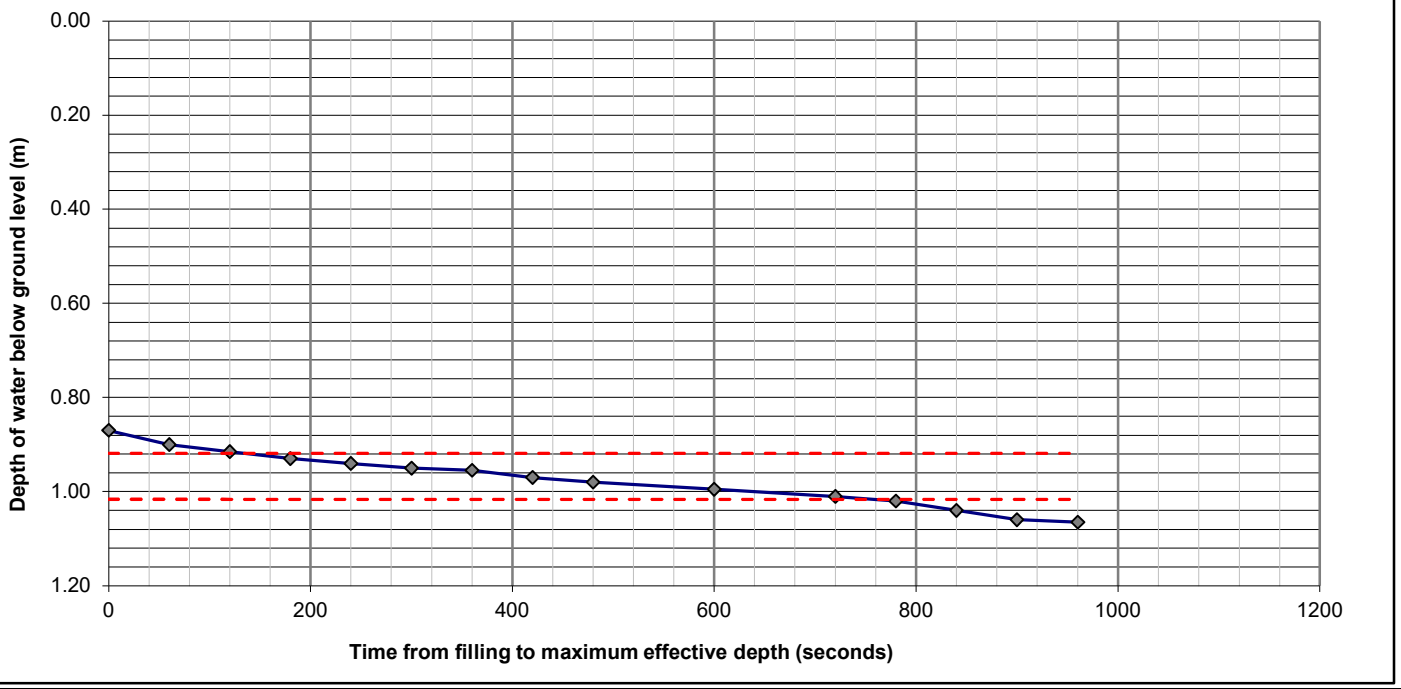
Compiled by:	TR
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA02
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.870
60	1.00	0.900
120	2.00	0.915
180	3.00	0.930
240	4.00	0.940
300	5.00	0.950
360	6.00	0.955
420	7.00	0.970
480	8.00	0.980
600	10.00	0.995
720	12.00	1.010
780	13.00	1.020
840	14.00	1.040
900	15.00	1.060
960	16.00	1.065

PIT LENGTH (m):	1.70	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.07	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.20
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.10
Effective depth of Pit	(m)	0.20
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.20
Level of water in pit at 75% effective depth (p_{75})	(m)	0.05
Level of water in pit at 25% effective depth (p_{25})	(m)	0.15
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.10
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.47
Time at 75% effective depth (p_{75})	(s)	135
Time at 25% effective depth (p_{25})	(s)	758
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	623

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.09E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

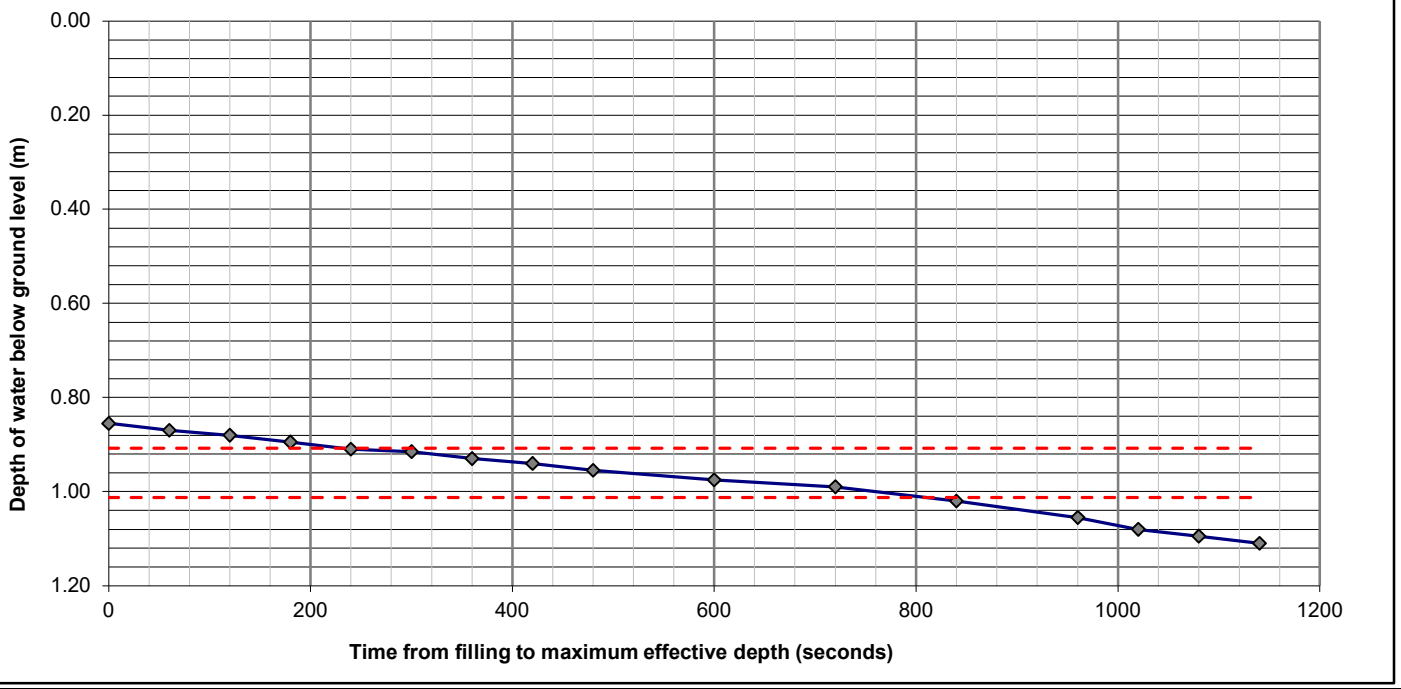
Compiled by:	TR
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA02
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.855
60	1.00	0.870
120	2.00	0.880
180	3.00	0.895
240	4.00	0.910
300	5.00	0.915
360	6.00	0.930
420	7.00	0.940
480	8.00	0.955
600	10.00	0.975
720	12.00	0.990
840	14.00	1.020
960	16.00	1.055
1020	17.00	1.080
1080	18.00	1.095
1140	19.00	1.110

PIT LENGTH (m):	1.70
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.07

Pit construction
Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.21
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.11
Effective depth of Pit	(m)	0.21
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.21
Level of water in pit at 75% effective depth (p_{75})	(m)	0.05
Level of water in pit at 25% effective depth (p_{25})	(m)	0.16
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.11
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.50
Time at 75% effective depth (p_{75})	(s)	230
Time at 25% effective depth (p_{25})	(s)	810
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	580

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.23E-04**

WATER INPUT: I 250

GEOLOGY OF TEST SECTION:
SAND

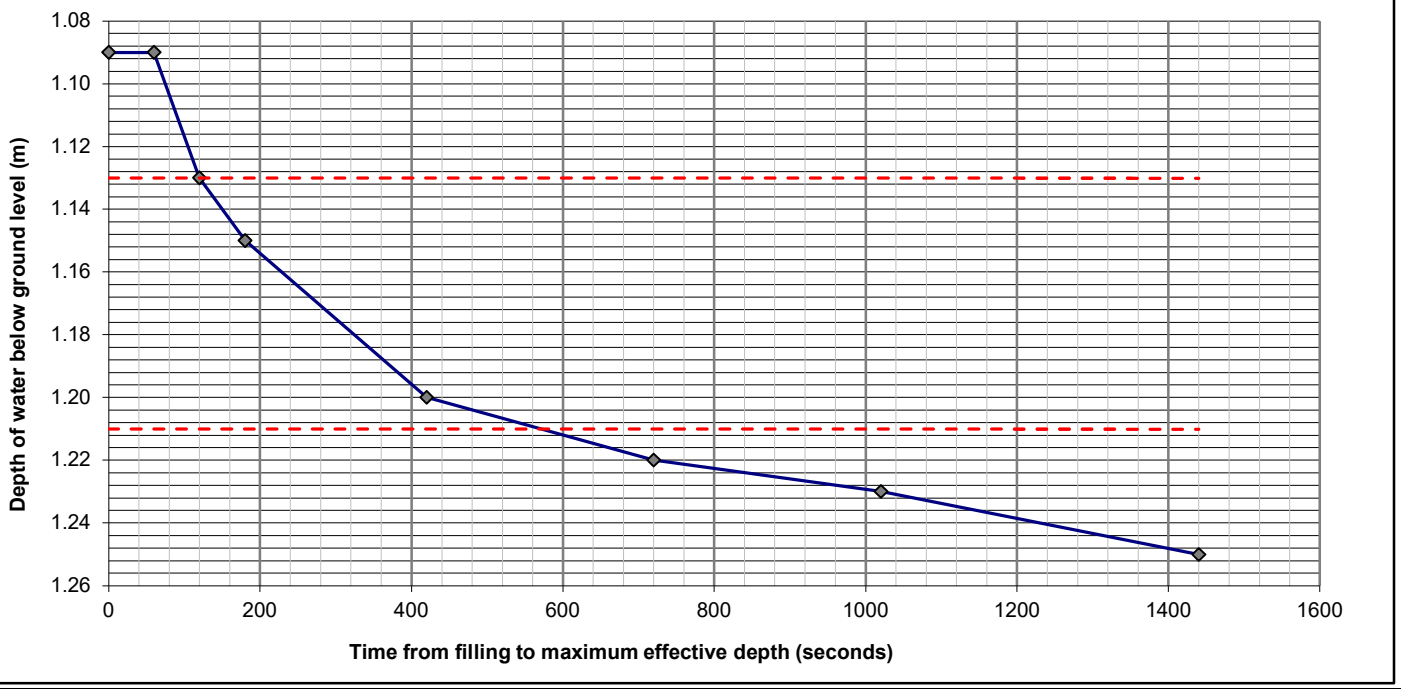
Compiled by: TR
Checked by: JC

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Pontprennau, Cardiff, CF23 8RD
Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA03
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.090
60	1.00	1.090
120	2.00	1.130
180	3.00	1.150
420	7.00	1.200
720	12.00	1.220
1020	17.00	1.230
1440	24.00	1.250

PIT LENGTH (m):	1.50
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.25

Pit construction
Very poor stability, pit collapse to 1.25m within first minute of testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.14
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.07
Effective depth of Pit	(m)	0.16
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.14
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.12
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.07
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.24
Time at 75% effective depth (p_{75})	(s)	120
Time at 25% effective depth (p_{25})	(s)	571
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	451

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.29E-04**

WATER INPUT:	I	300

GEOLOGY OF TEST SECTION:
Sand

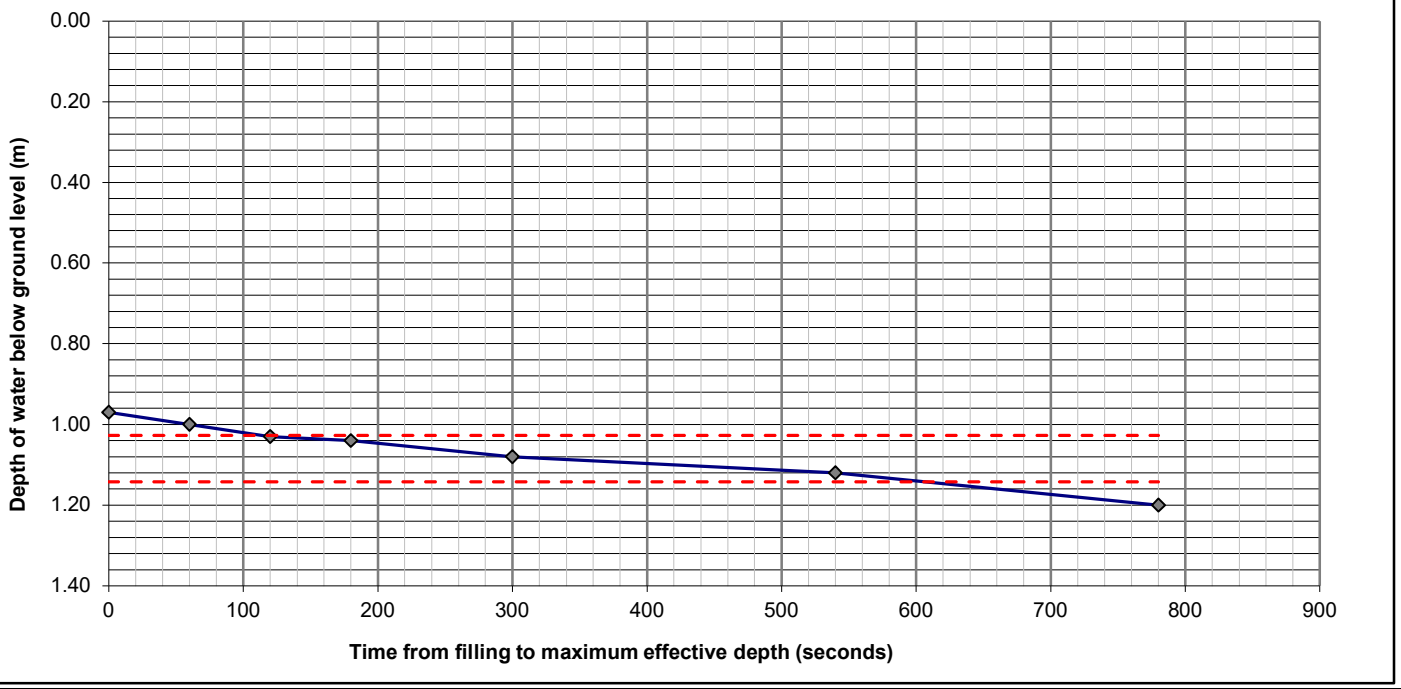
Compiled by: CS
Checked by: JC

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Pontprennau, Cardiff, CF23 8RD
Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA03
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0	0.970
60	1	1.000
120	2	1.030
180	3	1.040
300	5	1.080
540	9	1.120
780	13	1.200

PIT LENGTH (m):	1.80
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.20

Pit construction
Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.25
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.12
Effective depth of Pit	(m)	0.23
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.25
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.17
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.12
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.63
Time at 75% effective depth (p_{75})	(s)	115
Time at 25% effective depth (p_{25})	(s)	608
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	492

OUTPUT:

SOIL INFILTRATION RATE (f) $\frac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$ (m/s) **1.55E-04**

WATER INPUT: I 300

GEOLOGY OF TEST SECTION:
SAND

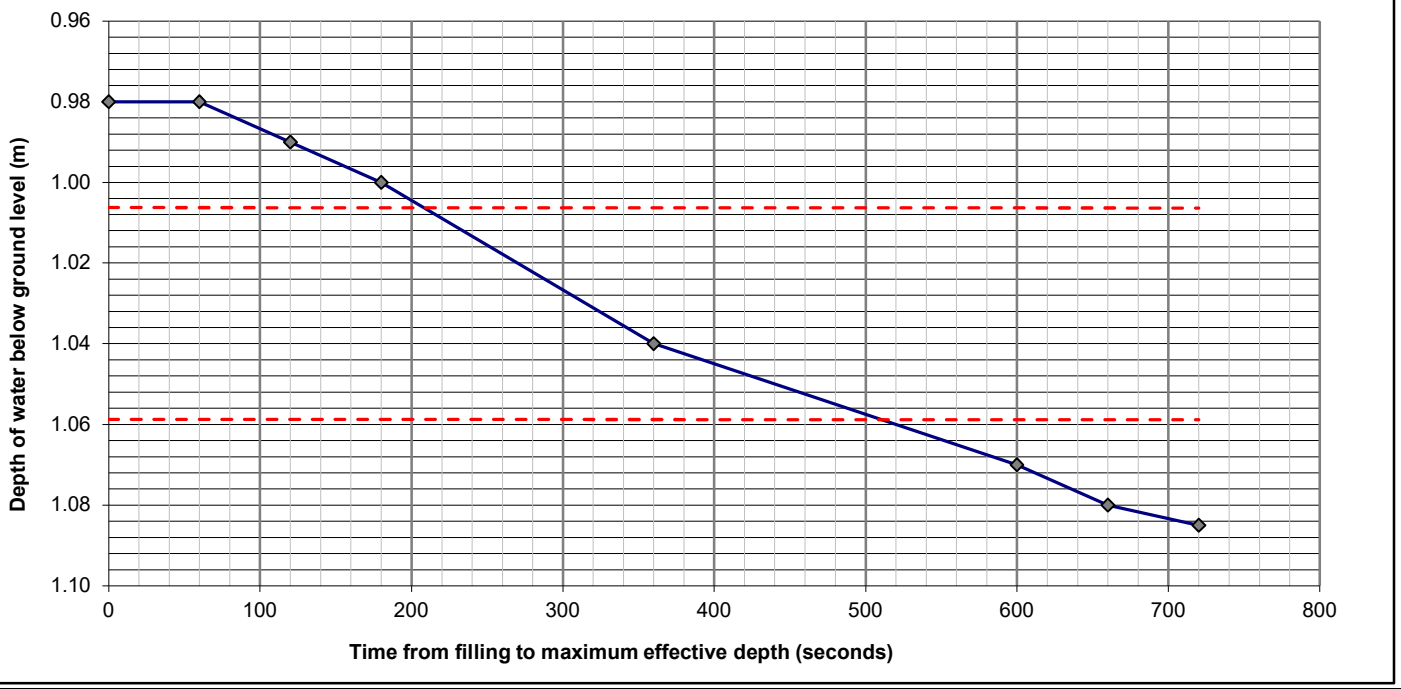
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Pontprennau, Cardiff, CF23 8RD
Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA01
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.980
60	1.00	0.980
120	2.00	0.990
180	3.00	1.000
360	6.00	1.040
600	10.00	1.070
660	11.00	1.080
720	12.00	1.085

PIT LENGTH (m):	1.40
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.09

Pit construction
Very poor stability, pit collapses during testing <1min

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.09
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.04
Effective depth of Pit	(m)	0.11
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.09
Level of water in pit at 75% effective depth (p_{75})	(m)	0.03
Level of water in pit at 25% effective depth (p_{25})	(m)	0.08
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.04
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.05
Time at 75% effective depth (p_{75})	(s)	208
Time at 25% effective depth (p_{25})	(s)	511
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	302

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.39E-04**

WATER INPUT:	I	300

GEOLOGY OF TEST SECTION:
SAND

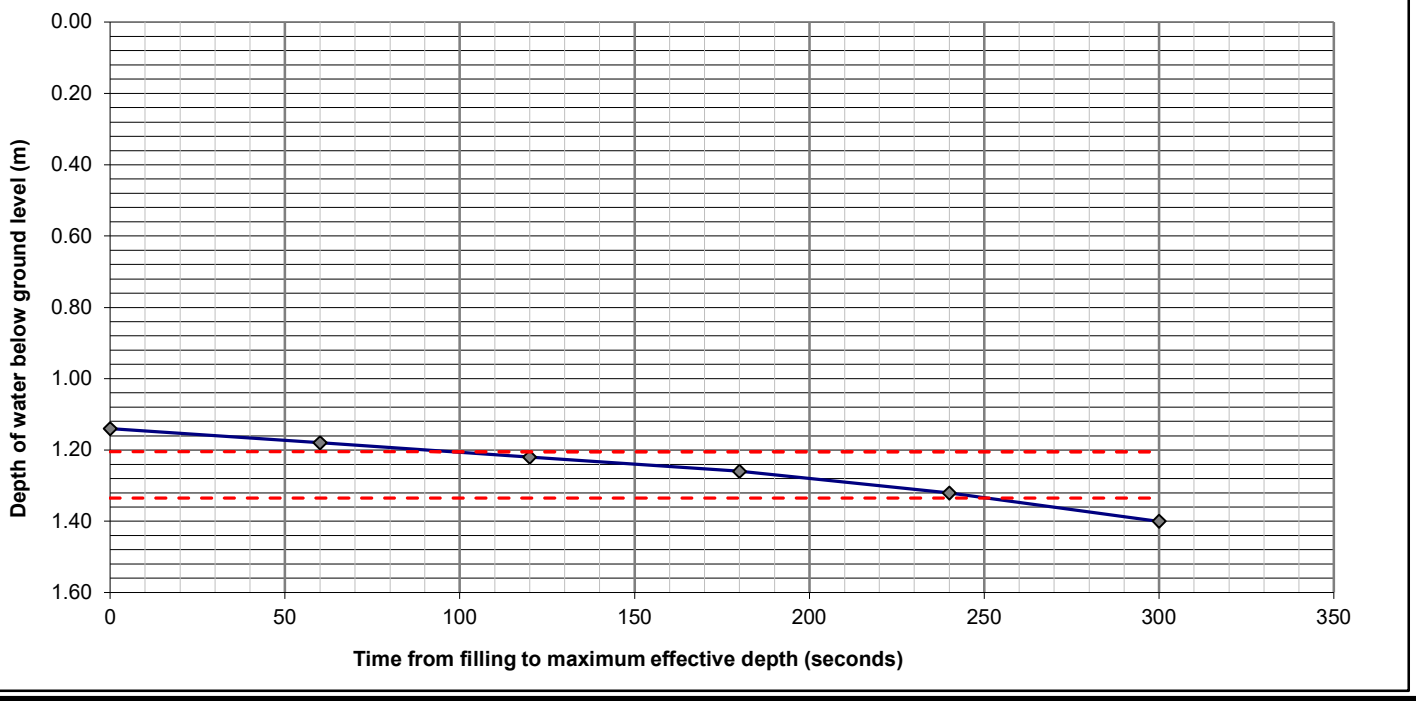
Compiled by:	TR
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA04
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.140
60	1.00	1.180
120	2.00	1.220
180	3.00	1.260
240	4.00	1.320
300	5.00	1.400

PIT LENGTH (m):	1.50
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.40

Pit construction

Very poor stability, pit collapse to 1.4m within first minute of testing

INPUT PARAMETERS:

Total volume of pit	(m^3)	0.23
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.12
Effective depth of Pit	(m)	0.26
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.23
Level of water in pit at 75% effective depth (p_{75})	(m)	0.07
Level of water in pit at 25% effective depth (p_{25})	(m)	0.20
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.12
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.45
Time at 75% effective depth (p_{75})	(s)	98
Time at 25% effective depth (p_{25})	(s)	251
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	154

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**5.27E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

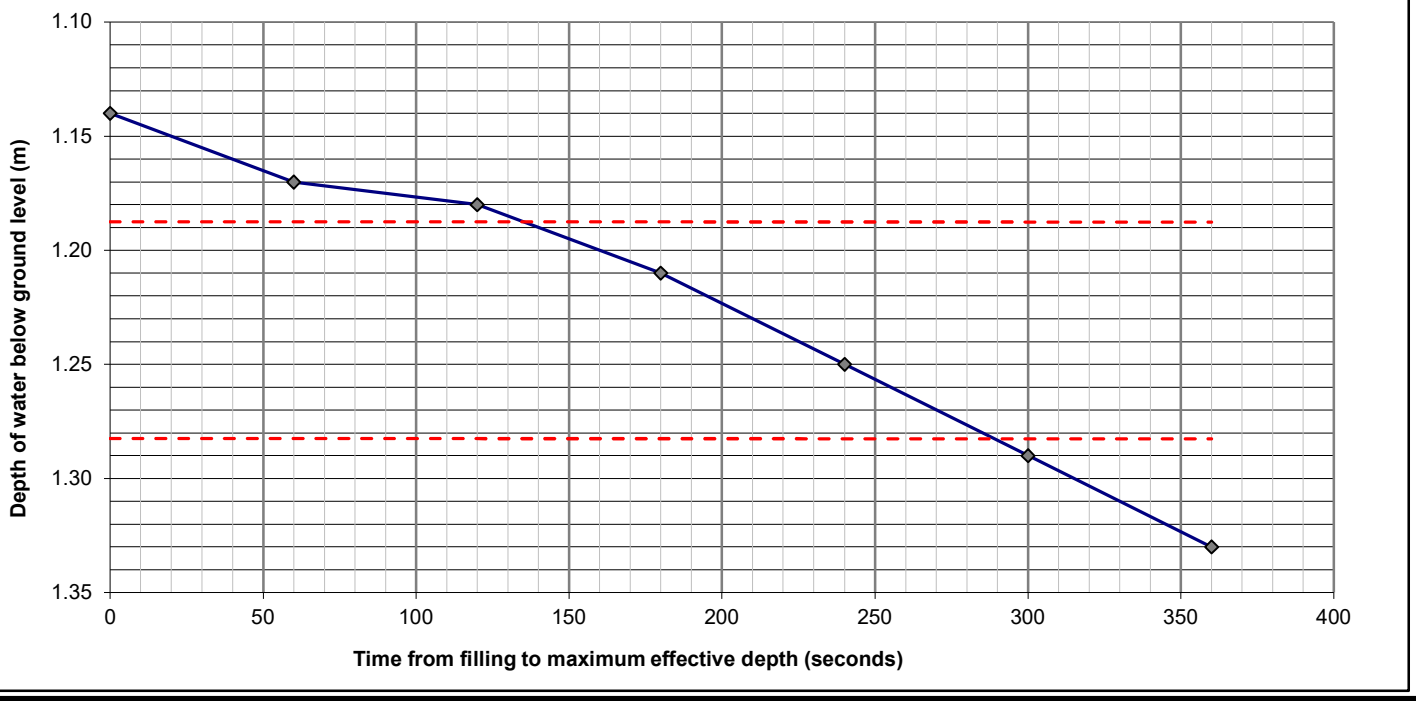
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Checked by:	JC

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Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA04
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0	1.140
60	1	1.170
120	2	1.180
180	3	1.210
240	4	1.250
300	5	1.290
360	6	1.330

PIT LENGTH (m):	1.80	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.33	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.21
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.10
Effective depth of Pit	(m)	0.19
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.21
Level of water in pit at 75% effective depth (p_{75})	(m)	0.05
Level of water in pit at 25% effective depth (p_{25})	(m)	0.14
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.10
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.54
Time at 75% effective depth (p_{75})	(s)	135
Time at 25% effective depth (p_{25})	(s)	289
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	154

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**4.34E-04**

WATER INPUT:	I	300

GEOLOGY OF TEST SECTION:

SAND

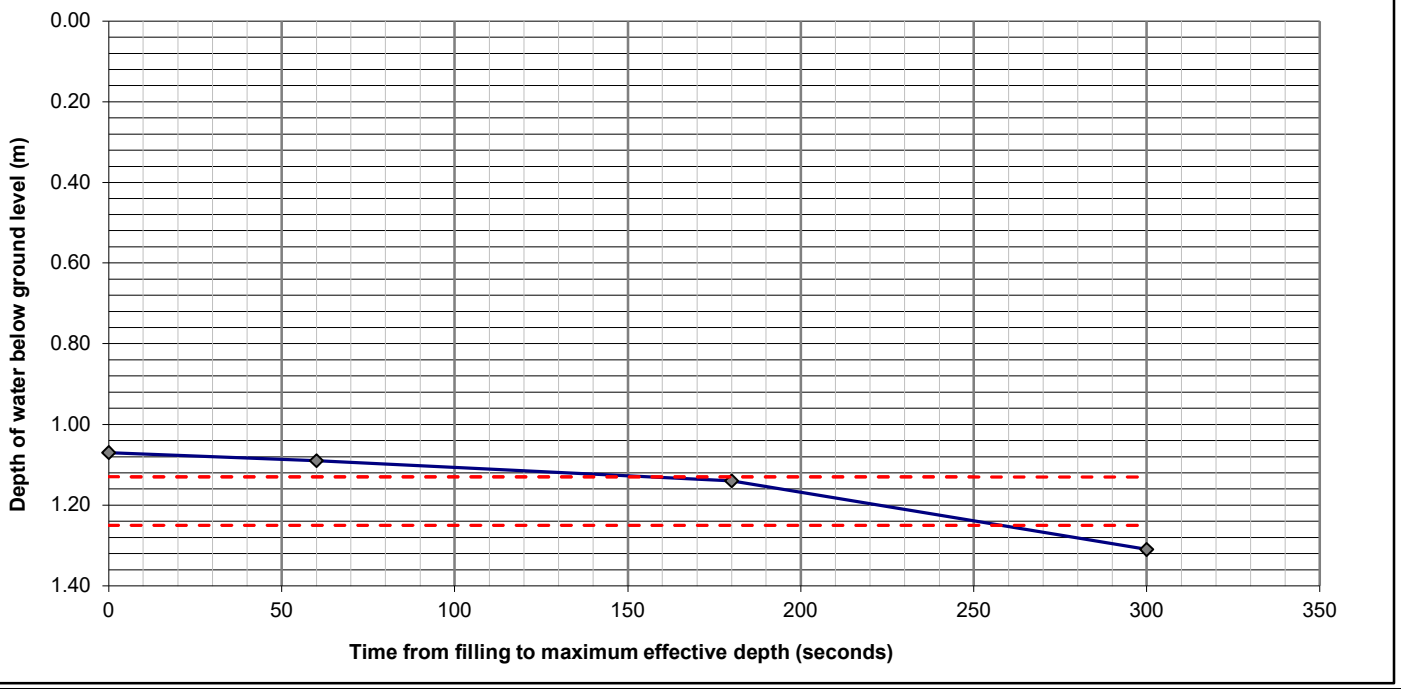
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Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA04
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.070
60	1.00	1.090
180	3.00	1.140
300	5.00	1.310

PIT LENGTH (m):	1.75
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.31

Pit construction
Very poor stability, pit collapses during testing <1min

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.25
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.13
Effective depth of Pit	(m)	0.24
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.25
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.18
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.13
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.61
Time at 75% effective depth (p_{75})	(s)	156
Time at 25% effective depth (p_{25})	(s)	258
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	102

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**7.69E-04**

WATER INPUT:	I	300

GEOLOGY OF TEST SECTION:
SAND

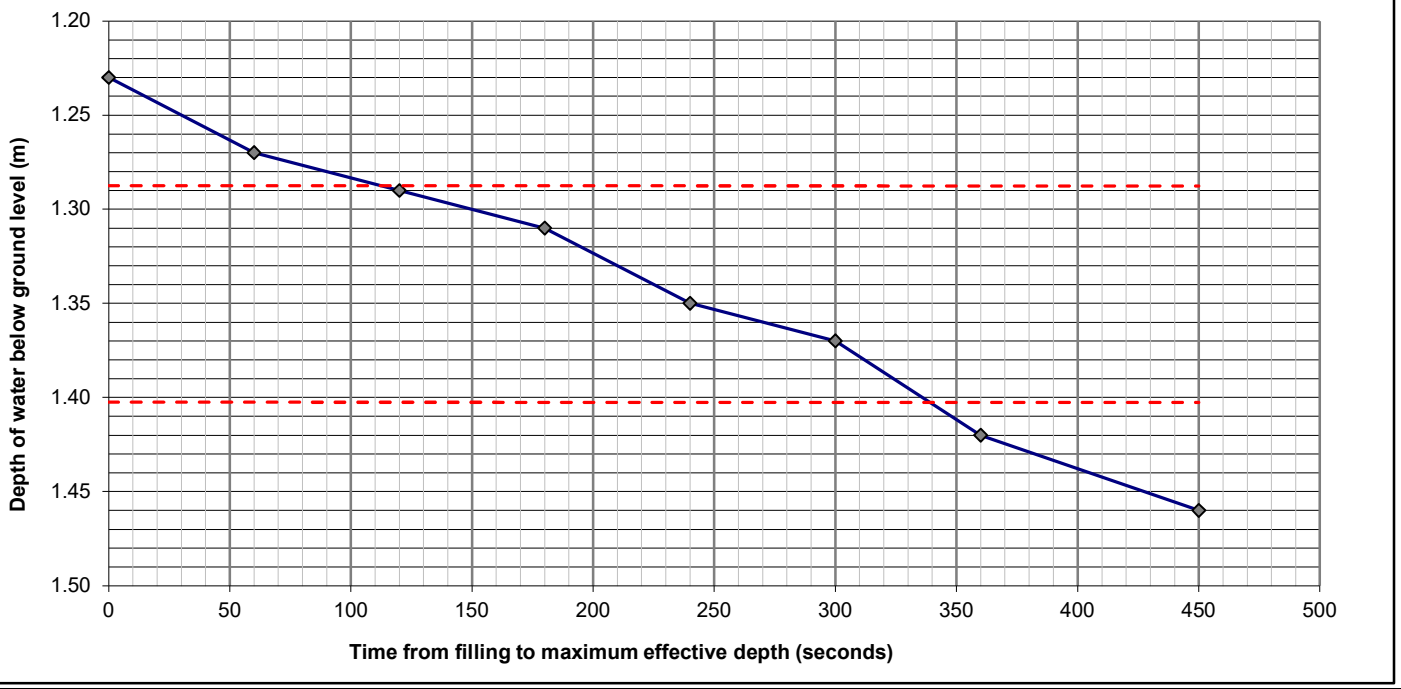
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Checked by:	JC

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Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA05
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.230
60	1.00	1.270
120	2.00	1.290
180	3.00	1.310
240	4.00	1.350
300	5.00	1.370
360	6.00	1.420
450	7.50	1.460

PIT LENGTH (m):	1.70
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.46

Pit construction
Very poor stability, pit collapse to 1.4m within first minute of testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.23
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.12
Effective depth of Pit	(m)	0.23
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.23
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.17
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.12
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.55
Time at 75% effective depth (p_{75})	(s)	113
Time at 25% effective depth (p_{25})	(s)	339
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	226

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**3.35E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

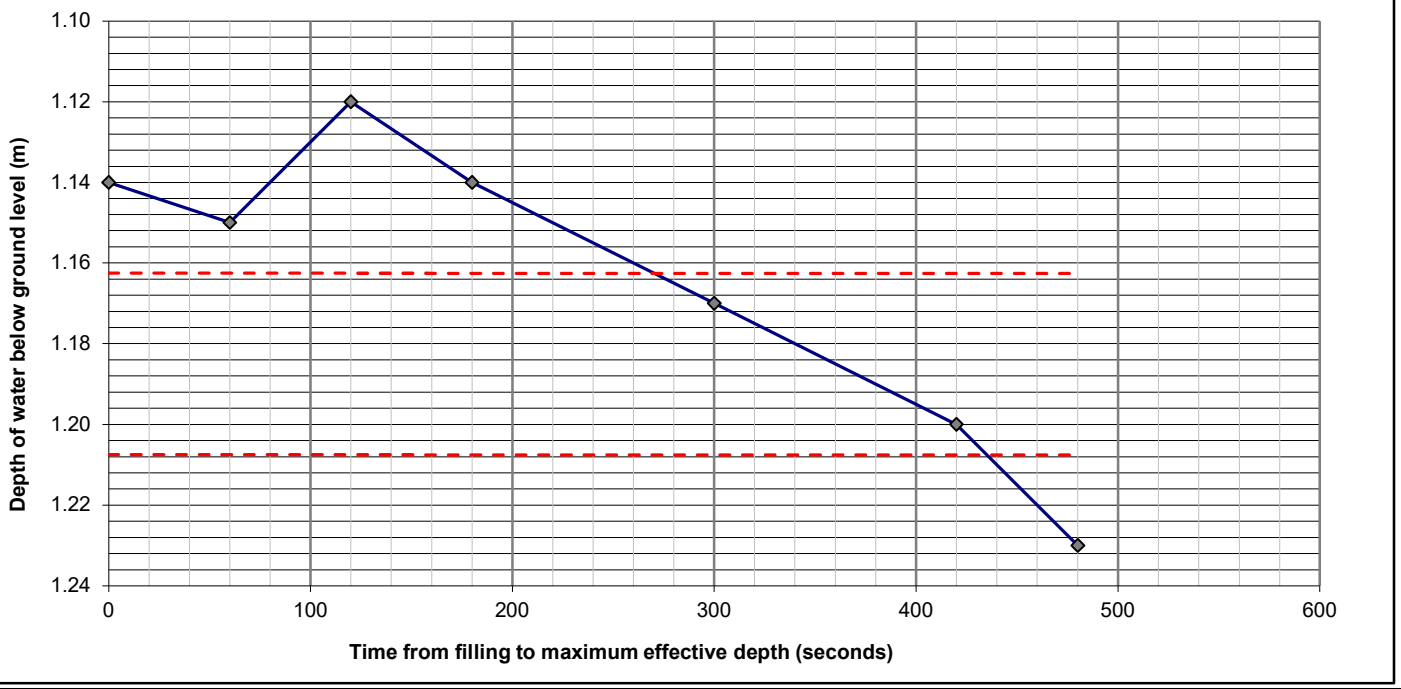
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DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA05
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0	1.140
60	1	1.150
120	2	1.120
180	3	1.140
300	5	1.170
420	7	1.200
480	8	1.230

PIT LENGTH (m):	1.80
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.23

Pit construction

Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.10
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.05
Effective depth of Pit	(m)	0.09
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.10
Level of water in pit at 75% effective depth (p_{75})	(m)	0.02
Level of water in pit at 25% effective depth (p_{25})	(m)	0.07
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.05
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.30
Time at 75% effective depth (p_{75})	(s)	270
Time at 25% effective depth (p_{25})	(s)	435
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	165

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**2.28E-04**

WATER INPUT: I 300

GEOLOGY OF TEST SECTION:

SAND

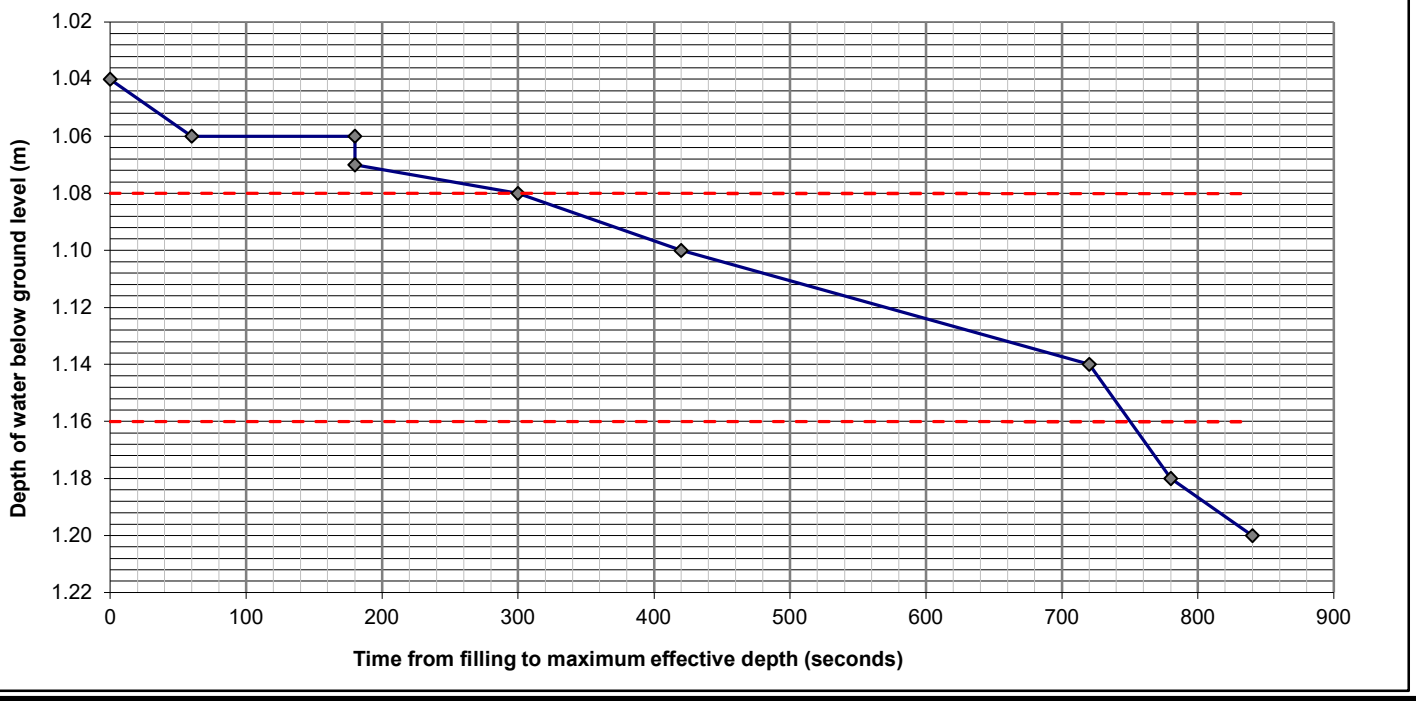
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TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA05
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.040
60	1.00	1.060
180	3.00	1.060
180	3.00	1.070
300	5.00	1.080
420	7.00	1.100
720	12.00	1.140
780	13.00	1.180
840	14.00	1.200

PIT LENGTH (m):	1.75
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.20

Pit construction

Very poor stability, pit collapses during testing <1min

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.17
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.08
Effective depth of Pit	(m)	0.16
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.17
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.12
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.08
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.43
Time at 75% effective depth (p_{75})	(s)	301
Time at 25% effective depth (p_{25})	(s)	750
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	449

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.31E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

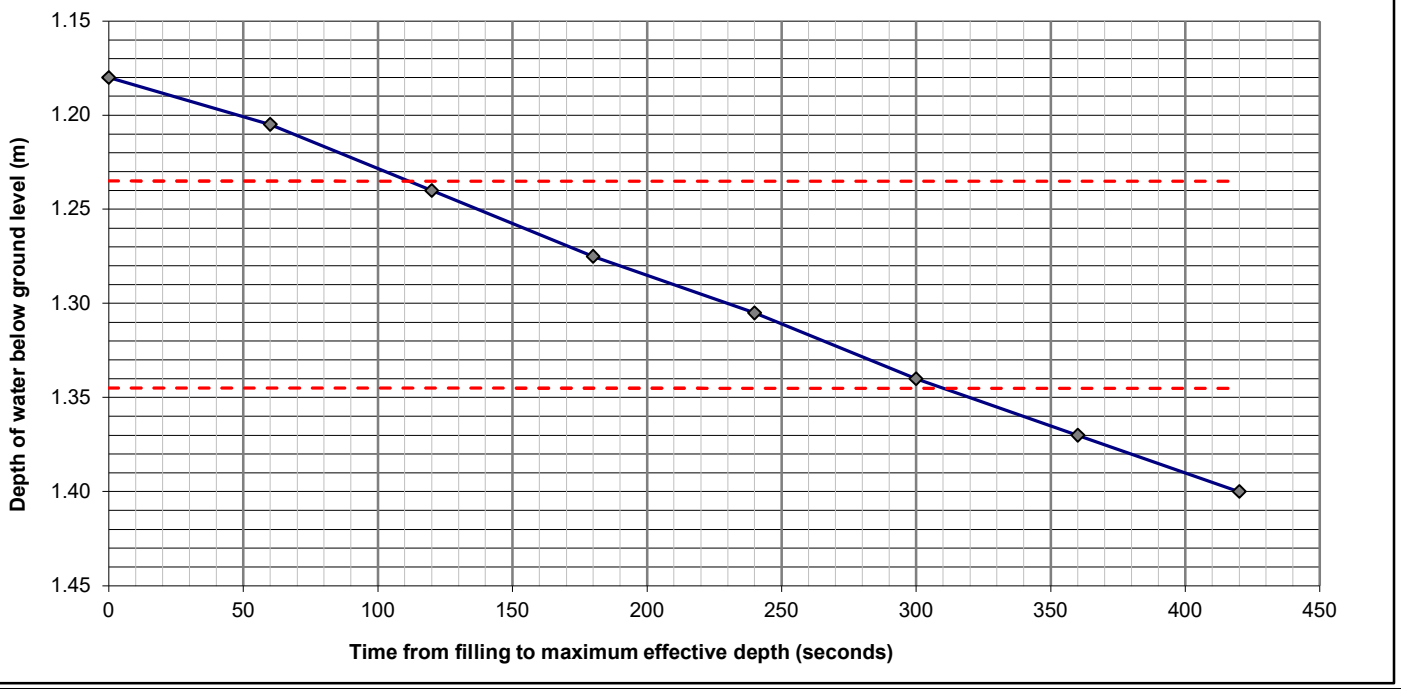
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Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA06
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.180
60	1.00	1.205
120	2.00	1.240
180	3.00	1.275
240	4.00	1.305
300	5.00	1.340
360	6.00	1.370
420	7.00	1.400

PIT LENGTH (m):	1.50
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.40

Pit construction
Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.20
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.10
Effective depth of Pit	(m)	0.22
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.20
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.17
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.10
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.36
Time at 75% effective depth (p_{75})	(s)	112
Time at 25% effective depth (p_{25})	(s)	310
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	198

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**3.66E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

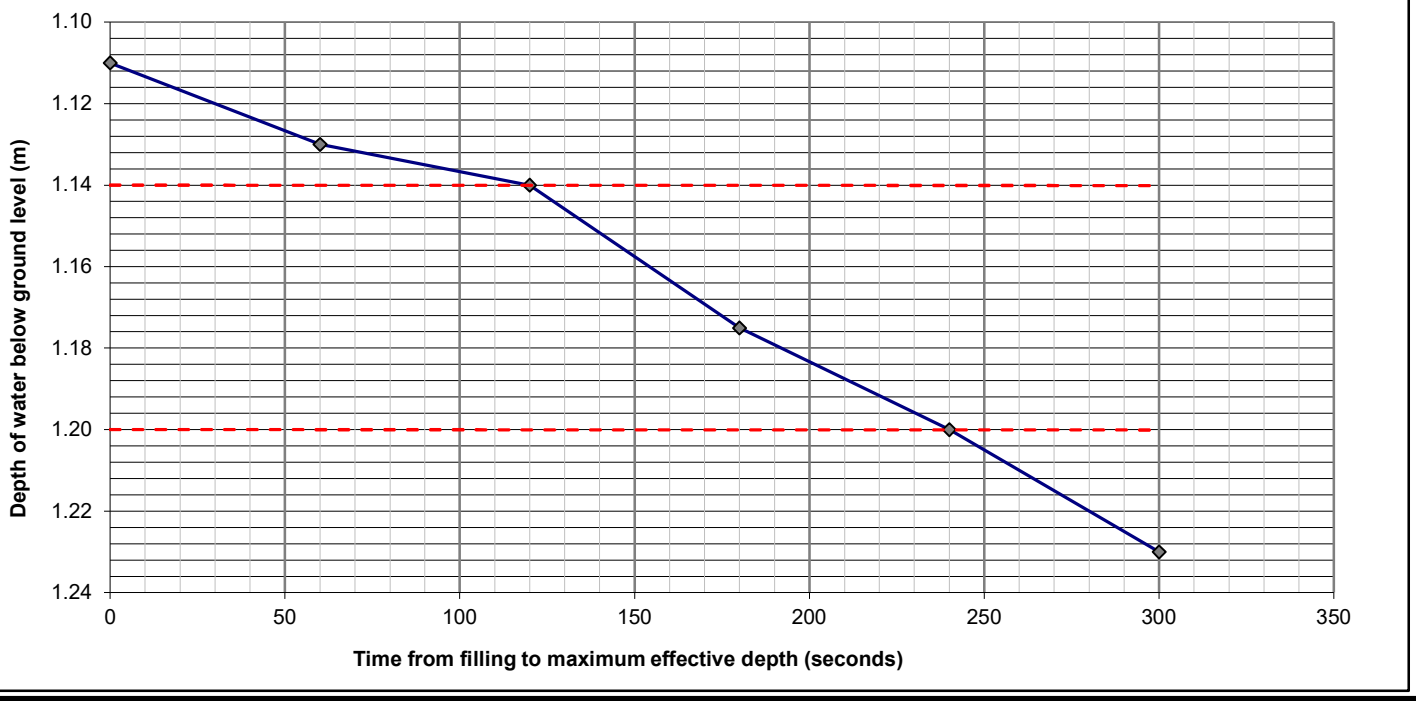
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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA06
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.110
60	1.00	1.130
120	2.00	1.140
180	3.00	1.175
240	4.00	1.200
300	5.00	1.230

PIT LENGTH (m):	1.50
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.23

Pit construction
Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.11
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.05
Effective depth of Pit	(m)	0.12
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.11
Level of water in pit at 75% effective depth (p_{75})	(m)	0.03
Level of water in pit at 25% effective depth (p_{25})	(m)	0.09
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.05
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.15
Time at 75% effective depth (p_{75})	(s)	120
Time at 25% effective depth (p_{25})	(s)	240
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	120

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$	(m/s)	**3.91E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

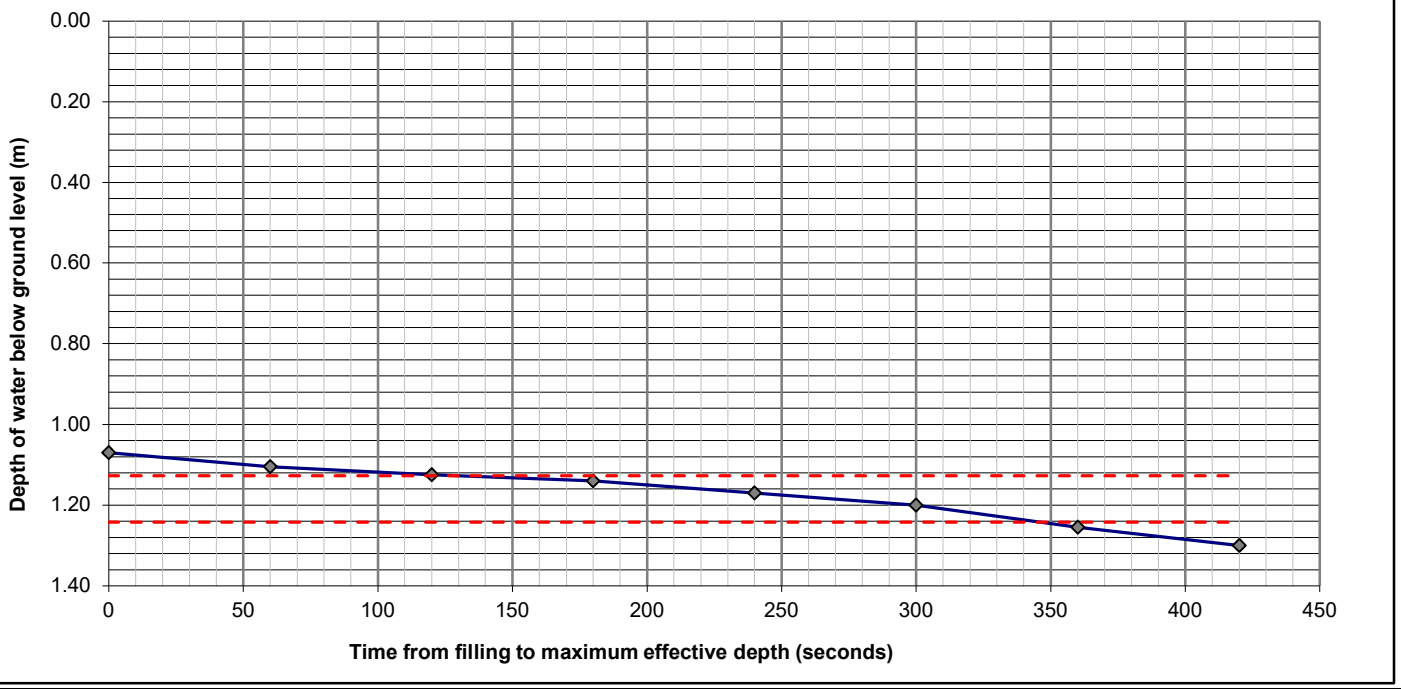
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Checked by:	JC

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Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA06
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.070
60	1.00	1.105
120	2.00	1.125
180	3.00	1.140
240	4.00	1.170
300	5.00	1.200
360	6.00	1.255
420	7.00	1.300

PIT LENGTH (m):	1.50
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.30

Pit construction
Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.21
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.10
Effective depth of Pit	(m)	0.23
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.21
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.17
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.10
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.38
Time at 75% effective depth (p_{75})	(s)	130
Time at 25% effective depth (p_{25})	(s)	346
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	216

OUTPUT:

SOIL INFILTRATION RATE (f) $\dfrac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$ (m/s) **3.46E-04**

WATER INPUT: I 250

GEOLOGY OF TEST SECTION:
SAND

Compiled by: TR
Checked by: JC

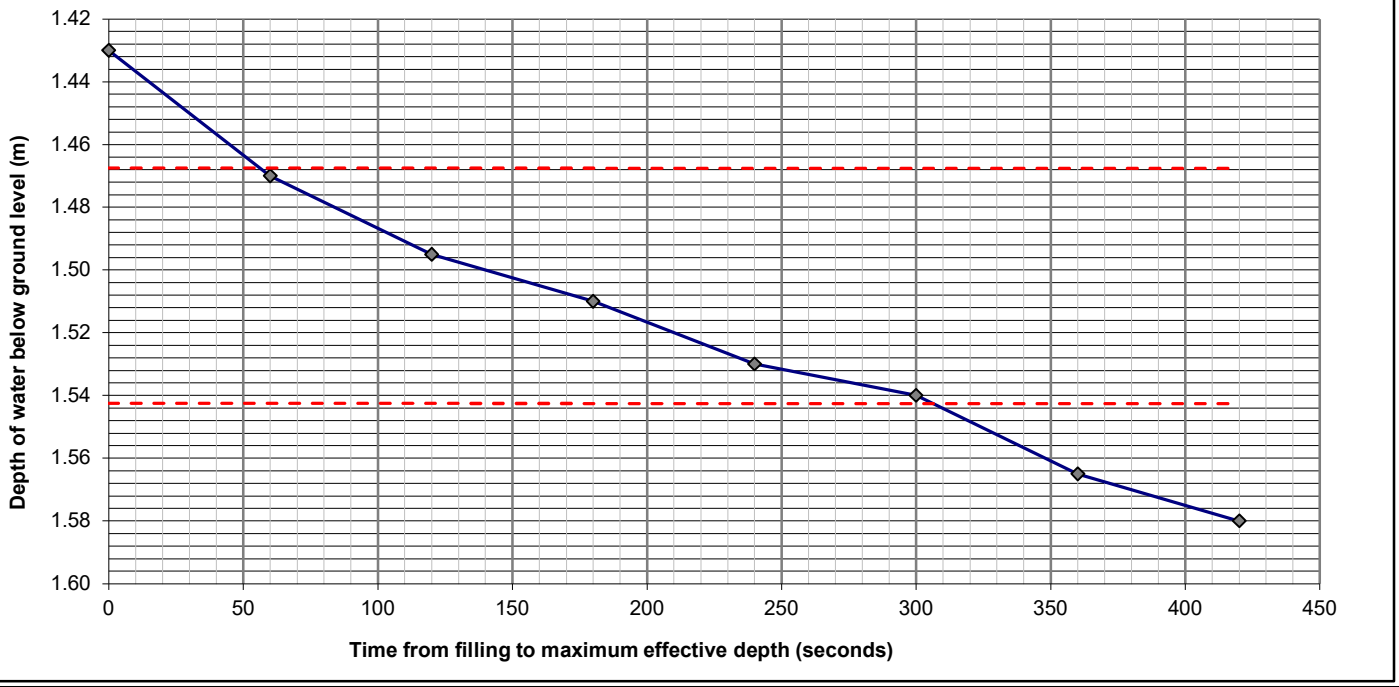
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Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA07
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.430
60	1.00	1.470
120	2.00	1.495
180	3.00	1.510
240	4.00	1.530
300	5.00	1.540
360	6.00	1.565
420	7.00	1.580

PIT LENGTH (m):	1.70
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.58

Pit construction

Very poor stability, pit collapse to 1.58m within first minute of testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.15
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.08
Effective depth of Pit	(m)	0.15
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.15
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.11
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.08
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.37
Time at 75% effective depth (p_{75})	(s)	56
Time at 25% effective depth (p_{25})	(s)	306
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	250

OUTPUT:

SOIL INFILTRATION RATE (f) $\dfrac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$ (m/s) **2.25E-04**

WATER INPUT: I 250

GEOLOGY OF TEST SECTION:

SAND

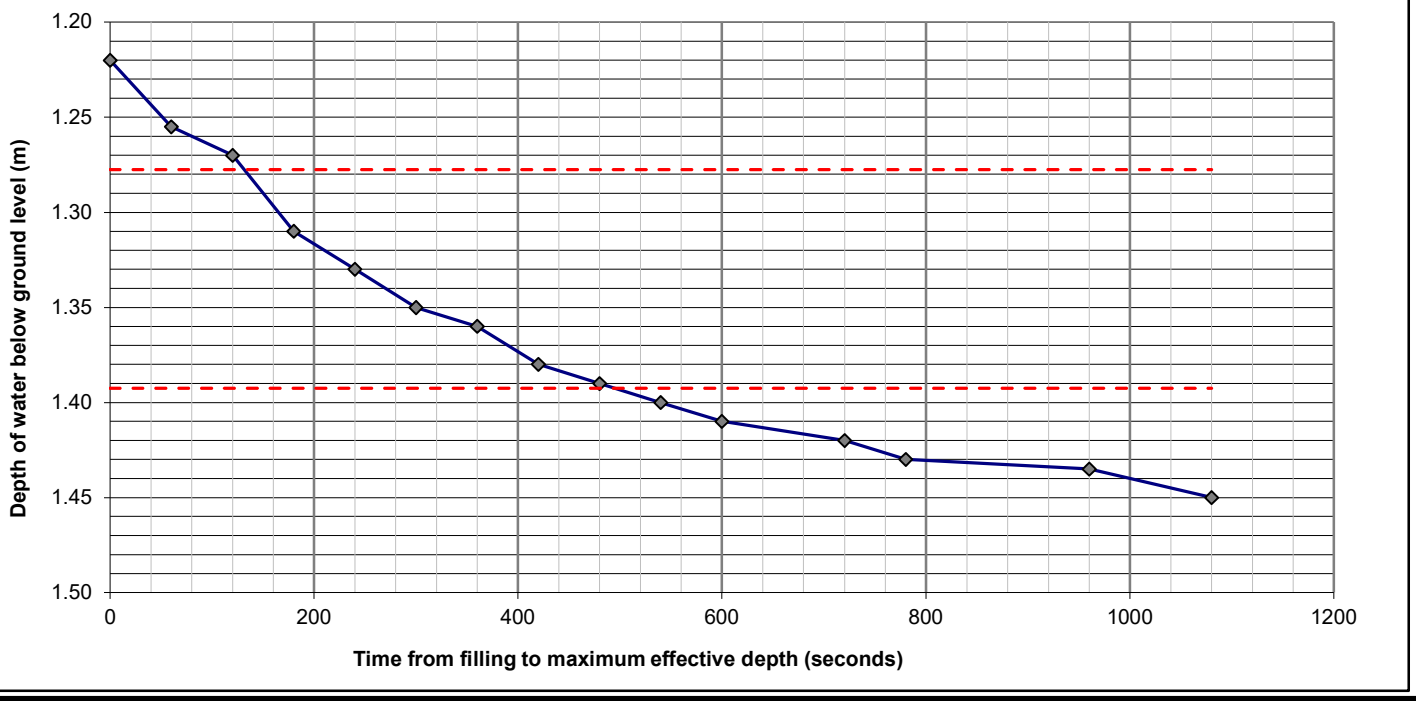
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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA07
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0	1.220
60	1	1.255
120	2	1.270
180	3	1.310
240	4	1.330
300	5	1.350
360	6	1.360
420	7.00	1.380
480	8.00	1.390
540	9.00	1.400
600	10.00	1.410
720	12.00	1.420
780	13.00	1.430
960	16.00	1.435
1080	18.00	1.450

PIT LENGTH (m):	1.80	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.45	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.25
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.12
Effective depth of Pit	(m)	0.23
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.25
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.17
Effective volume between 75% & 25% depth Vp_{75-25} = V x Pg	(m^3)	0.12
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.63
Time at 75% effective depth (p_{75})	(s)	131
Time at 25% effective depth (p_{25})	(s)	495
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	364

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**2.09E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

Compiled by:	CS
Checked by:	JC

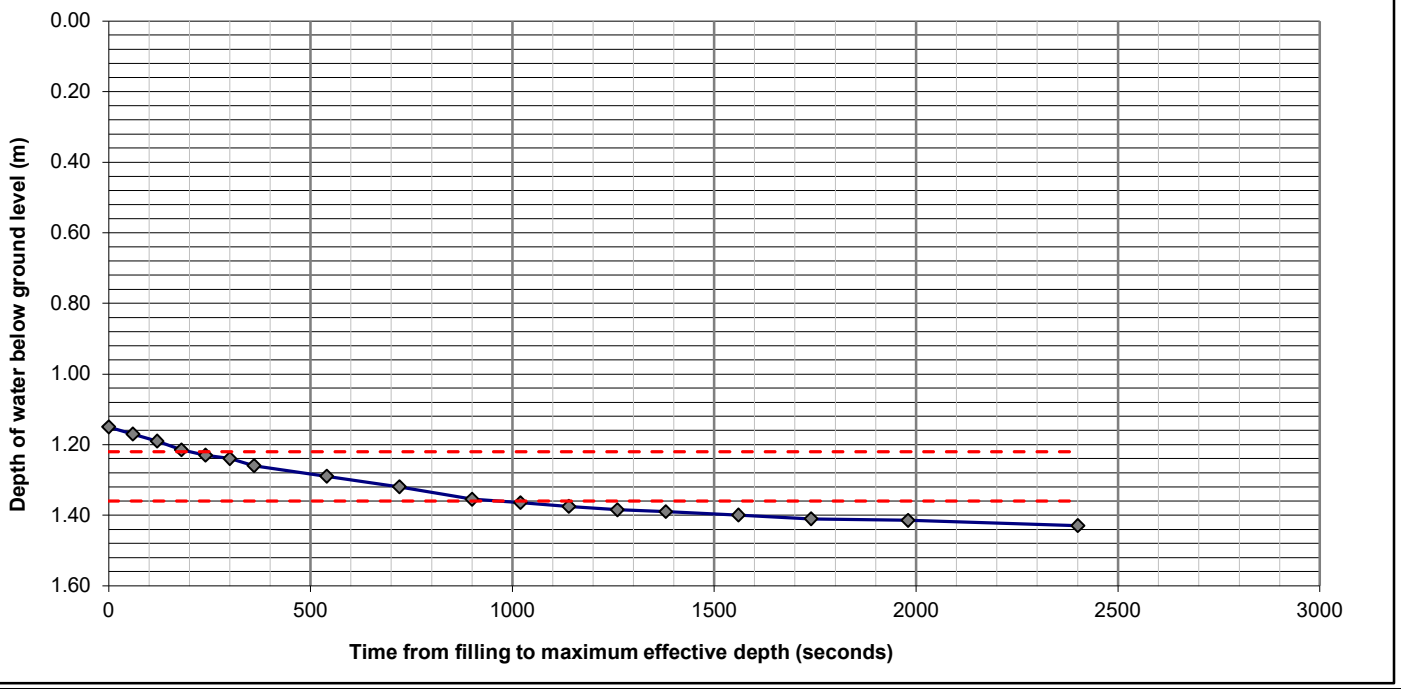
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TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA07
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.150
60	1.00	1.170
120	2.00	1.190
180	3.00	1.215
240	4.00	1.230
300	5.00	1.240
360	6.00	1.260
540	9.00	1.290
720	12.00	1.320
900	15.00	1.355
1020	17.00	1.365
1140	19.00	1.375
1260	21.00	1.385
1380	23.00	1.390
1560	26.00	1.400
1740	29.00	1.410
1980	33.00	1.415
2400	40.00	1.430

PIT LENGTH (m):	1.75	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing <1min
PIT DEPTH (m):	1.43	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.29
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.15
Effective depth of Pit	(m)	0.28
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.29
Level of water in pit at 75% effective depth (p_{75})	(m)	0.07
Level of water in pit at 25% effective depth (p_{25})	(m)	0.21
Effective volume between 75% & 25% depth Vp_{75-25} = V x Pg	(m^3)	0.15
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.71
Time at 75% effective depth (p_{75})	(s)	200
Time at 25% effective depth (p_{25})	(s)	961
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	760

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.13E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

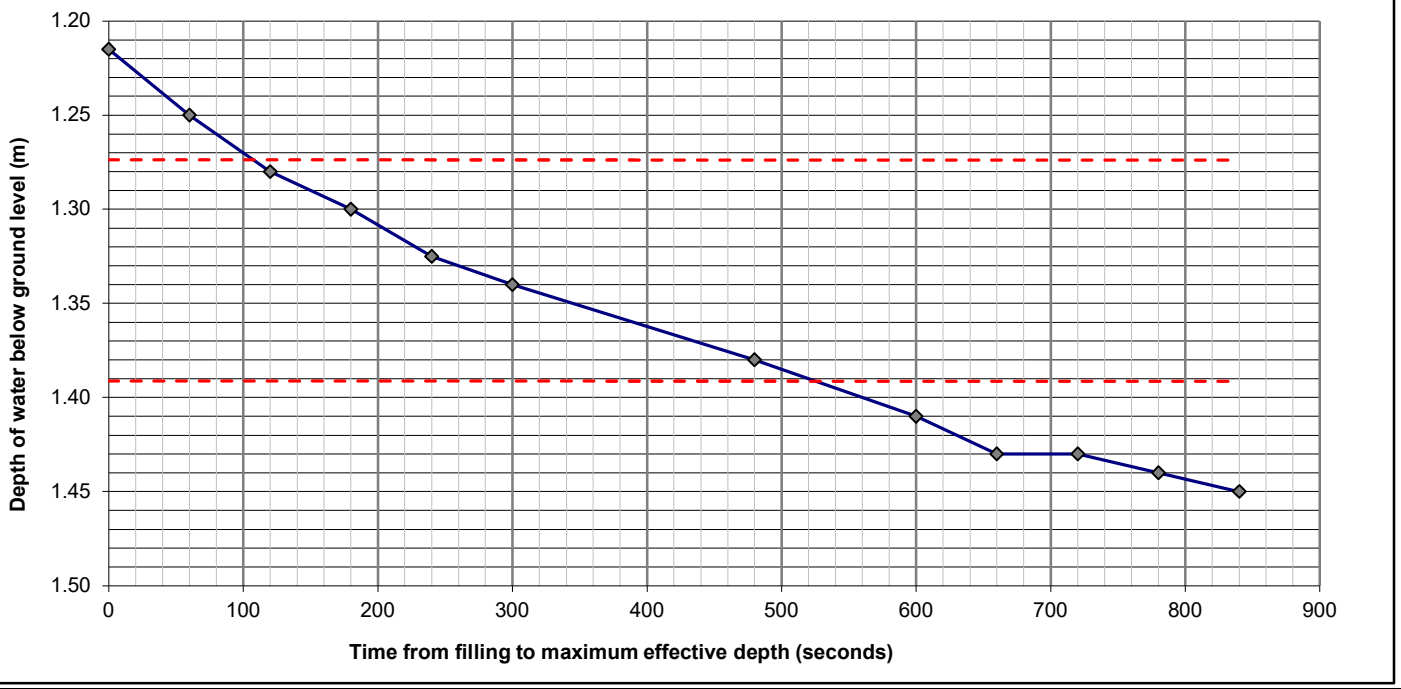
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Checked by: JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA08
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.215
60	1.00	1.250
120	2.00	1.280
180	3.00	1.300
240	4.00	1.325
300	5.00	1.340
480	8.00	1.380
600	10.00	1.410
660	11.00	1.430
720	12.00	1.430
780	13.00	1.440
840	14.00	1.450

PIT LENGTH (m):	1.30
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.45

Pit construction
Very poor stability, pit collapses during testing

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.18
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.09
Effective depth of Pit	(m)	0.24
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.18
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.18
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.09
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.23
Time at 75% effective depth (p_{75})	(s)	108
Time at 25% effective depth (p_{25})	(s)	525
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	417

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.79E-04**

WATER INPUT:	I	250

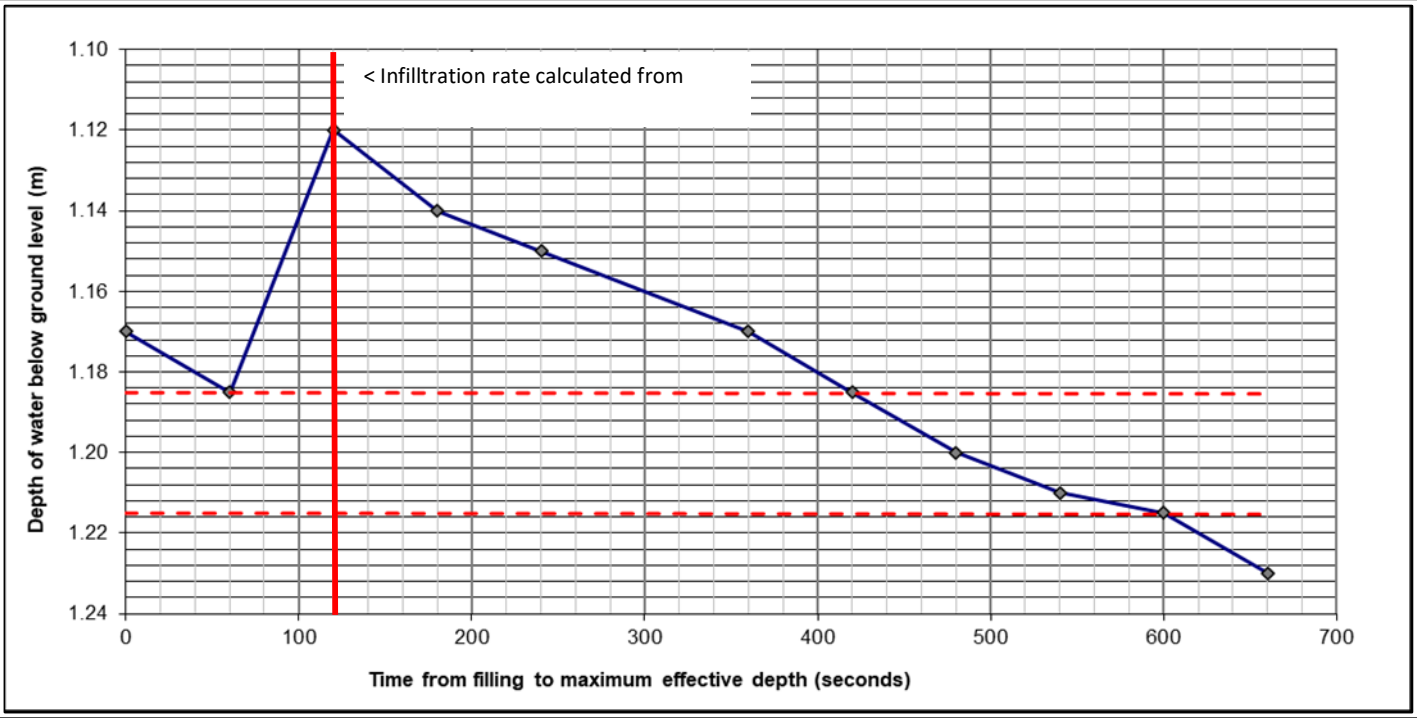
GEOLOGY OF TEST SECTION:
SAND

Compiled by: TR
Checked by: JC

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DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA08
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
120	2.00	1.120
180	3.00	1.140
240	4.00	1.150
360	6.00	1.170
420	7.00	1.185
480	8.00	1.200
540	9.00	1.210
600	10.00	1.215
660	11.00	1.230

PIT LENGTH (m):	1.55
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.23

Pit construction
Very poor stability, large pit collapse at 2 minutes.

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.10
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.05
Effective depth of Pit	(m)	0.11
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.10
Level of water in pit at 75% effective depth (p_{75})	(m)	0.03
Level of water in pit at 25% effective depth (p_{25})	(m)	0.08
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.05
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.17
Time at 75% effective depth (p_{75})	(s)	225
Time at 25% effective depth (p_{25})	(s)	495
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	270

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.63E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

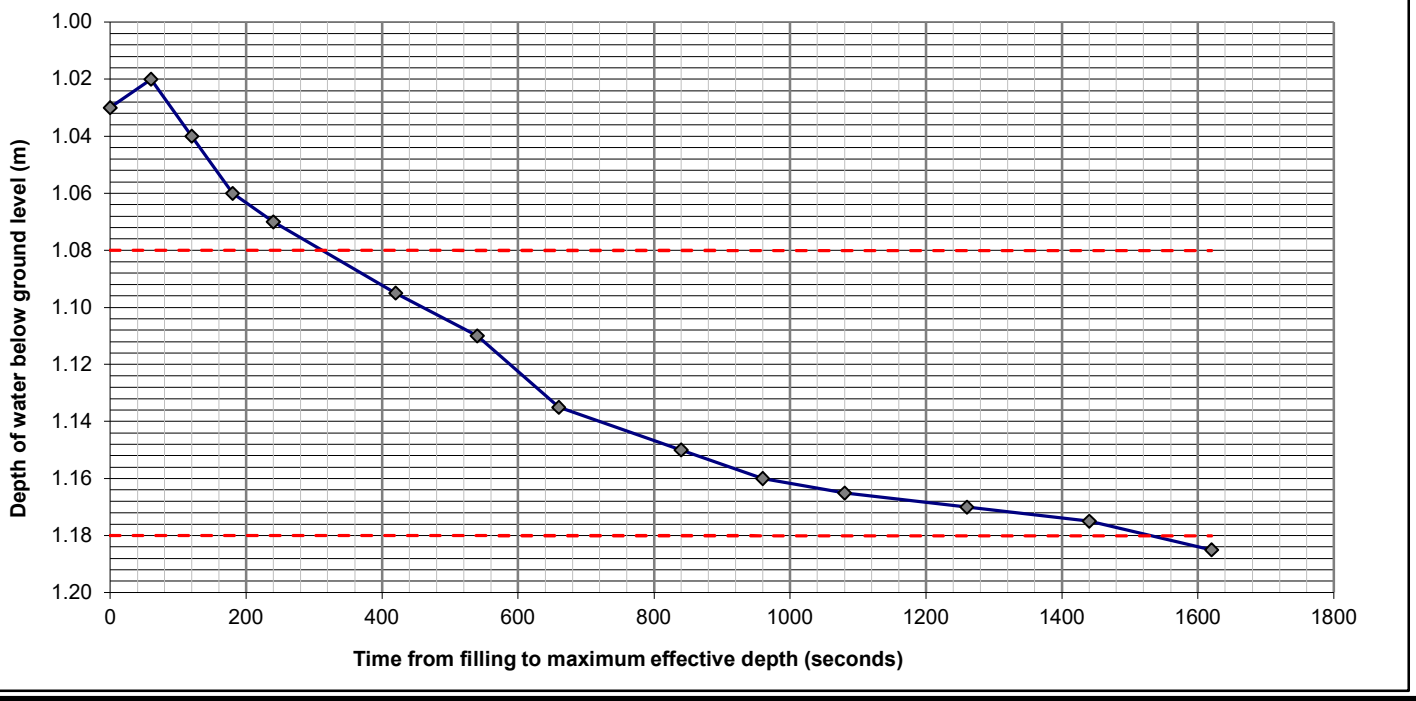
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Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA08
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.030
60	1.00	1.020
120	2.00	1.040
180	3.00	1.060
240	4.00	1.070
420	7.00	1.095
540	9.00	1.110
660	11.00	1.135
840	14.00	1.150
960	16.00	1.160
1080	18.00	1.165
1260	21.00	1.170
1440	24.00	1.175
1620	27.00	1.185

PIT LENGTH (m):	1.55
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.23

Pit construction

Very poor stability, large pit collapse at 1 minute.

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.19
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.09
Effective depth of Pit	(m)	0.20
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.19
Level of water in pit at 75% effective depth (p_{75})	(m)	0.05
Level of water in pit at 25% effective depth (p_{25})	(m)	0.15
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.09
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.36
Time at 75% effective depth (p_{75})	(s)	312
Time at 25% effective depth (p_{25})	(s)	1531
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	1219

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**5.61E-05**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

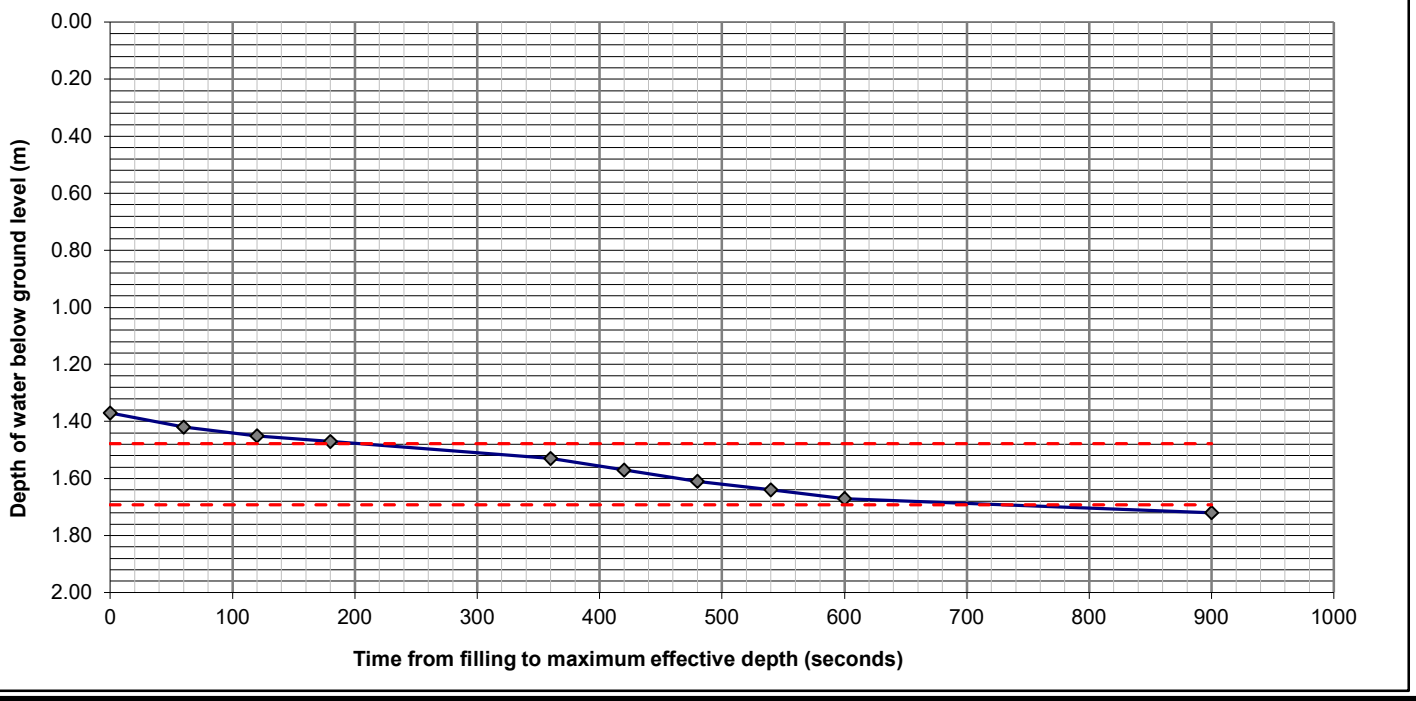
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Checked by:	JC

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TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA09
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.370
60	1.00	1.420
120	2.00	1.450
180	3.00	1.470
360	6.00	1.530
420	7.00	1.570
480	8.00	1.610
540	9.00	1.640
600	10.00	1.670
900	15.00	1.720

PIT LENGTH (m):	1.30	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapse
PIT DEPTH (m):	1.80	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.34
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.17
Effective depth of Pit	(m)	0.43
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.34
Level of water in pit at 75% effective depth (p_{75})	(m)	0.11
Level of water in pit at 25% effective depth (p_{25})	(m)	0.32
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.17
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.60
Time at 75% effective depth (p_{75})	(s)	203
Time at 25% effective depth (p_{25})	(s)	735
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	533

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.97E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

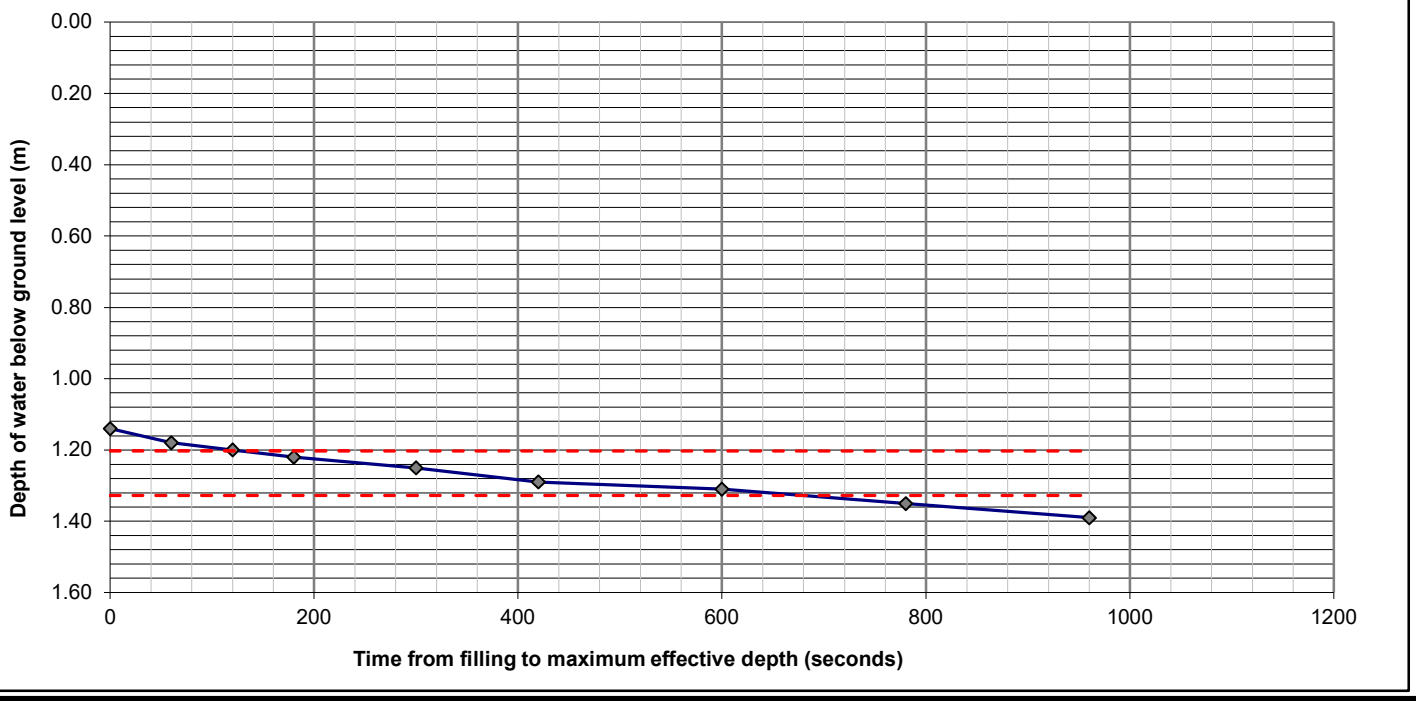
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TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA09
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0	1.140
60	1	1.180
120	2	1.200
180	3	1.220
300	5	1.250
420	7	1.290
600	10	1.310
780	13.00	1.350
960	16.00	1.390

PIT LENGTH (m):	1.30	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.39	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.20
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.10
Effective depth of Pit	(m)	0.25
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.20
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.19
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.10
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.26
Time at 75% effective depth (p_{75})	(s)	128
Time at 25% effective depth (p_{25})	(s)	679
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	551

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.41E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

Compiled by:	CS
Checked by:	JC

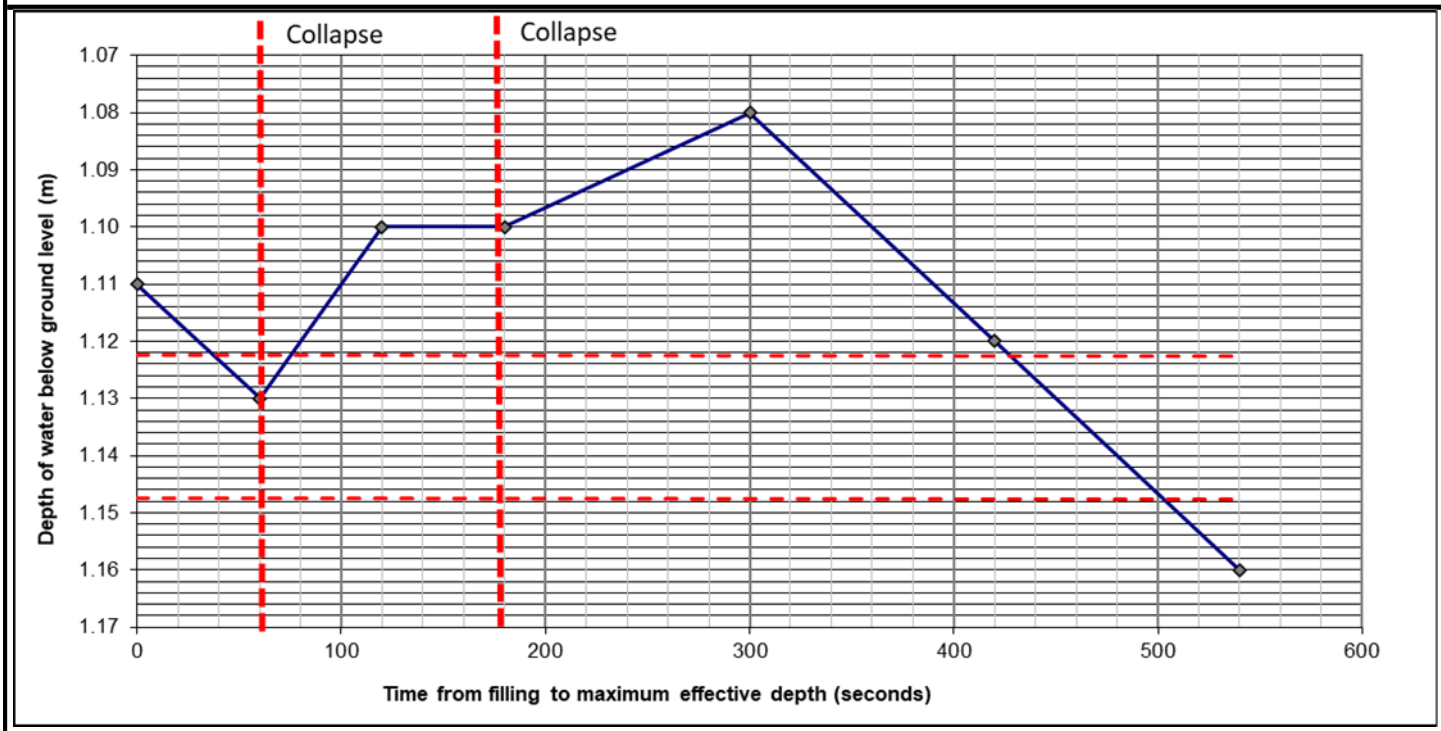
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TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA09
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
300	5.00	1.080
420	7.00	1.120
540	9.00	1.160

PIT LENGTH (m):	1.30
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.16

Pit construction

Very poor stability, pit collapses during testing <1min

INPUT PARAMETERS:

Total volume of pit	(m^3)	0.06
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.03
Effective depth of Pit	(m)	0.08
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.06
Level of water in pit at 75% effective depth (p_{75})	(m)	0.02
Level of water in pit at 25% effective depth (p_{25})	(m)	0.06
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.03
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	0.93
Time at 75% effective depth (p_{75})	(s)	360
Time at 25% effective depth (p_{25})	(s)	480
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	120

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$	(m/s)	**2.79E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

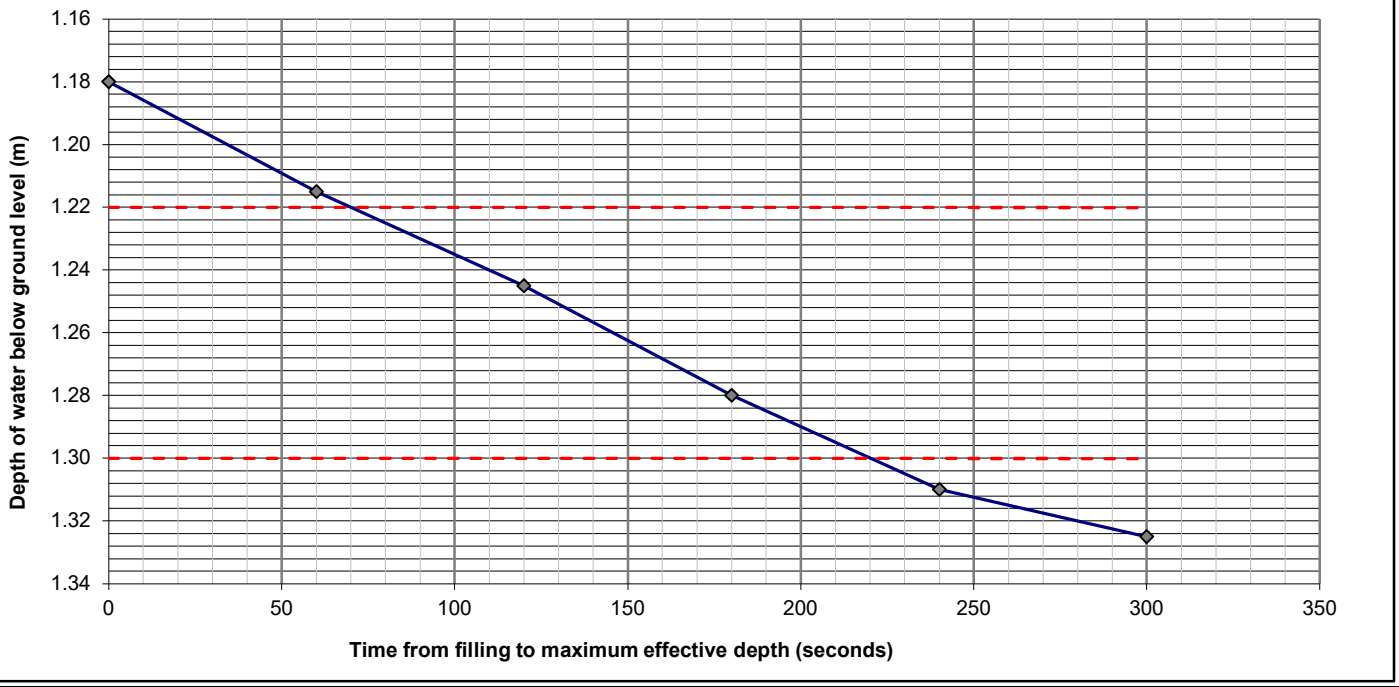
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Checked by:	JC

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Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA10
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.180
60	1.00	1.215
120	2.00	1.245
180	3.00	1.280
240	4.00	1.310
300	5.00	1.325

PIT LENGTH (m):	1.70
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.34

Pit construction
Very poor stability.

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.16
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.08
Effective depth of Pit	(m)	0.16
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.16
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.12
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.08
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.39
Time at 75% effective depth (p_{75})	(s)	70
Time at 25% effective depth (p_{25})	(s)	220
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	150

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**3.92E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

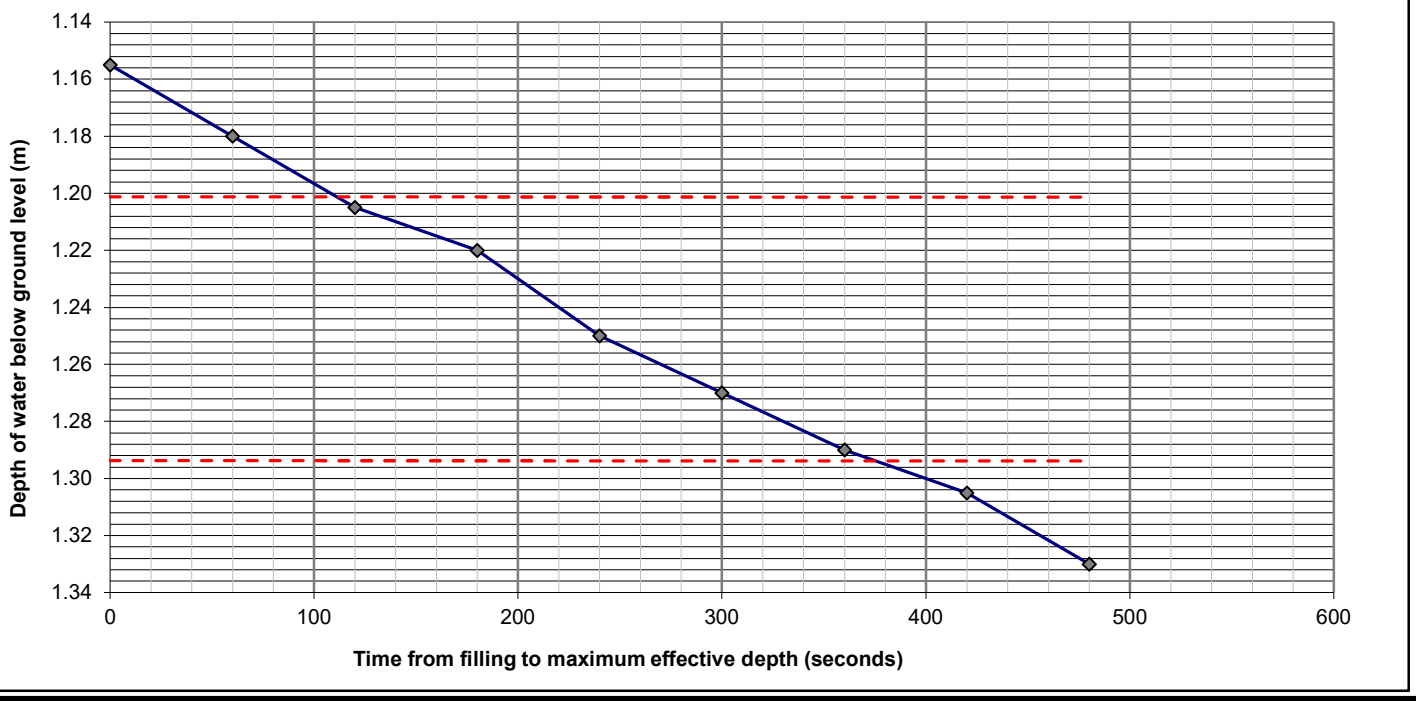
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Checked by: JC

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Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA10
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.155
60	1.00	1.180
120	2.00	1.205
180	3.00	1.220
240	4.00	1.250
300	5.00	1.270
360	6.00	1.290
420	7.00	1.305
480	8.00	1.330

PIT LENGTH (m):	1.70
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.34

Pit construction
Very poor stability.

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.19
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.09
Effective depth of Pit	(m)	0.19
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.19
Level of water in pit at 75% effective depth (p_{75})	(m)	0.05
Level of water in pit at 25% effective depth (p_{25})	(m)	0.14
Effective volume between 75% & 25% depth Vp_{75-25} = V x Pg	(m^3)	0.09
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.45
Time at 75% effective depth (p_{75})	(s)	111
Time at 25% effective depth (p_{25})	(s)	375
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	264

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**2.47E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

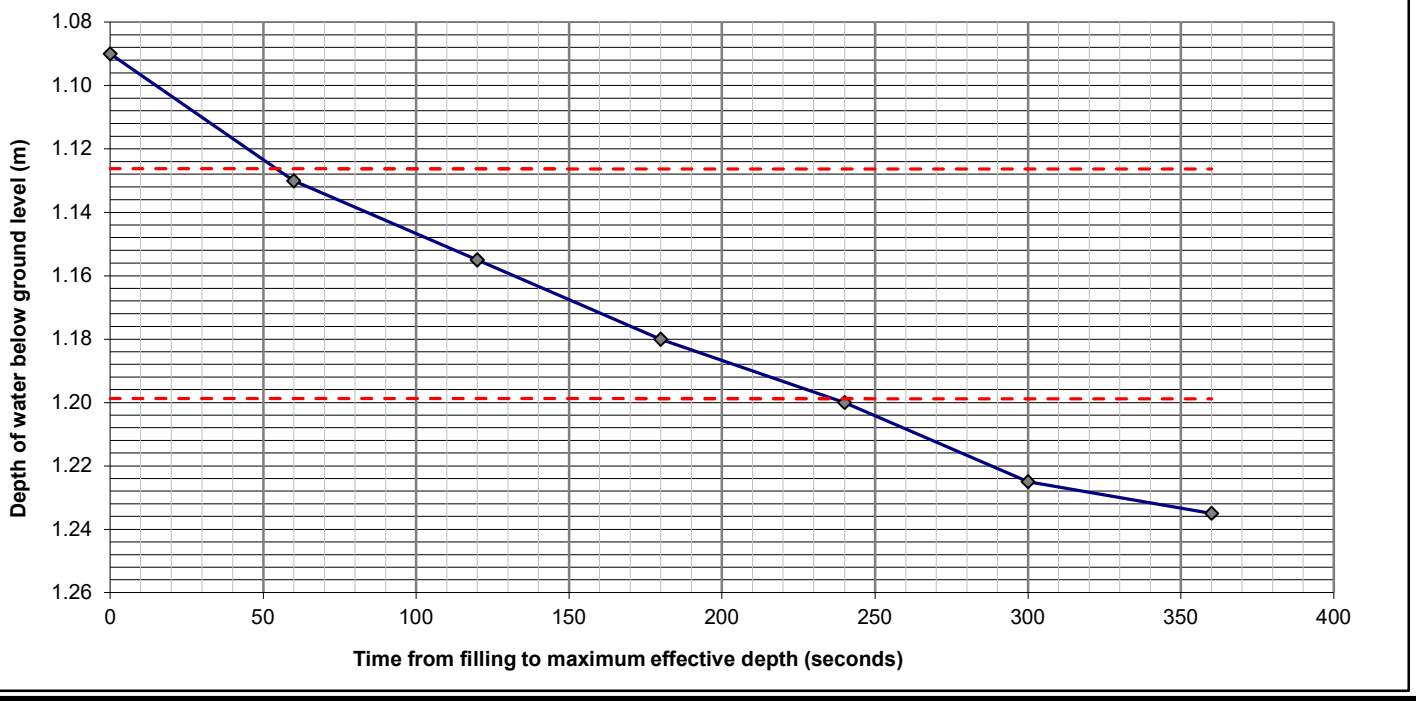
Compiled by:	TR
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA10
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.090
60	1.00	1.130
120	2.00	1.155
180	3.00	1.180
240	4.00	1.200
300	5.00	1.225
360	6.00	1.235

PIT LENGTH (m):	1.70	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability.
PIT DEPTH (m):	1.24	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.15
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.07
Effective depth of Pit	(m)	0.15
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.15
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.11
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.07
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.35
Time at 75% effective depth (p_{75})	(s)	55
Time at 25% effective depth (p_{25})	(s)	237
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	182

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$	(m/s)	**3.00E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

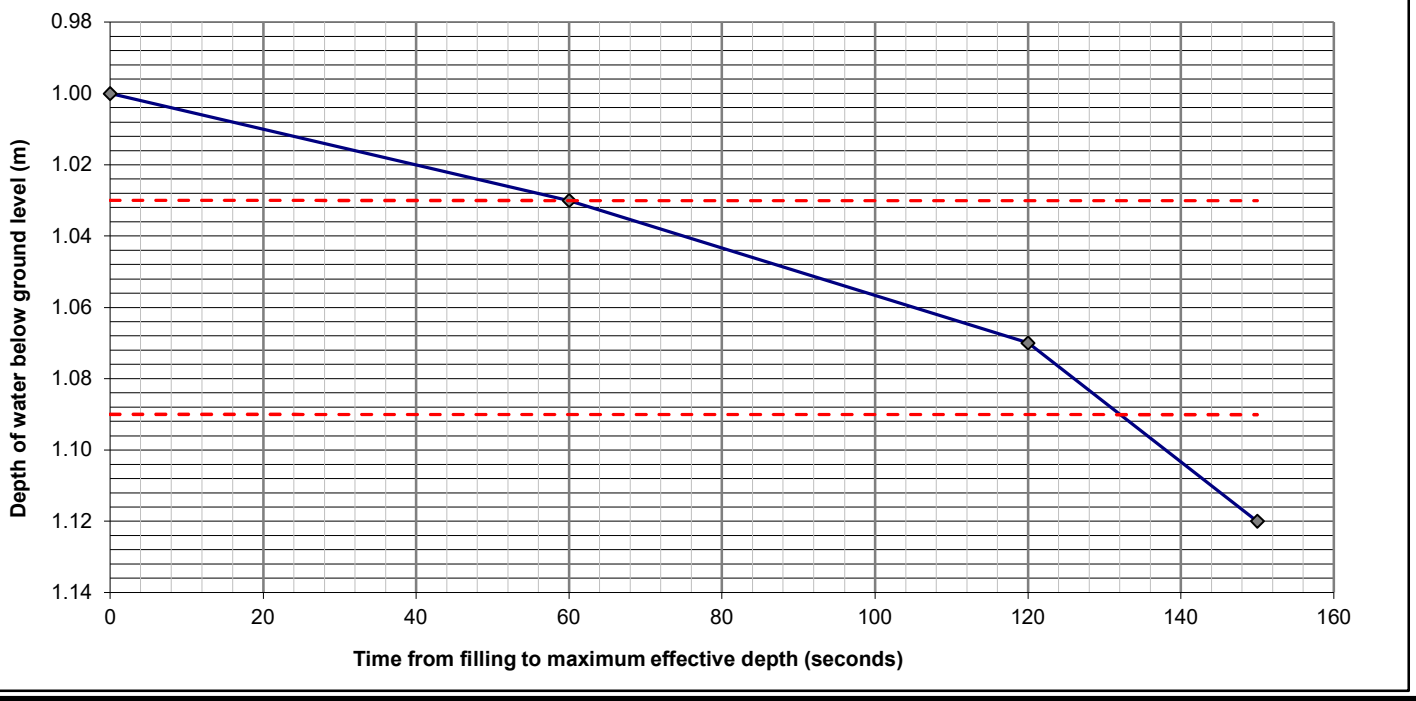
Compiled by:	TR
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA11
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.000
60	1.00	1.030
120	2.00	1.070
150	2.50	1.120

PIT LENGTH (m):	1.20
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.12

Pit construction
Very poor stability.

INPUT PARAMETERS:

Total volume of pit	(m^3)	0.09
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.04
Effective depth of Pit	(m)	0.12
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.09
Level of water in pit at 75% effective depth (p_{75})	(m)	0.03
Level of water in pit at 25% effective depth (p_{25})	(m)	0.09
Effective volume between 75% & 25% depth Vp_{75-25} = V x Pg	(m^3)	0.04
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	0.94
Time at 75% effective depth (p_{75})	(s)	60
Time at 25% effective depth (p_{25})	(s)	132
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	72

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**6.43E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

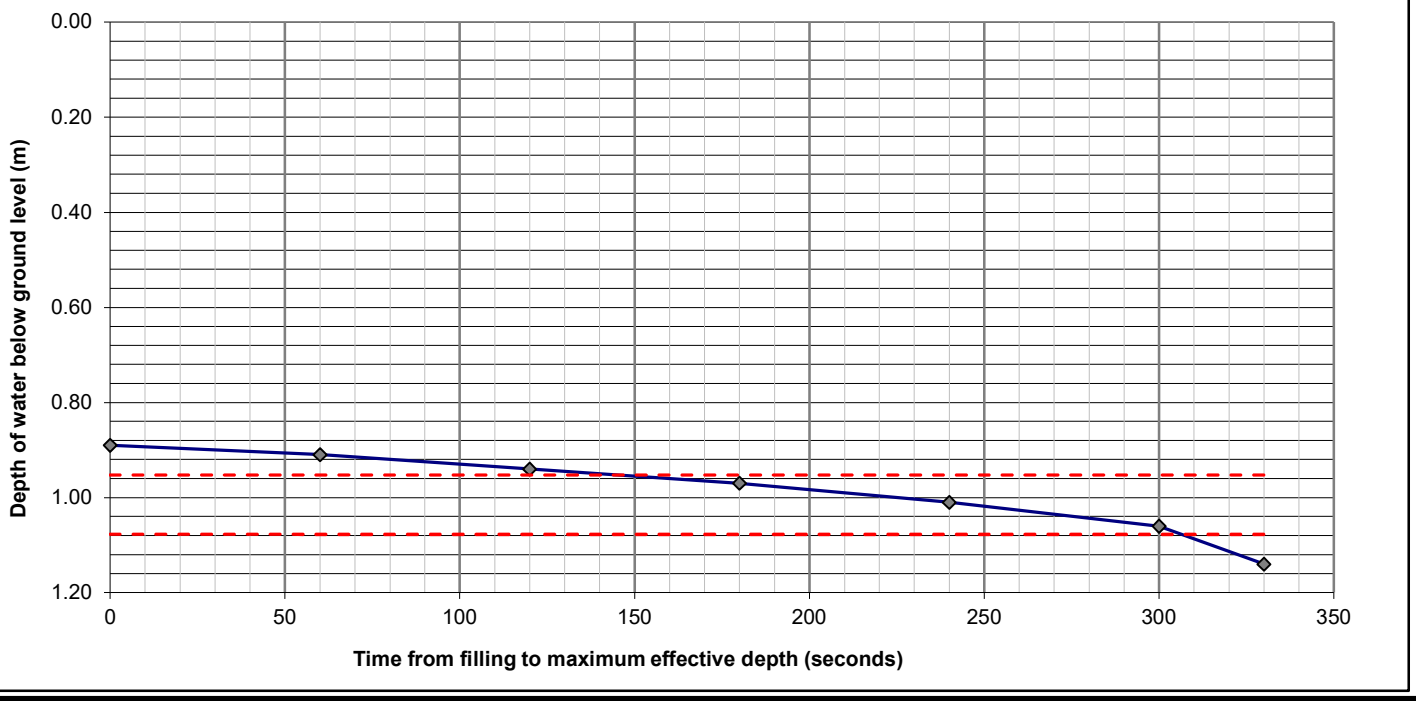
Compiled by:	TR
Checked by:	JC

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Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA11
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.890
60	1.00	0.910
120	2.00	0.940
180	3.00	0.970
240	4.00	1.010
300	5.00	1.060
330	5.50	1.140

PIT LENGTH (m):	1.20
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.14

Pit construction
Very poor stability.

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.18
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.09
Effective depth of Pit	(m)	0.25
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.18
Level of water in pit at 75% effective depth (p_{75})	(m)	0.06
Level of water in pit at 25% effective depth (p_{25})	(m)	0.19
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.09
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.17
Time at 75% effective depth (p_{75})	(s)	145
Time at 25% effective depth (p_{25})	(s)	307
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	161

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**4.76E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
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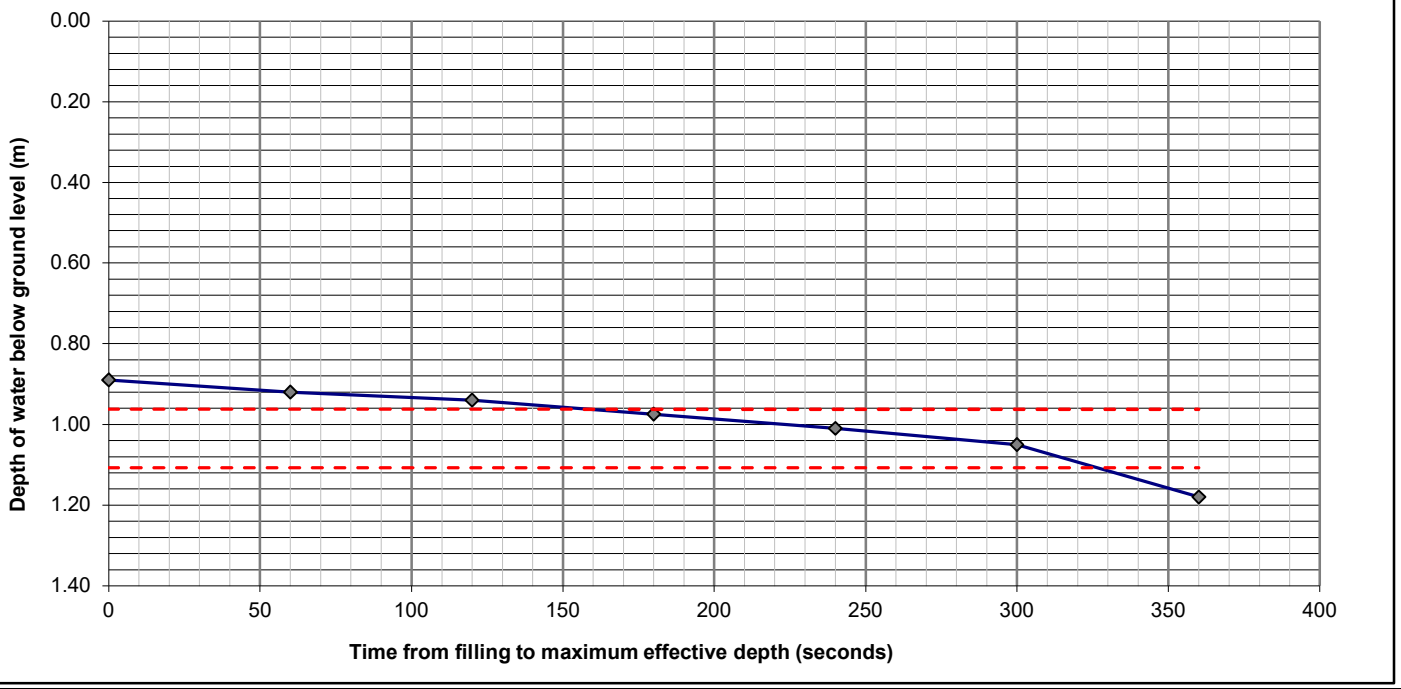
Compiled by:	TR
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	12/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA11
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	0.890
60	1.00	0.920
120	2.00	0.940
180	3.00	0.975
240	4.00	1.010
300	5.00	1.050
360	6.00	1.180

PIT LENGTH (m):	1.20
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.18

Pit construction
Very poor stability.

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.21
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.10
Effective depth of Pit	(m)	0.29
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.21
Level of water in pit at 75% effective depth (p_{75})	(m)	0.07
Level of water in pit at 25% effective depth (p_{25})	(m)	0.22
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.10
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.24
Time at 75% effective depth (p_{75})	(s)	159
Time at 25% effective depth (p_{25})	(s)	327
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	168

OUTPUT:

SOIL INFILTRATION RATE (f) $\dfrac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$ (m/s) **5.01E-04**

WATER INPUT: I 250

GEOLOGY OF TEST SECTION:
SAND

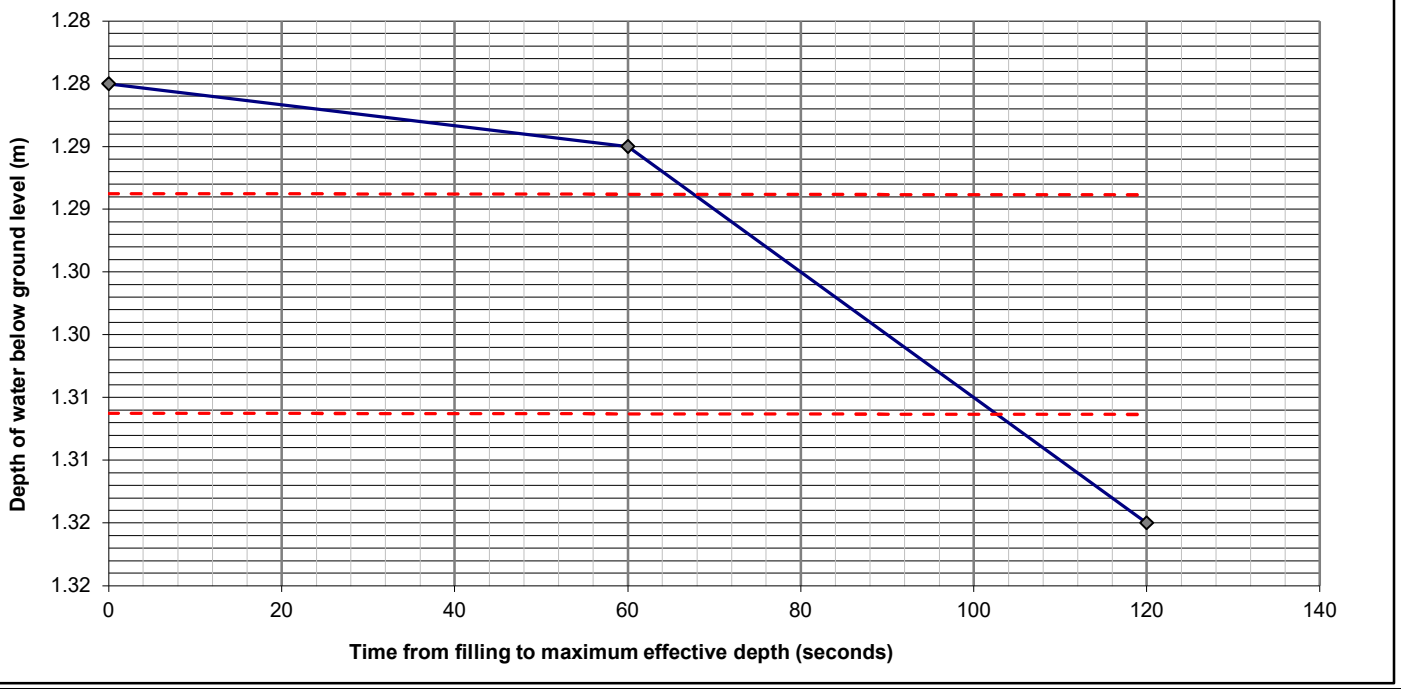
Compiled by: TR
Checked by: JC

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Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA012
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.280
60	1.00	1.285
120	2.00	1.315

PIT LENGTH (m):	1.50
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.32

Pit construction
Very poor stability, pit collapse during fill

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.03
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.02
Effective depth of Pit	(m)	0.03
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.03
Level of water in pit at 75% effective depth (p_{75})	(m)	0.01
Level of water in pit at 25% effective depth (p_{25})	(m)	0.03
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.02
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	0.97
Time at 75% effective depth (p_{75})	(s)	68
Time at 25% effective depth (p_{25})	(s)	103
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	35

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**4.61E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

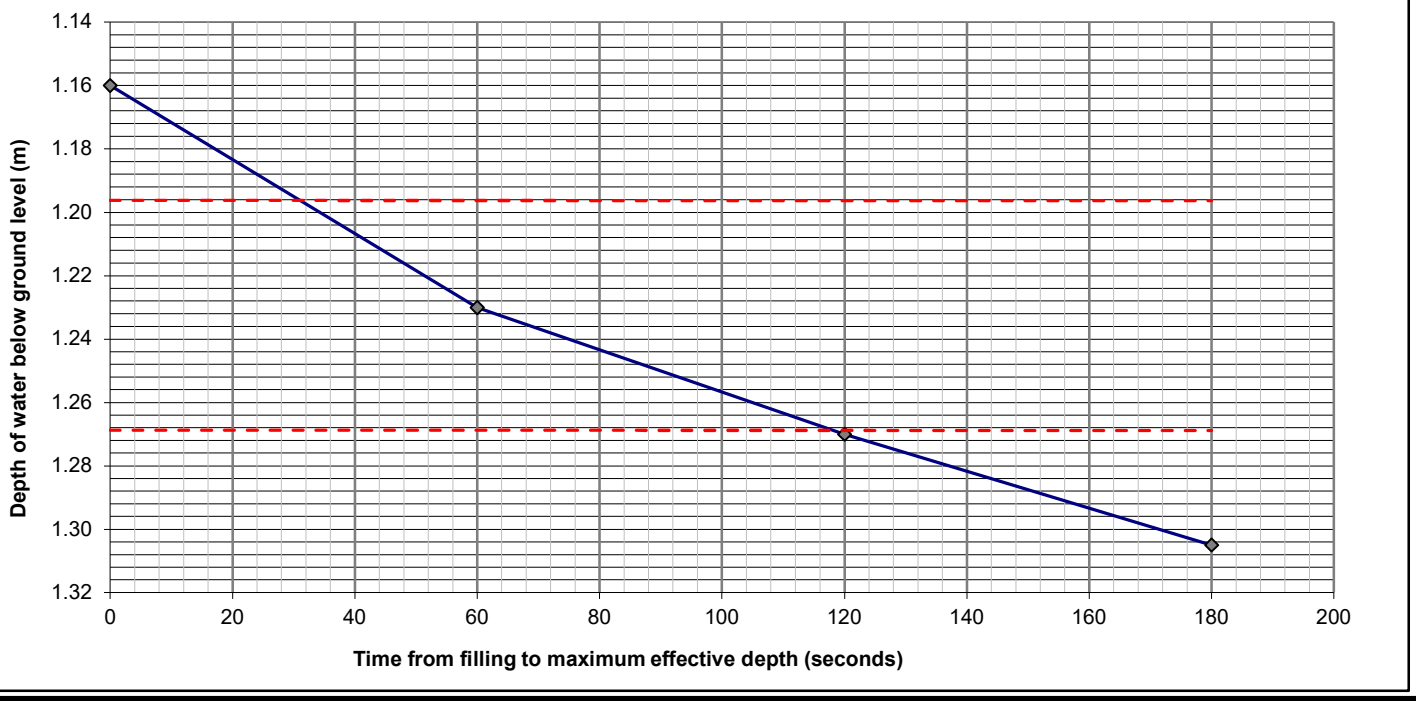
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Checked by: JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA12
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0	1.160
60	1	1.230
120	2	1.270
180	3	1.305

PIT LENGTH (m):	1.70	**Pit construction**
PIT WIDTH (m):	0.60	Very poor stability, pit collapses during testing
PIT DEPTH (m):	1.31	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.15
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.07
Effective depth of Pit	(m)	0.15
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.15
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.11
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.07
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.35
Time at 75% effective depth (p_{75})	(s)	31
Time at 25% effective depth (p_{25})	(s)	118
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	87

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**6.27E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:

SAND

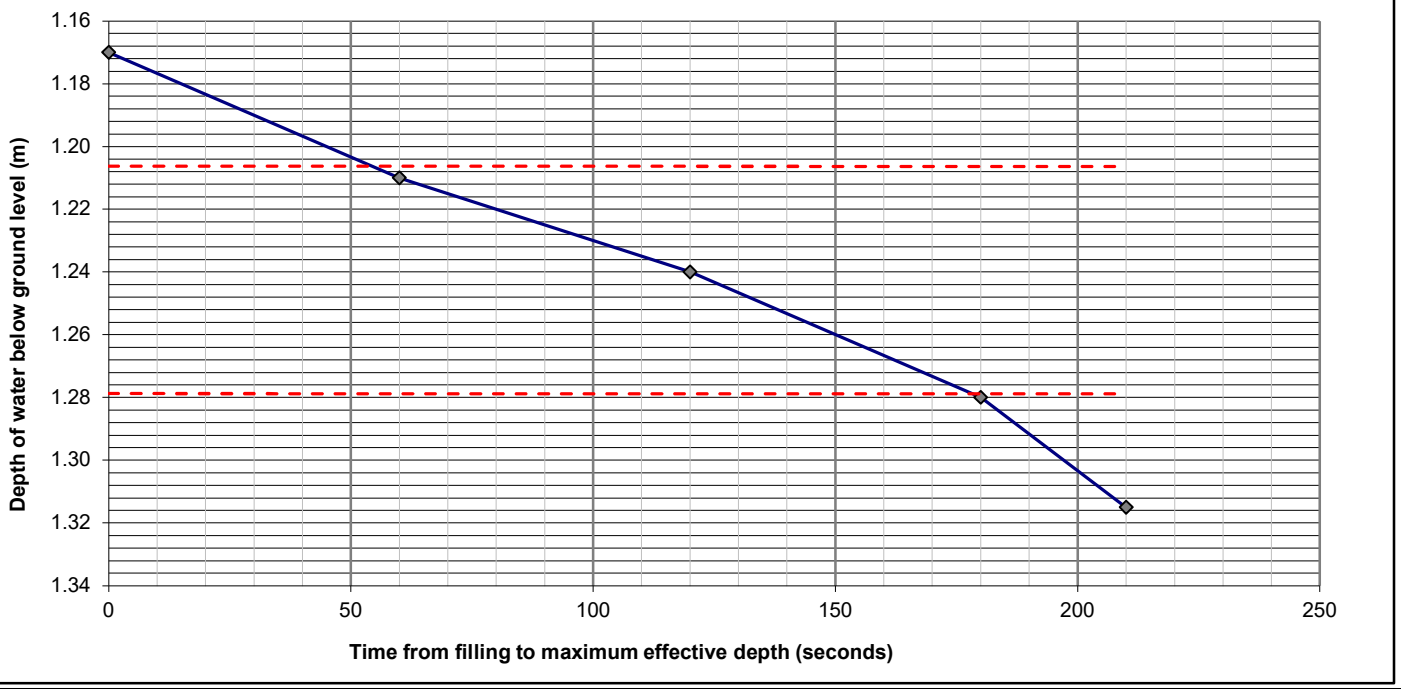
Compiled by:	CS
Checked by:	JC

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Environmental Consultancy
Ground Engineering Services

TETRA TECH

DATE:	13/08/2024
PROJECT No:	784-B068544
PROJECT NAME:	Rhosafan
CLIENT:	Morgan Sindell
TRIAL PIT ID:	SA12
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
	0.00	1.170
60	1.00	1.210
120	2.00	1.240
180	3.00	1.280
210	3.50	1.315

PIT LENGTH (m):	1.50
PIT WIDTH (m):	0.60
PIT DEPTH (m):	1.32

Pit construction
Very poor stability

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.13
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.07
Effective depth of Pit	(m)	0.15
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.13
Level of water in pit at 75% effective depth (p_{75})	(m)	0.04
Level of water in pit at 25% effective depth (p_{25})	(m)	0.11
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.07
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	1.20
Time at 75% effective depth (p_{75})	(s)	55
Time at 25% effective depth (p_{25})	(s)	178
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	124

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**4.38E-04**

WATER INPUT:	I	250

GEOLOGY OF TEST SECTION:
SAND

Compiled by: CS
Checked by: JC

After BRE Digest 365, Soakaway Design, 2016

APPENDIX F: GEOTECHNICAL TEST DATA

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES A PHENNA GROUP COMPANY

Contract Number: 74371

Client Ref: **B068544**
Client PO:

Client: **Tetra Tech**

Contract Title: **Rhoafan, Port Talbot**
For the attention of: **Paul Vincent**

Date Received: **22-08-2024**
Date Completed: **09-09-2024**
Report Date: **09-09-2024**

This report has been checked and approved by:

B. Evans

Brendan Evans
Office Administrator

Description	Qty
Particle Size Distribution BS EN ISO 17892-4 : 5.1 - * UKAS	13
BRE Suite A Greenfield Site (pyrite absent) includes pH and water soluble sulphate Sub-contracted Test	12
Disposal of samples for job	1

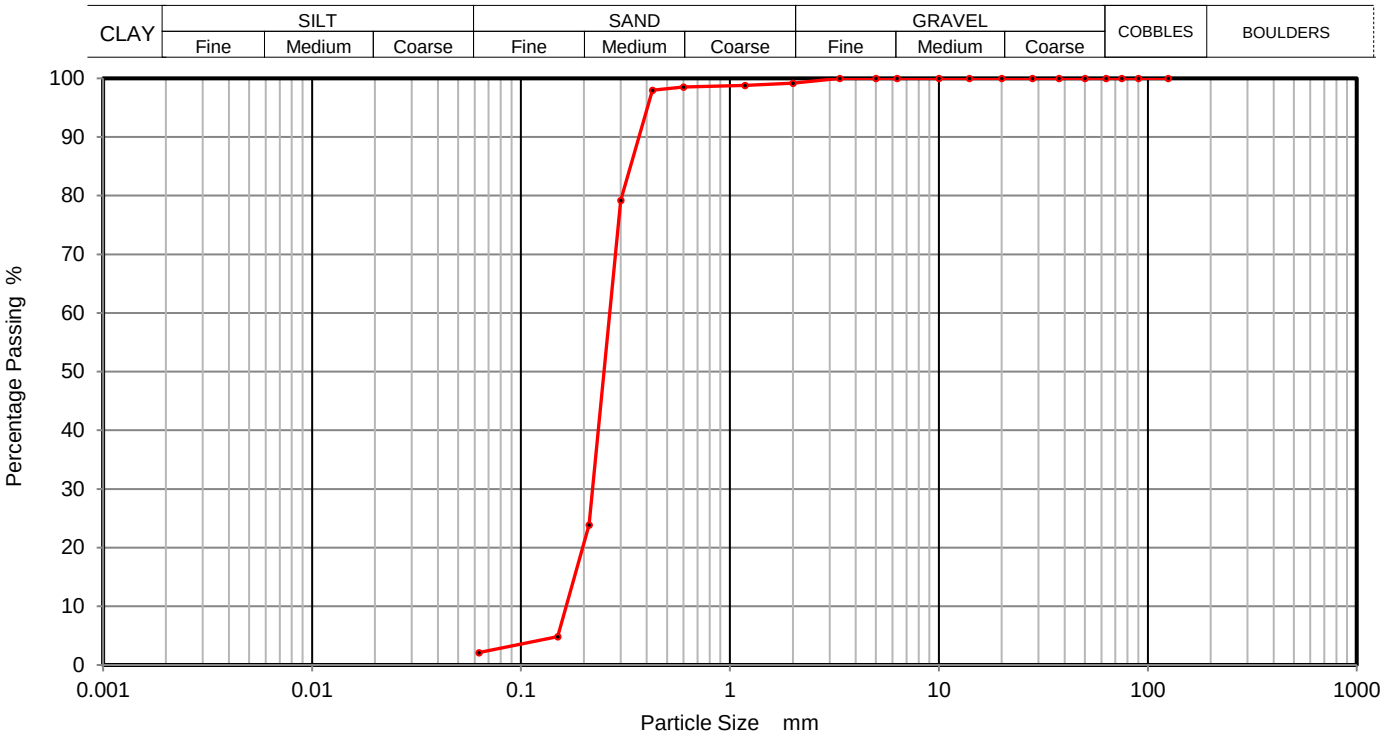
Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (HR & HSE Manager)

GEO Site & Testing Services Ltd
Unit 3-4 Heol Aur, Dafen Ind Est, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784 040 Fax: 01554 784 040 info@gstl.co.uk https://gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH01**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**1**
Sample Description	Brown slightly gravelly slightly silty/ clayey fine to coarse SAND	Depth Top	**0.20**
		Depth Base	**1.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.63	99		
0.425	98		
0.30	79		
0.20	24		
0.15	5		
0.063	2		

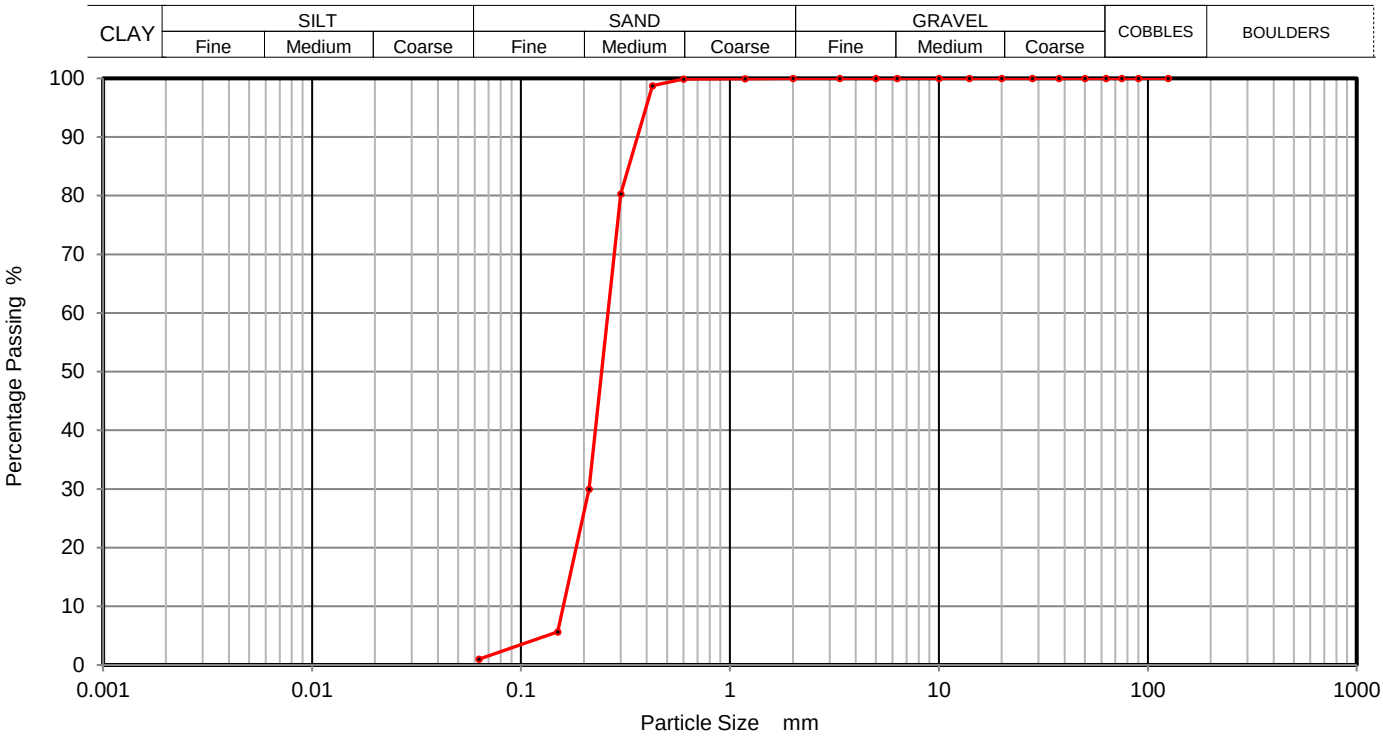
Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	97
Silt and Clay	2

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH01**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**3**
Sample Description	Brown slightly silty/ clayey fine to medium SAND	Depth Top	**1.20**
		Depth Base	**2.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.425	99		
0.30	80		
0.20	30		
0.15	6		
0.063	1		

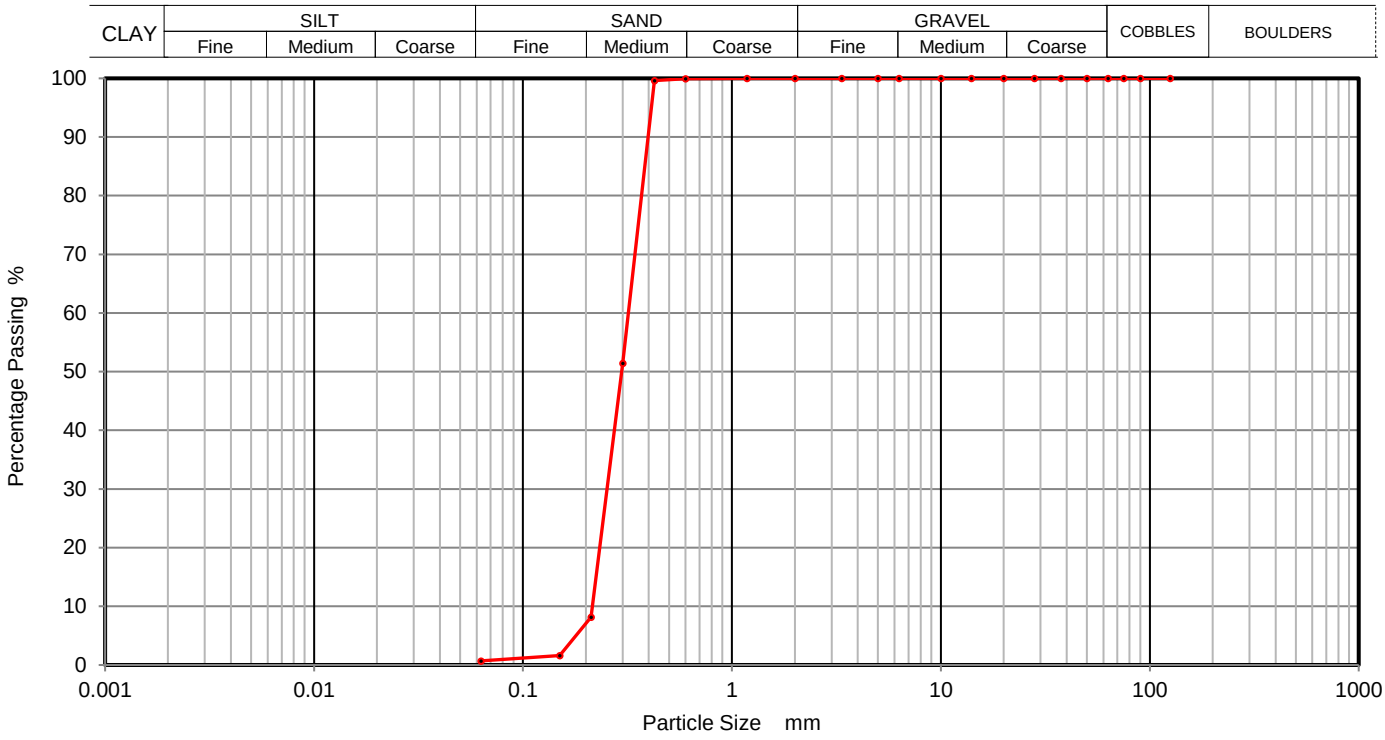
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	99
Silt and Clay	1

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS EN ISO 17892-4:2016 Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH02**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**1**
Sample Description	Brown slightly silty/ clayey fine to medium SAND	Depth Top	**0.30**
		Depth Base	**1.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.425	100		
0.30	51		
0.20	8		
0.15	2		
0.063	1		

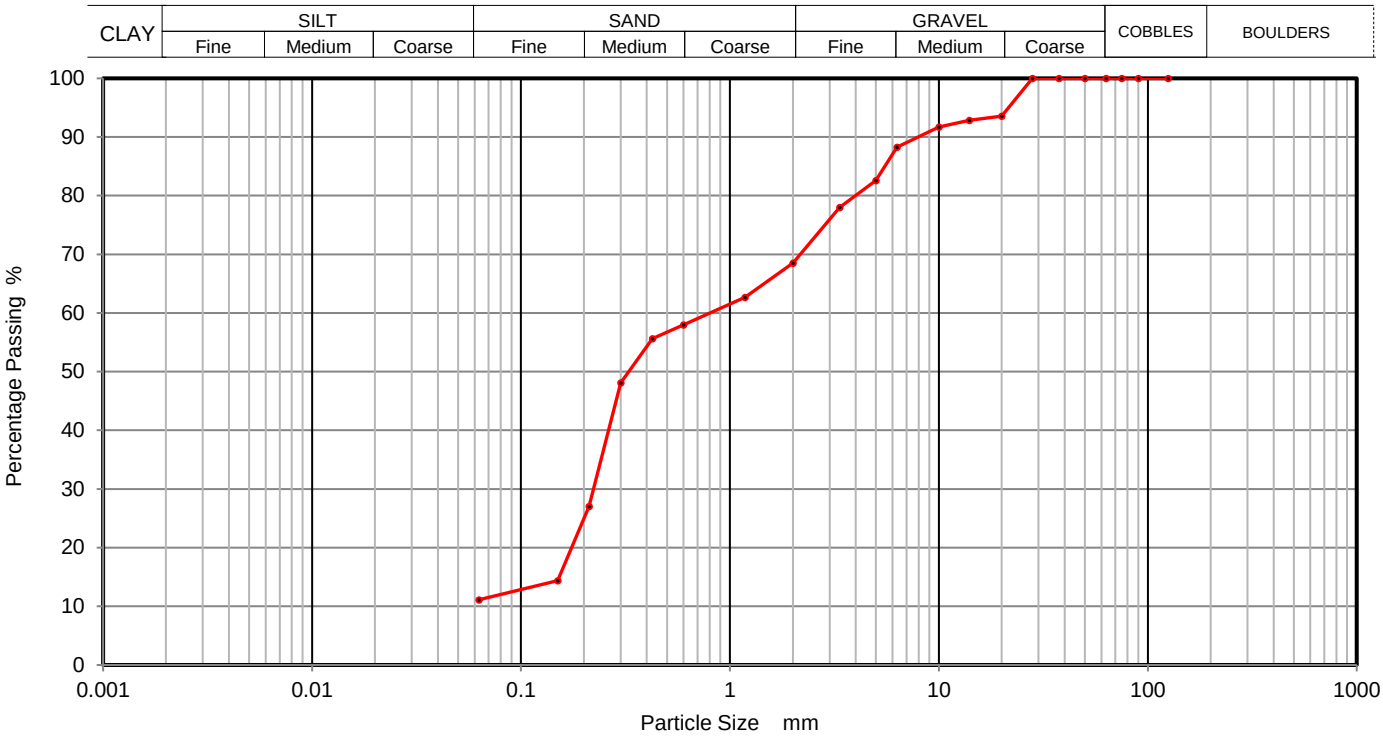
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	99
Silt and Clay	1

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH02**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**2**
Sample Description	Brown silty/ clayey fine to coarse gravelly fine to coarse SAND	Depth Top	**1.00**
		Depth Base	**1.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	94		
14	93		
10	92		
6.3	88		
5	83		
3.35	78		
2	68		
1.18	63		
0.63	58		
0.425	56		
0.30	48		
0.20	27		
0.15	14		
0.063	11		

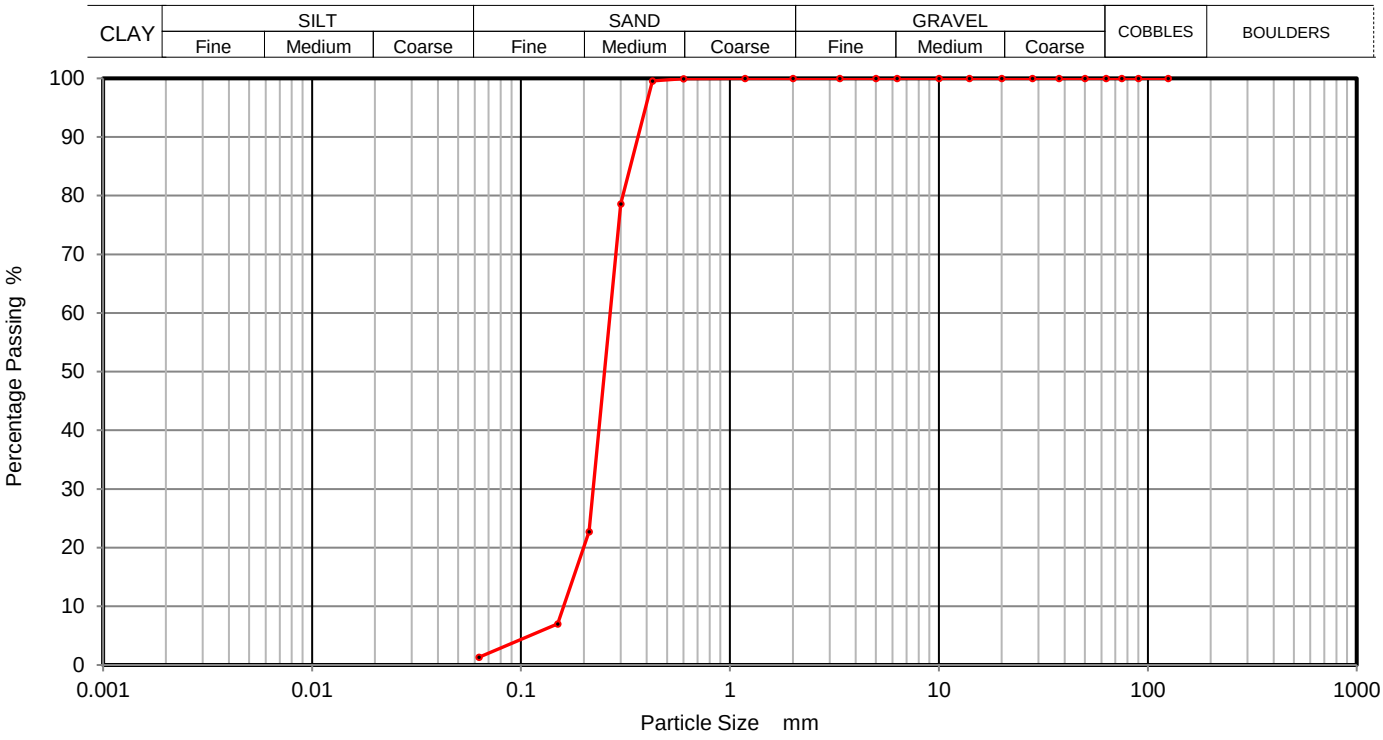
Sample Proportions	% dry mass
Cobbles	0
Gravel	32
Sand	57
Silt and Clay	11

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS EN ISO 17892-4:2016 Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH02**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**6**
Sample Description	Brown slightly silty/ clayey fine to medium SAND	Depth Top	**2.20**
		Depth Base	**3.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.425	100		
0.30	79		
0.20	23		
0.15	7		
0.063	1		

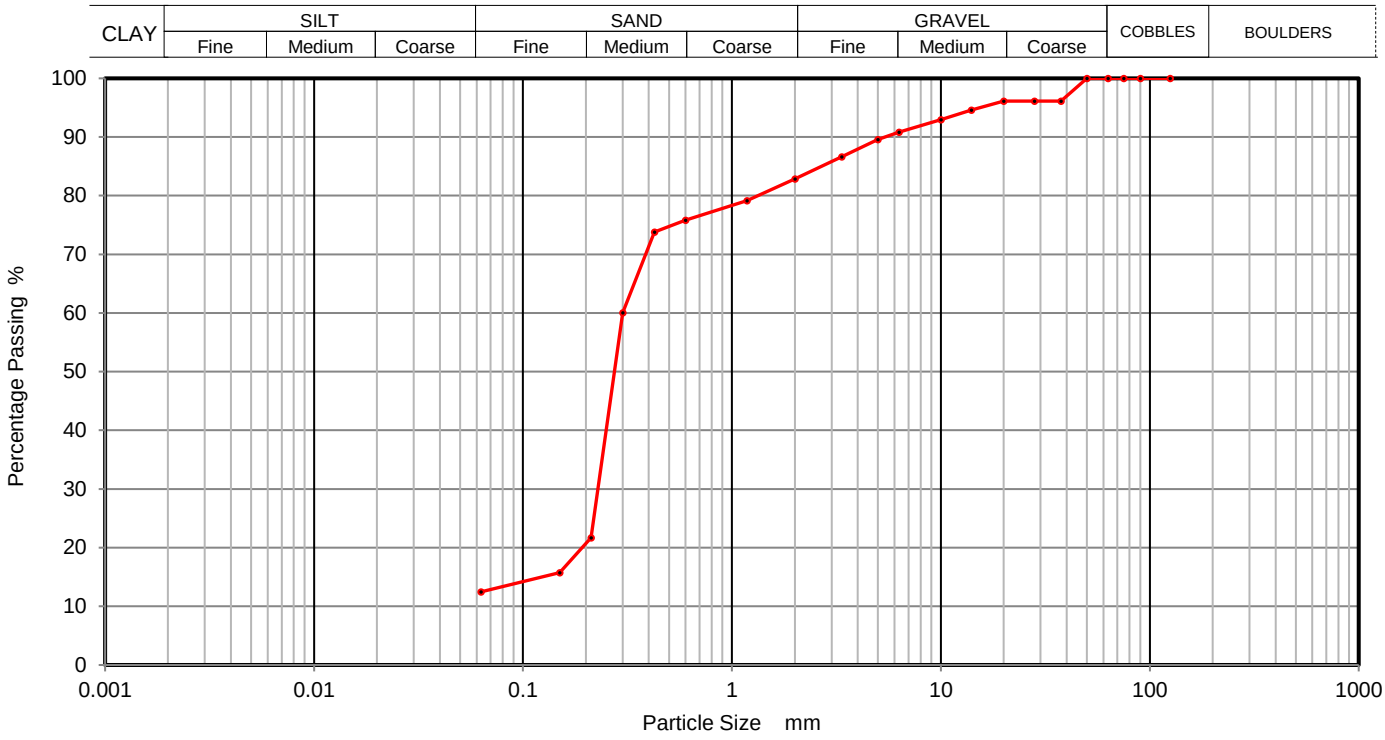
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	99
Silt and Clay	1

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH03**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**1**
Sample Description	Brown silty/ clayey fine to coarse gravelly fine to coarse SAND	Depth Top	**0.30**
		Depth Base	**1.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	96		
20	96		
14	95		
10	93		
6.3	91		
5	90		
3.35	87		
2	83		
1.18	79		
0.63	76		
0.425	74		
0.30	60		
0.20	22		
0.15	16		
0.063	12		

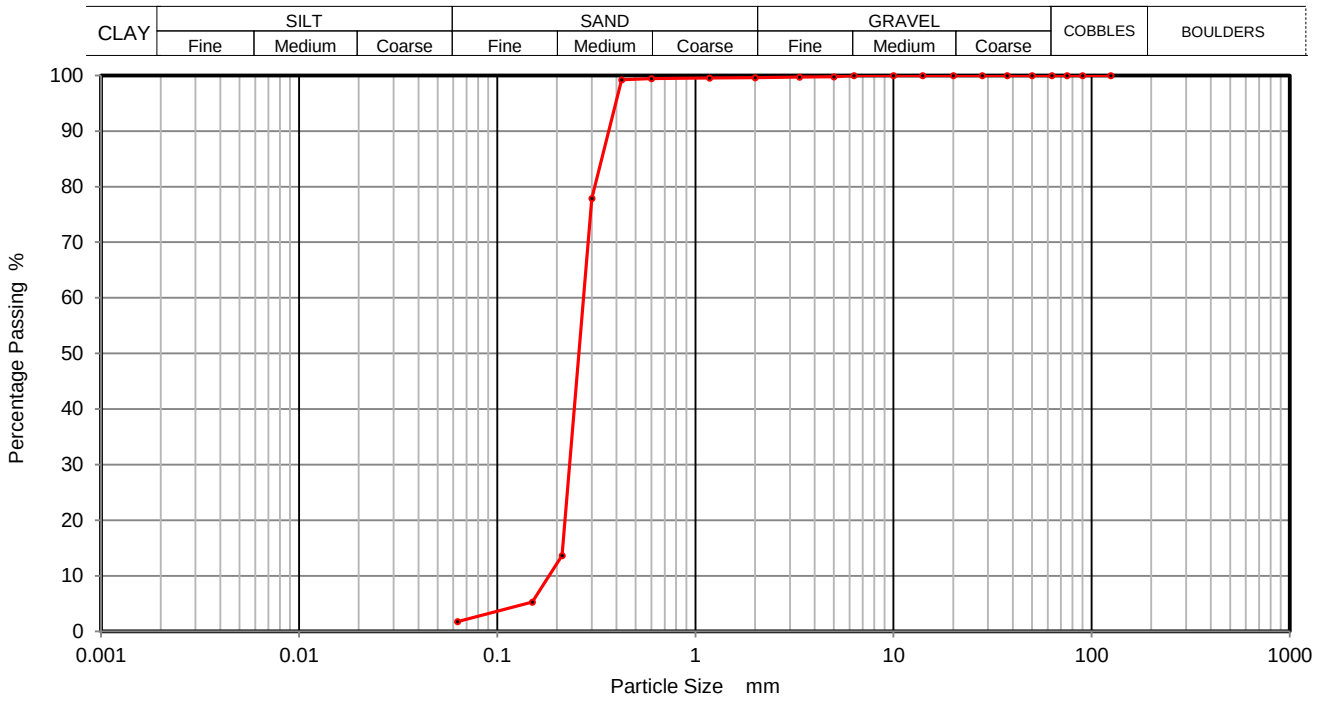
Sample Proportions	% dry mass
Cobbles	0
Gravel	17
Sand	71
Silt and Clay	12

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS EN ISO 17892-4:2016 Wet Sieve, Clause 5.2	Contract Number	74371
		Borehole/Pit No.	BH03
Project Name	Rhoafan, Port Talbot	Sample No.	3
Sample Description	Brown slightly silty/ clayey fine to coarse SAND	Depth Top	1.20
		Depth Base	2.20
Date Tested	05/09/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	99		
0.425	99		
0.30	78		
0.20	14		
0.15	5		
0.063	2		

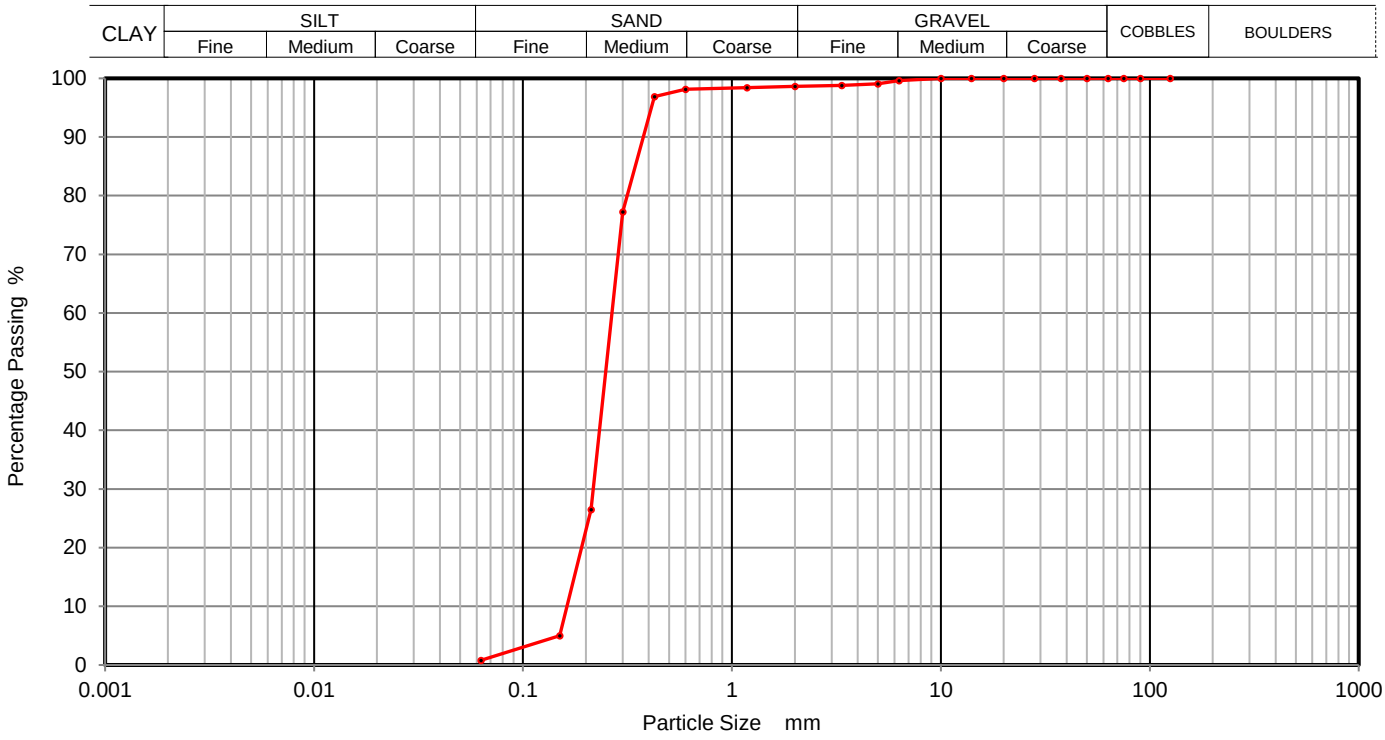
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	98
Silt and Clay	2

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH04**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**1**
Sample Description	Brown slightly silty/ clayey slightly gravelly fine to coarse SAND	Depth Top	**0.20**
		Depth Base	**0.60**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	99		
1.18	98		
0.63	98		
0.425	97		
0.30	77		
0.20	26		
0.15	5		
0.063	1		

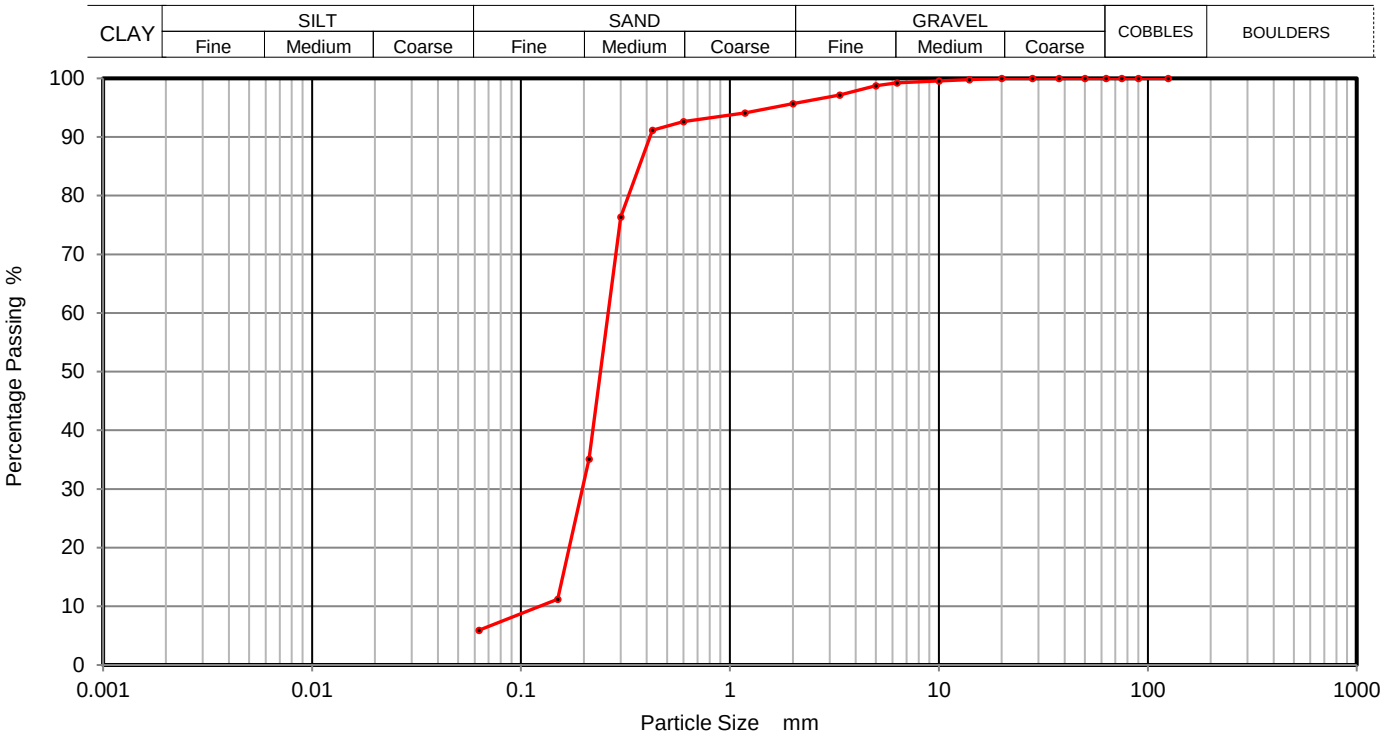
Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	98
Silt and Clay	1

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS EN ISO 17892-4:2016 Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH04**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**2**
Sample Description	Brown slightly gravelly slightly silty/ clayey fine to coarse SAND	Depth Top	**0.60**
		Depth Base	**1.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	97		
2	96		
1.18	94		
0.63	93		
0.425	91		
0.30	76		
0.20	35		
0.15	11		
0.063	6		

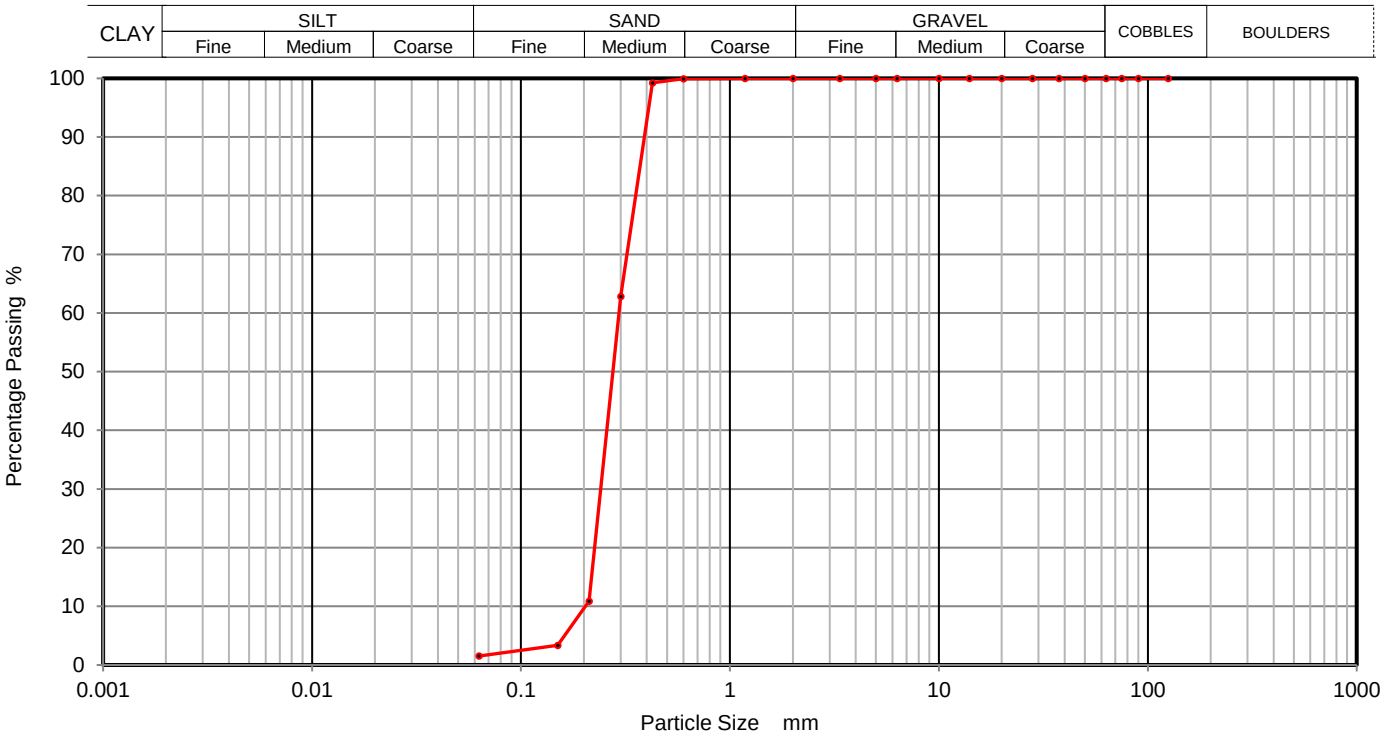
Sample Proportions	% dry mass
Cobbles	0
Gravel	4
Sand	90
Silt and Clay	6

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS EN ISO 17892-4:2016 Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**BH04**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**6**
Sample Description	Brown slightly silty/ clayey fine to medium SAND	Depth Top	**2.20**
		Depth Base	**3.20**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.425	99		
0.30	63		
0.20	11		
0.15	3		
0.063	2		

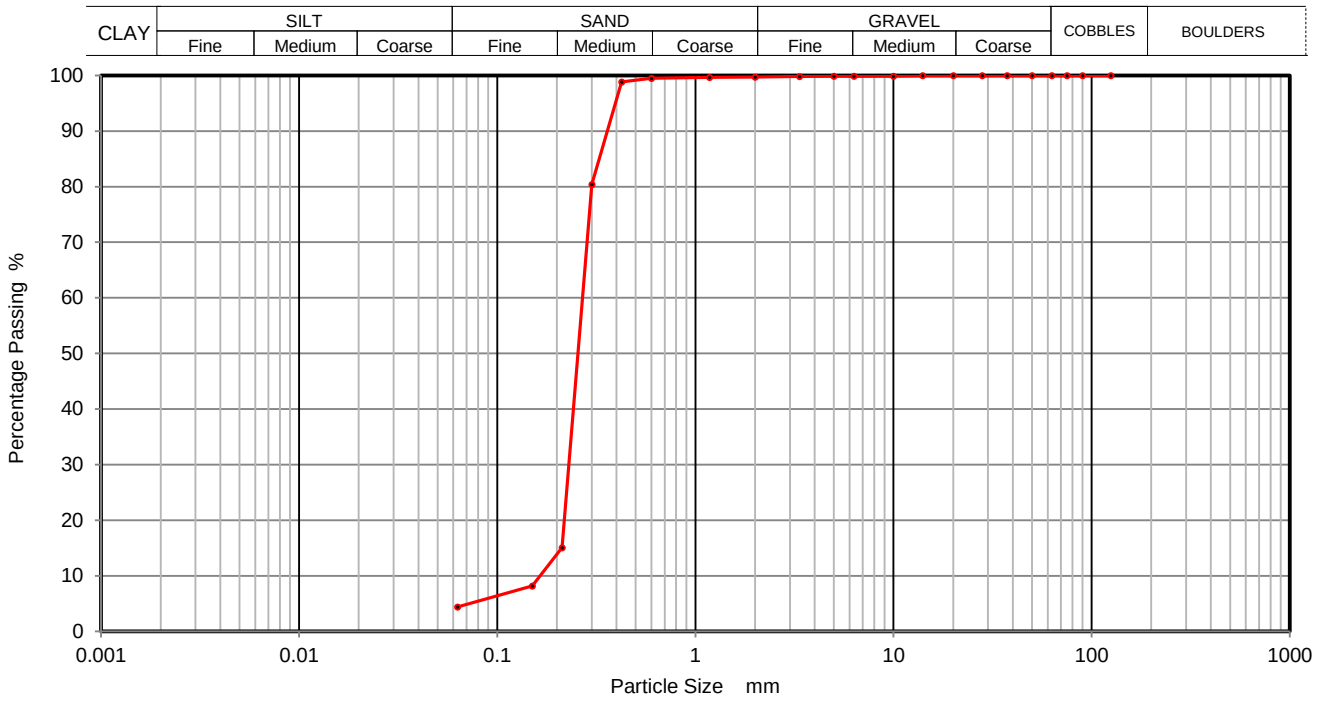
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	98
Silt and Clay	2

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**SA01**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**1**
Sample Description	Brown slightly silty/ clayey fine to coarse SAND	Depth Top	**0.35**
		Depth Base	**1.50**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.425	99		
0.30	80		
0.20	15		
0.15	8		
0.063	4		

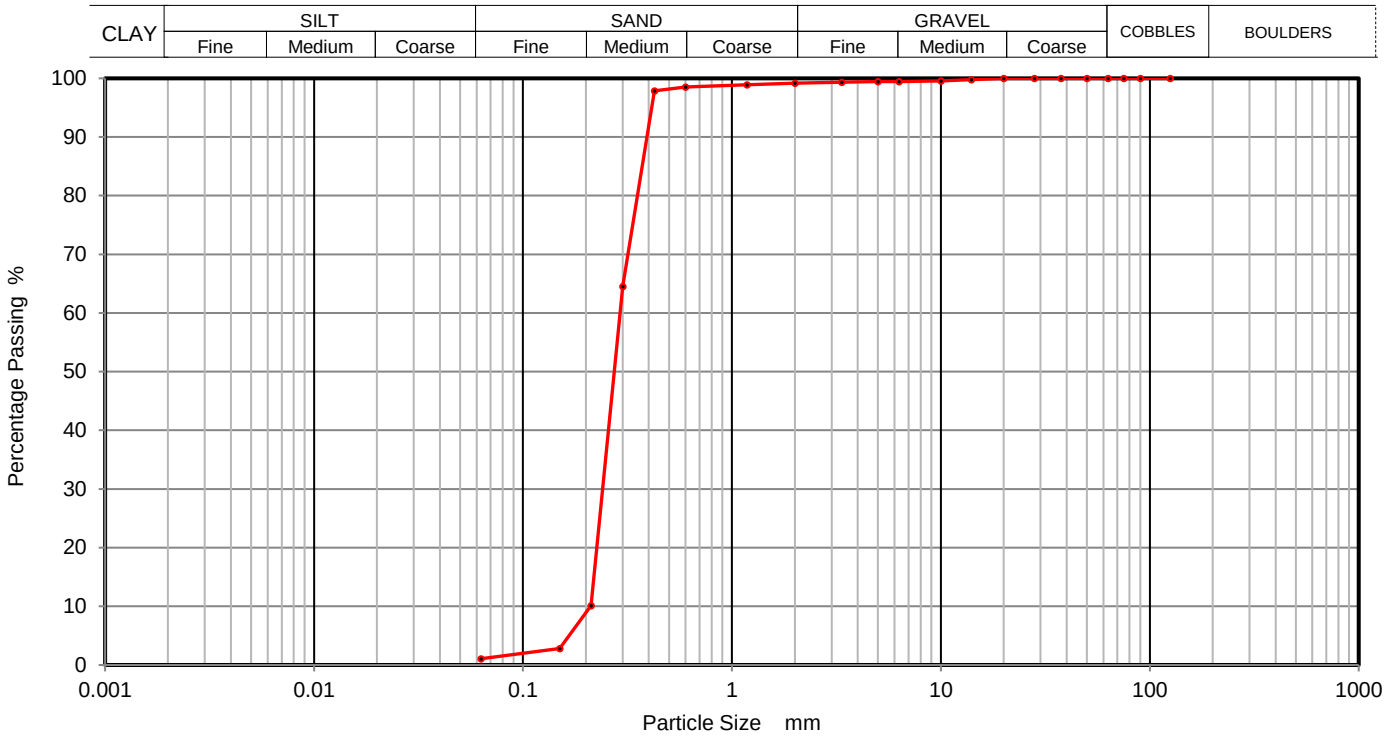
Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	96
Silt and Clay	4

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**SA02**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**1**
Sample Description	Brown slightly silty/ clayey slightly gravelly fine to coarse SAND	Depth Top	**0.20**
		Depth Base	**1.50**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	99		
2	99		
1.18	99		
0.63	99		
0.425	98		
0.30	65		
0.20	10		
0.15	3		
0.063	1		

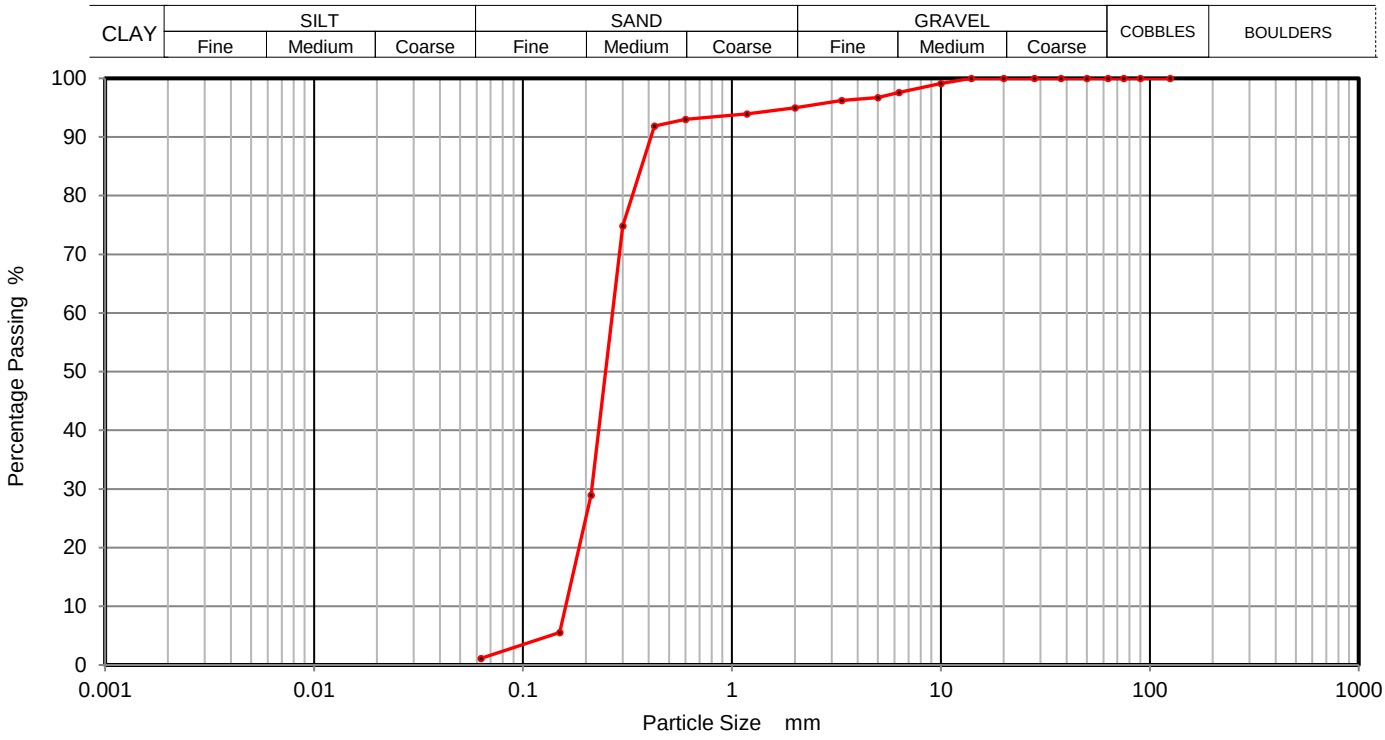
Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	98
Silt and Clay	1

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**74371**
		Borehole/Pit No.	**TP01**
Project Name	**Rhoafan, Port Talbot**	Sample No.	**1**
Sample Description	Brown slightly silty/ clayey slightly gravelly fine to coarse SAND	Depth Top	**0.40**
		Depth Base	**1.10**
Date Tested	05/09/2024	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	97		
3.35	96		
2	95		
1.18	94		
0.63	93		
0.425	92		
0.30	75		
0.20	29		
0.15	6		
0.063	1		

Sample Proportions	% dry mass
Cobbles	0
Gravel	5
Sand	94
Silt and Clay	1

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron Thomas

7 - 11 Harding Street
Leicester
LE1 4DH

GSTL
Unit 3-4 Heol Aur
Dafen Ind Estate
Dafen
SA14 8QN

Analytical Test Report: L24/08054/GSL - 24-49280

Your Project Reference:	**Rhoafan, Port Talbot 784-B068544**		
Your Order Number:	74371	Samples Received / Instructed:	30/08/2024 / 30/08/2024
Report Issue Number:	1	Sample Tested:	30/08 to 06/09/2024
Samples Analysed:	12 sample(s)	Report issued:	06/09/2024

Signed



James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited, subUKAS - Subcontracted to a laboratory UKAS accredited for this test, subMCERTS - Subcontracted to a laboratory MCERTS accredited for this test

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 03.09.2024

Issued by: J. Gane

Issue No: 4

Rev No: 14

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Leicester
LE1 4DH

L24/08054/GSL - 24-49280

Project Reference - Rhoafan, Port Talbot 784-B068544

Analytical Test Results - Chemical Analysis

Lab Reference			394436	394437	394438	394439	394440	394441
Client Sample ID			-	-	-	-	-	-
Client Sample Location			BH01	BH01	BH02	BH02	BH02	BH03
Client Sample Type			B	B	B	B	B	B
Client Sample Number			1	3	1	2	6	1
Depth - Top (m)			0.20	1.20	0.30	1.00	2.20	0.30
Depth - Bottom (m)			1.20	2.20	1.20	1.20	3.20	1.20
Date of Sampling			14/08/2024	14/08/2024	13/08/2024	13/08/2024	13/08/2024	15/08/2024
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Sand	Sand	Sand	Sand	Sand	Sand
Determinant	**Units**	**Accreditation**						
Water soluble sulphate (as SO_4)	(mg/l)	u	< 10	< 10	< 10	27	< 10	15
pH Value	pH Units	MCERTS	8.7	8.6	8.5	8.2	8.5	8.4

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L24/08054/GSL - 24-49280

Project Reference - Rhoafan, Port Talbot 784-B068544

Analytical Test Results - Chemical Analysis

Lab Reference			394442	394443	394444	394445	394446	394447
Client Sample ID			-	-	-	-	-	-
Client Sample Location			BH03	BH04	BH04	BH04	SA01	SA02
Client Sample Type			B	B	B	B	B	B
Client Sample Number			3	1	2	6	1	1
Depth - Top (m)			1.20	0.20	0.60	2.20	0.35	0.20
Depth - Bottom (m)			2.20	0.60	1.20	3.20	1.50	1.50
Date of Sampling			15/08/2024	19/08/2024	19/08/2024	19/08/2024	-	-
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Sand	Sand	Sand	Sand	Sand	Sand
Determinant	**Units**	**Accreditation**						
Water soluble sulphate (as SO_4)	(mg/l)	u	< 10	< 10	< 10	< 10	< 10	12
pH Value	pH Units	MCERTS	8.5	8.6	8.6	8.8	8.5	8.5

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L24/08054/GSL - 24-49280

Project Reference - Rhoafan, Port Talbot 784-B068544

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
394436	-	BH01	B	1	Brown silty sand	-	-	100
394437	-	BH01	B	3	Brown silty sand	-	-	100
394438	-	BH02	B	1	Brown silty sand	-	-	100
394439	-	BH02	B	2	Brown slightly gravelly silty sand	-	-	100
394440	-	BH02	B	6	Brown silty sand	-	-	100
394441	-	BH03	B	1	Brown silty sand	-	-	100
394442	-	BH03	B	3	Brown silty sand	-	-	100
394443	-	BH04	B	1	Brown silty sand	-	-	100
394444	-	BH04	B	2	Brown slightly gravelly silty sand	-	-	100
394445	-	BH04	B	6	Brown silty sand	-	-	100
394446	-	SA01	B	1	Brown silty sand	-	-	100
394447	-	SA02	B	1	Brown silty sand	-	-	100

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L24/08054/GSL - 24-49280

Project Reference - Rhoafan, Port Talbot 784-B068544

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
394436	-	BH01	B	1	
394437	-	BH01	B	3	
394438	-	BH02	B	1	
394439	-	BH02	B	2	
394440	-	BH02	B	6	
394441	-	BH03	B	1	
394442	-	BH03	B	3	
394443	-	BH04	B	1	
394444	-	BH04	B	2	
394445	-	BH04	B	6	
394446	-	SA01	B	1	
394447	-	SA02	B	1	

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L24/08054/GSL - 24-49280

Project Reference - Rhoafan, Port Talbot 784-B068544

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis

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Leicester
LE1 4DH

L24/08054/GSL - 24-49280

Project Reference - Rhoafan, Port Talbot 784-B068544

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
394436	-	BH01	B	1	MS - CL - pH in Soils	RX
394437	-	BH01	B	3	MS - CL - pH in Soils	RX
394438	-	BH02	B	1	MS - CL - pH in Soils	RX
394439	-	BH02	B	2	MS - CL - pH in Soils	RX
394440	-	BH02	B	6	MS - CL - pH in Soils	RX
394441	-	BH03	B	1	MS - CL - pH in Soils	RX
394442	-	BH03	B	3	MS - CL - pH in Soils	RX
394443	-	BH04	B	1	MS - CL - pH in Soils	RX
394444	-	BH04	B	2	MS - CL - pH in Soils	RX
394445	-	BH04	B	6	MS - CL - pH in Soils	RX
394446	-	SA01	B	1		A
394447	-	SA02	B	1		A

APPENDIX G: CHEMICAL LABORATORY TEST RESULTS

Tetra Tech.
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i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-037505

Project / Site name:	Rhosafan	**Samples received on:**	19/08/2024
Your job number:	B068544	**Samples instructed on/ Analysis started on:**	20/08/2024
Your order number:	7016940	**Analysis completed by:**	29/08/2024
Report Issue Number:	1	**Report issued on:**	30/08/2024
Samples Analysed:	8 soil samples - 4 leachate samples		

Signed:

Anna Goc
PL Head of 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.

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

Analytical Report Number: 24-037505
Project / Site name: Rhosafan

Lab Sample Number				292618	292620	292621	292622	292623
Sample Reference				SA03	SA08	SA09	TP02	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.10	0.35	0.20	0.20
Date Sampled				12/08/2024	13/08/2024	13/08/2024	14/08/2024	14/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	29.3	20.9	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.3	13	6.9	7.4	16
Total mass of sample received	kg	0.1	NONE	0.8	0.9	0.8	0.8	0.9
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SCA	SCA	SCA	SCA	SCA
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8.1	7.6	7.8	7.8	7.6
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.044	0.027	0.041	0.049	0.02
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	0.66	< 0.05	0.74	0.43	< 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	0.18	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1	0.07	1.2	0.97	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.07	0.07	0.07	0.06	0.06
Pyrene	mg/kg	0.05	MCERTS	0.07	0.06	0.11	0.07	0.06
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.07	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.27	< 0.05	0.32	0.26	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.08	< 0.05	0.11	0.07	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	2.18	< 0.80	2.84	1.86	< 0.80

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Analytical Report Number: 24-037505
Project / Site name: Rhosafan

Lab Sample Number				292618	292620	292621	292622	292623
Sample Reference				SA03	SA08	SA09	TP02	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.10	0.35	0.20	0.20
Date Sampled				12/08/2024	13/08/2024	13/08/2024	14/08/2024	14/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	99	25	32	96	24
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.62	0.71	1.1	0.33	1.3
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.5	0.4	0.4	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1.1	< 0.2	< 0.2	1.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	8.4	22	6.4	8.7	32
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.7	22	6.8	8.9	32
Copper (aqua regia extractable)	mg/kg	1	MCERTS	58	18	47	42	23
Lead (aqua regia extractable)	mg/kg	1	MCERTS	50	50	33	43	63
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.7	< 0.3	0.3	0.5	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	19	31	9	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	4.3	1.8	2.1	4.8	3.6
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	18	33	18	16	42
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	45	87	55	21	95
Petroleum Hydrocarbons								
TPH (>EC5 - EC10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
VOCs								
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-037505
Project / Site name: Rhosafan

Lab Sample Number				292624	292625	292626
Sample Reference				BH01	BH03	BH03
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.50	2.50
Date Sampled				15/08/2024	16/08/2024	16/08/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	14.7	< 0.1
Moisture Content	%	0.01	NONE	15	4.8	17
Total mass of sample received	kg	0.1	NONE	0.6	0.5	0.6
Asbestos						
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SCA	SCA	SCA
General Inorganics						
pH (L099)	pH Units	N/A	MCERTS	9.3	7.6	8.9
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	< 0.0010	0.013	0.0017
Total Phenols						
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.15	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 24-037505
Project / Site name: Rhosafan

Lab Sample Number				292624	292625	292626
Sample Reference				BH01	BH03	BH03
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.50	2.50
Date Sampled				15/08/2024	16/08/2024	16/08/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	30	9.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.15	0.34	0.12
Boron (water soluble)	mg/kg	0.2	MCERTS	0.2	0.3	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	5	9.3	4.1
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	5.2	9.9	4.2
Copper (aqua regia extractable)	mg/kg	1	MCERTS	3.8	17	5.5
Lead (aqua regia extractable)	mg/kg	1	MCERTS	4.1	27	4.5
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	4.4	11	3.7
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	12	18	9.8
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	19	47	17
Petroleum Hydrocarbons						
TPH (>EC5 - EC10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10
VOCs						
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0

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Analytical Report Number: 24-037505
Project / Site name: Rhosafan

Lab Sample Number				292619	292624	292625	292626
Sample Reference				SA03	BH01	BH03	BH03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	1.50	0.50	2.50
Date Sampled				12/08/2024	15/08/2024	16/08/2024	16/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
General Inorganics							
pH (automated)	pH Units	N/A	ISO 17025	9	8.8	7.6	7.9
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	0.926	1.41	1.8	0.857
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15	< 15	40	28
Heavy Metals / Metalloids							
Arsenic (dissolved)	µg/l	1	ISO 17025	1.1	1.3	< 1.0	< 1.0
Boron (dissolved)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4	< 0.4	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	1.3	3.9	6.1	4.6
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3	< 0.3	< 0.3	0.4
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	0.9	0.7	4.2	8.6

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 24-037505
Project / Site name: Rhosafan

* 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 *
292618	SA03	None Supplied	0.7	Brown clay and sand with gravel and stones
292620	SA08	None Supplied	0.1	Brown loam and sand with vegetation and stones
292621	SA09	None Supplied	0.35	Brown clay and sand with gravel
292622	TP02	None Supplied	0.2	Brown clay and loam with gravel and vegetation
292623	TP04	None Supplied	0.2	Brown clay and loam with gravel and vegetation
292624	BH01	None Supplied	1.5	Brown sand
292625	BH03	None Supplied	0.5	Brown loam and sand with stones and vegetation
292626	BH03	None Supplied	2.5	Brown sand

Analytical Report Number : 24-037505
Project / Site name: Rhosafan

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

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 dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
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	L038B	D	MCERTS
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	L038B	D	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	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	L080	W	MCERTS
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	L080	W	MCERTS
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement	In-house method	L099	W	ISO 17025

Analytical Report Number : 24-037505
Project / Site name: Rhosafan

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	NONE
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate	In-house method	L009B	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' 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.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Sample Deviation Report

Analytical Report Number : 24-037505
Project / Site name: Rhosafan

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

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

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
SA03	N/A	S	292618	c	Free cyanide in soil	L080	c
SA08	N/A	S	292620	c	Free cyanide in soil	L080	c
SA09	N/A	S	292621	c	Free cyanide in soil	L080	c

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Analytical Report Number : 24-051574

Project / Site name:	Rhosafan	**Samples received on:**	04/11/2024
Your job number:	B068544	**Samples instructed on/ Analysis started on:**	04/11/2024
Your order number:	7016940	**Analysis completed by:**	11/11/2024
Report Issue Number:	1	**Report issued on:**	18/11/2024
Samples Analysed:	6 soil samples		

Signed:

Joanna Wawrzeczko
Senior Reporting Specialist
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.

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-051574
Project / Site name: Rhosafan

Lab Sample Number				367636	367637	367638	367639	367640
Sample Reference				TP02A	TP02B	TP02C	SA03A	SA03B
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.80	0.20-0.80	0.20-0.80	0.20-0.80	0.20-0.80
Date Sampled				31/10/2024	31/10/2024	31/10/2024	31/10/2024	31/10/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Mass of stone > 0.25mm	%	0.1	NONE	57.8	25.2	19	26.2	29.5
Moisture Content	%	0.01	NONE	10	5.2	7.1	7.7	5.3
Total mass of sample received	kg	0.1	NONE	0.8	0.9	0.8	0.9	0.9
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	21	14	11	14	12
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.1	< 0.2	< 0.2	0.4	< 0.2
Lead (aqua regia extractable)	mg/kg	1	MCERTS	50	7.5	6.7	19	11
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	5.9	4.9	9.2	6.3
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	13	13	18	13
Stomach Phase								
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	1.4	0.3	0.4	0.3	0.5
Arsenic Bioaccessible Fraction	%	-	NONE	6.9	2.3	3.8	2.1	4.5
Stomach and Intestine Phase								
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	2.0	1.2
Arsenic Bioaccessible Fraction	%	-	NONE	< 1.0	< 1.0	< 1.0	14.0	10.2
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach and Intestine Phase (SI)								
Arsenic Bioaccessible Fraction	%	-	NONE	**6.9 % (S)**	**2.3 % (S)**	**3.8 % (S)**	**14 % (SI)**	**10.2 % (SI)**
Stomach Phase								
Cadmium (Bioaccessible)	mg/kg	0.1	NONE	0.3	< 0.1	< 0.1	0.1	< 0.1
Cadmium Bioaccessible Fraction	%	-	NONE	29.7	< 1.0	< 1.0	21.8	< 1.0
Stomach and Intestine Phase								
Cadmium (Bioaccessible)	mg/kg	0.1	NONE	0.2	< 0.1	< 0.1	0.2	< 0.1
Cadmium Bioaccessible Fraction	%	-	NONE	19.2	< 1.0	< 1.0	46.5	< 1.0
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach and Intestine Phase (SI)								
Cadmium Bioaccessible Fraction	%	-	NONE	**29.7 % (S)**	**< 1.0**	**< 1.0**	**46.5 % (SI)**	**< 1.0**
Stomach Phase								
Lead (Bioaccessible)	mg/kg	0.1	NONE	3.5	< 0.1	1.4	2.1	1.3
Lead Bioaccessible Fraction	%	-	NONE	7.0	< 1.0	20.7	10.8	11.6
Stomach and Intestine Phase								
Lead (Bioaccessible)	mg/kg	0.1	NONE	1.6	< 0.1	0.6	< 0.1	3.5
Lead Bioaccessible Fraction	%	-	NONE	3.2	< 1.0	8.9	< 1.0	31.7
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach and Intestine Phase (SI)								
Lead Bioaccessible Fraction	%	-	NONE	**7 % (S)**	**< 1.0**	**20.7 % (S)**	**10.8 % (S)**	**31.7 % (SI)**

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Analytical Report Number: 24-051574
Project / Site name: Rhosafan

Lab Sample Number				367636	367637	367638	367639	367640
Sample Reference				TP02A	TP02B	TP02C	SA03A	SA03B
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.80	0.20-0.80	0.20-0.80	0.20-0.80	0.20-0.80
Date Sampled				31/10/2024	31/10/2024	31/10/2024	31/10/2024	31/10/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stomach Phase								
Nickel (Bioaccessible)	mg/kg	0.1	NONE	1.2	1.1	0.3	0.8	0.2
Nickel Bioaccessible Fraction	%	-	NONE	6.9	18.2	6.2	8.7	3.7
Stomach and Intestine Phase								
Nickel (Bioaccessible)	mg/kg	0.1	NONE	1.8	0.7	0.7	1.3	0.9
Nickel Bioaccessible Fraction	%	-	NONE	9.8	11.6	15.0	14.6	13.8
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach and Intestine Phase (SI)								
Nickel Bioaccessible Fraction	%	-	NONE	**9.8 % (SI)**	**18.2 % (S)**	**15 % (SI)**	**14.6 % (SI)**	**13.8 % (SI)**
Stomach Phase								
Vanadium (Bioaccessible)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Vanadium Bioaccessible Fraction	%	-	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Stomach and Intestine Phase								
Vanadium (Bioaccessible)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Vanadium Bioaccessible Fraction	%	-	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach and Intestine Phase (SI)								
Vanadium Bioaccessible Fraction	%	-	NONE	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**	**< 1.0**

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number: 24-051574
Project / Site name: Rhosafan

Lab Sample Number				367641
Sample Reference				SA03C
Sample Number				None Supplied
Depth (m)				0.20-0.80
Date Sampled				31/10/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Mass of stone > 0.25mm	%	0.1	NONE	20.9
Moisture Content	%	0.01	NONE	9.7
Total mass of sample received	kg	0.1	NONE	0.8
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	24
Stomach Phase				
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	0.2
Arsenic Bioaccessible Fraction	%	-	NONE	1.0
Stomach and Intestine Phase				
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	< 0.1
Arsenic Bioaccessible Fraction	%	-	NONE	< 1.0
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach a				
Arsenic Bioaccessible Fraction	%	-	NONE	**1 % (S)**
Stomach Phase				
Cadmium (Bioaccessible)	mg/kg	0.1	NONE	0.2
Cadmium Bioaccessible Fraction	%	-	NONE	28.4
Stomach and Intestine Phase				
Cadmium (Bioaccessible)	mg/kg	0.1	NONE	0.1
Cadmium Bioaccessible Fraction	%	-	NONE	13.8
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach a				
Cadmium Bioaccessible Fraction	%	-	NONE	**28.4 % (S)**
Stomach Phase				
Lead (Bioaccessible)	mg/kg	0.1	NONE	4.2
Lead Bioaccessible Fraction	%	-	NONE	13.9
Stomach and Intestine Phase				
Lead (Bioaccessible)	mg/kg	0.1	NONE	2.9
Lead Bioaccessible Fraction	%	-	NONE	9.6
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach a				
Lead Bioaccessible Fraction	%	-	NONE	**13.9 % (S)**

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Analytical Report Number: 24-051574
Project / Site name: Rhosafan

Lab Sample Number				367641
Sample Reference				SA03C
Sample Number				None Supplied
Depth (m)				0.20-0.80
Date Sampled				31/10/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
Stomach Phase				
Nickel (Bioaccessible)	mg/kg	0.1	NONE	0.7
Nickel Bioaccessible Fraction	%	-	NONE	4.8
Stomach and Intestine Phase				
Nickel (Bioaccessible)	mg/kg	0.1	NONE	1.4
Nickel Bioaccessible Fraction	%	-	NONE	9.6
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach a				
Nickel Bioaccessible Fraction	%	-	NONE	**9.6 % (SI)**
Stomach Phase				
Vanadium (Bioaccessible)	mg/kg	0.1	NONE	< 0.1
Vanadium Bioaccessible Fraction	%	-	NONE	< 1.0
Stomach and Intestine Phase				
Vanadium (Bioaccessible)	mg/kg	0.1	NONE	< 0.1
Vanadium Bioaccessible Fraction	%	-	NONE	< 1.0
Bioaccessibility Summary Data (Maximum value) Stomach Phase (S) or Stomach a				
Vanadium Bioaccessible Fraction	%	-	NONE	**< 1.0**

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Analytical Report Number : 24-051574
Project / Site name: Rhosafan

* 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 *
367636	TP02A	None Supplied	0.20-0.80	Brown clay and sand with gravel and vegetation
367637	TP02B	None Supplied	0.20-0.80	Brown sand with gravel
367638	TP02C	None Supplied	0.20-0.80	Brown sand with gravel
367639	SA03A	None Supplied	0.20-0.80	Brown loam and sand with gravel and vegetation
367640	SA03B	None Supplied	0.20-0.80	Brown loam and sand with gravel and vegetation
367641	SA03C	None Supplied	0.20-0.80	Brown loam and sand with gravel

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Analytical Report Number : 24-051574
Project / Site name: Rhosafan

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
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	L038B	D	MCERTS
UBM Method Required		In-house method	L019B	D	NONE

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' 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.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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Analytical Report Number : 24-037507

Project / Site name:	Rhosafan	**Samples received on:**	19/08/2024
Your job number:	B068544	**Samples instructed on/ Analysis started on:**	20/08/2024
Your order number:	7016940	**Analysis completed by:**	26/08/2024
Report Issue Number:	1	**Report issued on:**	30/08/2024
Samples Analysed:	3 10:1 WAC samples		



Signed:

Anna Goc
PL Head of 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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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.

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

Analytical Report Number: 24-037507
Project / Site name: Rhosafan

Lab Sample Number				292636	292637	292638
Sample Reference				SA03	TP02	BH02
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.20	1.00
Date Sampled				12/08/2024	14/08/2024	12/08/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Stone Content	%	0.1	NONE	29.3	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.3	7.4	6.4
Total mass of sample received	kg	0.1	NONE	0.8	0.8	0.5
General Inorganics						
pH (L005B)	pH Units	N/A	MCERTS	7.7	7.2	7.2
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	4.4	4.9	0.8
Loss on Ignition @ 450°C	%	0.2	MCERTS	25	28	6
Acid Neutralisation Capacity	+/- mmol/kg	N/A	NONE	1.1	0.48	0.59
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	0.66	0.41	0.13
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1	0.99	0.28
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.06	0.06	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.07	0.06	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.27	0.28	0.07
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.07	0.07	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Coronene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Total PAH						
Total WAC-17 PAHs	mg/kg	0.85	NONE	2.15	1.87	< 0.85
Petroleum Hydrocarbons						
Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	< 10	< 10	< 10
VOCs						
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Total BTEX	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0

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Analytical Report Number: 24-037507
Project / Site name: Rhosafan

Lab Sample Number				292636	292637	292638
Sample Reference				SA03	TP02	BH02
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.20	1.00
Date Sampled				12/08/2024	14/08/2024	12/08/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
PCBs by GC-MS						
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	< 0.007

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Waste Acceptance Criteria Analytical Results

Report No:	**24-037507**						
					Client:	**TETRATECH**	
Location	**Rhosafan**						
Lab Reference (Sample Number)	292636				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	12/08/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	SA03						
Depth (m)	0.70						
Solid Waste Analysis							
TOC (%)**	4.4				3%	5%	6%
Loss on Ignition (%) **	25				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	2.15				100	--	--
pH (units)**	7.7				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	1.1				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00155			0.0155	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	< 0.00040			< 0.0040	0.5	10	70
Copper *	0.0046			0.046	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	< 0.000400			< 0.00400	0.5	10	30
Nickel *	< 0.00030			< 0.0030	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0035			0.035	4	50	200
Chloride *	1.6			16	800	15000	25000
Fluoride*	0.20			2.0	10	150	500
Sulphate *	1.4			14	1000	20000	50000
TDS*	14			140	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.38			73.8	500	800	1000
Leach Test Information							
Stone Content (%)	29.3						
Sample Mass (kg)	0.8						
Dry Matter (%)	92						
Moisture (%)	8.3						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-037507**						
					Client:	**TETRATECH**	
Location	**Rhosafan**						
Lab Reference (Sample Number)	292637				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	14/08/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP02						
Depth (m)	0.20						
Solid Waste Analysis							
TOC (%)**	4.9				3%	5%	6%
Loss on Ignition (%) **	28				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	1.87				100	--	--
pH (units)**	7.2				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	0.48				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00250			0.0250	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00085			0.0085	0.5	10	70
Copper *	0.0037			0.037	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	< 0.000400			< 0.00400	0.5	10	30
Nickel *	< 0.00030			< 0.0030	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0051			0.051	4	50	200
Chloride *	2.8			28	800	15000	25000
Fluoride*	0.15			1.5	10	150	500
Sulphate *	2.1			21	1000	20000	50000
TDS*	14			140	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	5.39			53.9	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.8						
Dry Matter (%)	93						
Moisture (%)	7.4						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

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Waste Acceptance Criteria Analytical Results

Report No:	**24-037507**						
					Client:	**TETRATECH**	
Location	**Rhosafan**						
Lab Reference (Sample Number)	292638				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	12/08/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH02						
Depth (m)	1.00						
Solid Waste Analysis							
TOC (%)**	0.8				3%	5%	6%
Loss on Ignition (%) **	6.0				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	7.2				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	0.59				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.00286			0.0286	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00060			0.0060	0.5	10	70
Copper *	0.0048			0.048	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	< 0.000400			< 0.00400	0.5	10	30
Nickel *	< 0.00030			< 0.0030	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0033			0.033	4	50	200
Chloride *	1.3			13	800	15000	25000
Fluoride*	0.17			1.7	10	150	500
Sulphate *	4.2			42	1000	20000	50000
TDS*	28			280	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	5.34			53.4	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.5						
Dry Matter (%)	94						
Moisture (%)	6.4						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 24-037507
Project / Site name: Rhosafan

* 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 *
292636	SA03	None Supplied	0.7	Brown clay and sand with gravel and stones
292637	TP02	None Supplied	0.2	Brown clay and loam with gravel and vegetation
292638	BH02	None Supplied	1	Brown sand with gravel

Analytical Report Number : 24-037507
Project / Site name: Rhosafan

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025

Analytical Report Number : 24-037507
Project / Site name: Rhosafan

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' 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.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

APPENDIX H: GROUNDWATER AND GROUND GAS MONITORING RESULTS

Tetra Tech

LANDGAS AND GROUNDWATER MONITORING RESULTS

Atlantic House, Greenwood Close, Cardiff Gate Business Park, Pontprennau, Cardiff, CF23 8RD.

TETRA TECH

Site Name: YGG Rhosafan
Job No.: 784-B068544
Client: Morgan Sindell

Date Monitored: 02/09/24
Monitoring Engineer: TR
Weather: Light rain

EQUIPMENT USED

Type	Make	Serial	Last Calibrated
Gas Analyser	**Landtec GA5000**	**G502044**	**Apr-23**
Interface Meter	**Solinst**	**122-004988-1**	**n/a**

LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS

Exploratory Hole No	Peak		Steady									
	CH_4 (% vol)	CO_2 (% vol)	CH_4 (% vol)	CO_2 (% vol)	O_2 (% vol)	BAL (%)	PID (ppm)	H_2S (ppm)	HCN (ppm)	CO (ppm)	Time	Remarks
BH01	0.2	0.6	0.2	0.6	19.9	79.3	nt	0	nt	0	10:32	
BH02	0.2	0.5	0.2	0.5	20.3	79	nt	0	nt	0	09:22	
BH03	0.2	1.8	0.2	1.8	18.3	79.7	nt	0	nt	0	10:12	
BH04	0.2	1.8	0.2	1.8	18.8	79.3	nt	0	nt	0	09:52	

LANDGAS - PHYSICAL PARAMETERS

Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)	
BH01	1009	18.0	0.50	0.50	0.12	0.12	
BH02	1008	18.0	5.20	5.20	0.46	0.46	
BH03	1009	18.0	0.60	0.60	0.12	-0.10	
BH04	1008	18.0	0.6	0.6	-0.6	-0.6	

AMBIENT ATMOSPHERIC CONDITIONS

Parameter	Before Monitoring	After Monitoring
CH_4 (% vol)	0.2	0.1
CO_2 (% vol)	0.2	0.1
O_2 (% vol)	20.8	20.7
PID (ppm)	nt	nt
Atmos Press. (m bar)	1008	1009

ATMOSPHERIC PRESSURE CONDITIONS

3 days prior (m bar)	1023
2 days prior (m bar)	1021
1 day prior (m bar)	1012
during (m bar) am,midday,pm	1009, 1009, 1009
1 day post (m bar)	1008

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators								Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Dissolved Solids (ppt)	Resistivity (Ω·cm)	Temp (°C)	
BH01	4.72	8.76	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
BH02	5.63	9.98	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
BH03	5.42	9.98	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
BH04	5.25	9.85	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt

Notes nt = not tested
nd = not detected

Data Compiled by: TR
Data Checked by: NEB

Tetra Tech

LANDGAS AND GROUNDWATER MONITORING RESULTS

Atlantic House, Greenwood Close, Cardiff Gate Business Park, Pontprennau, Cardiff, CF23 8RD.

Site Name: YGG Rhosafan
Job No.: 784-B068544
Client: Morgan Sindell

Date Monitored: 12/09/24
Monitoring Engineer: CS
Weather: Rain and clear

EQUIPMENT USED

Type	Make	Serial	Last Calibrated
Gas Analyser	**Landtec GA5000**	**G502044**	**Apr-24**
Interface Meter	**Solinst**	**122-004988-1**	**n/a**

LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS

Exploratory Hole No	Peak		Steady									
	CH_4 (% vol)	CO_2 (% vol)	CH_4 (% vol)	CO_2 (% vol)	O_2 (% vol)	BAL (%)	PID (ppm)	H_2S (ppm)	HCN (ppm)	CO (ppm)	Time	Remarks
BH01	0.1	1.1	0.1	1.1	19.1	79.8	nt	0	nt	0	09:45	
BH02	0.2	0.8	0.2	0.8	20.2	78.9	nt	0	nt	0	11:45	
BH03	0.1	0.6	0.1	0.6	20.1	79.3	nt	0	nt	0	09:35	
BH04	0.1	1.6	0.1	1.5	19.5	78.9	nt	0	nt	0	09:20	

LANDGAS - PHYSICAL PARAMETERS

Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)	
BH01	1016	16.0	0.3	0.3	1.1	1.1	GW Sample at 6.00mbgl
BH02	1016	15.0	0.2	0.2	-6.99	-6.99	GW Sample at 6.00mbgl
BH03	1015	16.0	0.4	0.4	-4.8	-4.8	GW Sample at 6.00mbgl
BH04	1016	16.0	0.3	0.3	-0.3	-0.3	GW Sample at 6.00mbgl

AMBIENT ATMOSPHERIC CONDITIONS

Parameter	Before Monitoring	After Monitoring
CH_4 (% vol)	0.0	0.2
CO_2 (% vol)	0.3	0.2
O_2 (% vol)	20.6	20.6
PID (ppm)	nt	nt
Atmos Press. (m bar)	1015	1016

ATMOSPHERIC PRESSURE CONDITIONS

3 days prior (m bar)	1015
2 days prior (m bar)	1010
1 day prior (m bar)	1012
during (m bar) am,midday,pm	1017, 1016, 1020
1 day post (m bar)	1028

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators								Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Dissolved Solids (ppt)	Resistivity (Ω·cm)	Temp (°C)	
BH01	4.70	8.71	nt	nt	-629.9	693.0	nt	9.1	8.4	nt	nt	15.6	
BH02	5.37	9.73	nt	nt	-639.6	727.0	nt	9.0	7.4	nt	nt	15.5	
BH03	5.27	9.83	nt	nt	-637.3	463.6	nt	9.4	8.9	nt	nt	14.9	
BH04	5.10	9.72	nt	nt	-636.9	482.9	nt	10.2	9.6	nt	nt	14.4	

Notes nt = not tested
nd = not detected

Data Compiled by: cs
Data Checked by: pv

Tetra Tech

LANDGAS AND GROUNDWATER MONITORING RESULTS

Atlantic House, Greenwood Close, Cardiff Gate Business Park, Pontprennau, Cardiff, CF23 8RD.

Site Name: YGG Rhosafan
Job No.: 784-B068544
Client: Morgan Sindell

Date Monitored: 18/09/24
Monitoring Engineer: TR
Weather: Sunny

EQUIPMENT USED

Type	Make	Serial	Last Calibrated
Gas Analyser	**Landtec GA5000**	**G502044**	**Apr-23**
Interface Meter	**Solinst**	**122-004988-1**	**n/a**

LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS

Exploratory Hole No	Peak		Steady									
	CH_4 (% vol)	CO_2 (% vol)	CH_4 (% vol)	CO_2 (% vol)	O_2 (% vol)	BAL (%)	PID (ppm)	H_2S (ppm)	HCN (ppm)	CO (ppm)	Time	Remarks
BH01	0.2	0.7	0.2	0.7	19.7	79.4	nt	0	nt	0		
BH02	0.2	0.2	0.2	0.2	20.2	79.4	nt	0	nt	0		
BH03	0.2	1.4	0.2	1.4	18.5	79.9	nt	0	nt	0		
BH04	0.2	1.4	0.2	1.4	18.7	79.7	nt	0	nt	0		

LANDGAS - PHYSICAL PARAMETERS

Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)	
BH01	1028	17.0	0.4	0.4	-0.75	-0.75	
BH02	1028	17.0	-10.4	-7.6	0.22	-0.36	
BH03	1028	17.0	0.5	0.5	0.02	0.02	
BH04	1028	17.0	0.6	0.6	-2.25	-2.25	

AMBIENT ATMOSPHERIC CONDITIONS

Parameter	Before Monitoring	After Monitoring
CH_4 (% vol)	0.2	0.2
CO_2 (% vol)	0.2	0.1
O_2 (% vol)	20.5	20.4
PID (ppm)	nt	nt
Atmos Press. (m bar)	1027	1028

ATMOSPHERIC PRESSURE CONDITIONS

3 days prior (m bar)	1026
2 days prior (m bar)	1028
1 day prior (m bar)	1032
during (m bar) am,midday,pm	1026, 1028, 1028
1 day post (m bar)	1028

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators								Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Dissolved Solids (ppt)	Resistivity (Ω·cm)	Temp (°C)	
BH01	4.50	8.70	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	
BH02	5.42	9.76	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	
BH03	5.25	9.83	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	
BH04	5.06	9.73	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	

Notes nt = not tested
nd = not detected

Data Compiled by: TR
Data Checked by: NEB

APPENDIX I: CIRIA C552 RISK METHODOLOGY

The following tables are derived from CIRIA C552 and have been used to define the risk rating presented in the Qualitative Risk Assessment matrix.

Classification of consequence

Classification	Definition
Severe	Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution (note; Water Resources Act contains no scope for considering significant pollution) of sensitive water resource. Catastrophic damage to building/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Medium	Chronic damage to human health ('significant harm', as defined In DETR, 2000). Pollution of sensitive water resources (note; Water Resources Act contains no scope for considering significant pollution). A significant change in a particular ecosystem, or an organism forming part of such an ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm', as defined In DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

Classification of probability

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

Matrix of consequence against probability to gain a risk classification

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate/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