



Phase I & II Geo-Environmental Assessment

Station Road/Blyth Road

Southwold
IP18 6AX

Prepared for:

Southwold Town Council

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STATION ROAD/BLYTH ROAD, SOUTHWOLD

NON TECHNICAL CLIENT SUMMARY

This report presents the findings of a combined Phase I Desk Study and Phase II Intrusive Investigation undertaken to determine ground conditions, establish if there are any environmental risks associated with the site and its development and provide a geotechnical appraisal. Pertinent findings and conclusions may be summarised as follows:

- The Desk Study established the site to have been an unoccupied parcel of land, during the early 1880s. During the early 1900s housing occupied the site along both Station Road and Blyth Road. By the early 1970s the site contained a bus station and garage.
- Geological maps and historical boreholes indicate the site to be underlain by the Crag Group (Beccles Formation) bedrock, which is classified as a Principal Aquifer in an area considered to be of relatively high environmental sensitivity.
- The intrusive investigation comprised the forming of five boreholes, with the ground conditions summarised as follows:

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Made Ground	1.40	0.55-1.40
Crag Group (sand)	>3.00	>2.45





- Underground Storage Tanks (USTs) and a potential well/chamber have been encountered during the works. It is recognised that the presence of USTs on site will be considered as a potential risk and it is recommended that these be removed prior to the development.
- Review of the results of environmental testing and risk assessment has not indicated any risks to future site users or controlled waters, however in order to ensure safe development, some precautionary measures have been recommended.

ENGINEERING SUMMARY

- Whilst the ground conditions are considered suitable for the use of conventional spread foundations, adopting an allowable bearing capacity of 85kN/m² at around 0.75m to 175kN/m² at around 2.0m.
- The presence of Underground Storage Tanks (USTs) and a well/chamber with a depth of at least 2.60m, could lead to potentially localised deep deposits of made ground/backfill, therefore any new foundations that correspond with the positions of these features, could therefore lead to locally relatively deep foundations. It is recommended that the position of the USTs and well/chamber be confirmed in order that the impact on foundations can be more accurately assessed.
- A design sulphate class of DS-1 with an aggressive chemical for concrete classification of AC-1s is considered suitable for shallow buried concrete in contact with natural soils.

The above points represent a simplified summary of the findings of this assessment and should not form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.

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Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework 2012 requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance (2012), with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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1 INTRODUCTION

In March 2018, Environmental Protection Strategies Ltd (EPS) was commissioned by Ingleton Wood, on behalf of Southwold Town Council, to complete a Phase I and II Geo-Environmental Assessment Report for a plot of land at Station Road/Blyth Road, Southwold, IP18 6AX ('the site'); see Figure 1.

The work was commissioned in order to support a pre-application for the demolition of existing buildings and redevelopment of the site to create a mixed-use development consisting of flexible office space, retail units, along with residential accommodation.

This report presents the findings, conclusions, and recommendations of the Phase I Desk Study and subsequent Phase II Intrusive Investigation undertaken as instructed.

1.1 Background

A Desk Study comprises the first stage of any geo-environmental assessment, the purpose of which is to determine what potentially contaminative activities may have occurred at the property or the surrounding area which may pose an environmental or geological risk to site users, the surrounding environment or proposed development, either at present or in the future.

The method used in this investigation to assess the environmental risk posed is based on the concept of 'contaminant linkage', which considers the following three factors:

Source	The location from which an environmentally hazardous / contaminative substance is, (or was,) derived.
Receptor	An environmentally sensitive object or condition e.g. person, property, controlled water, or ecological system, which may be present now or in future.
Pathway	A route or mechanism via which a source could come into contact with a receptor to cause significant harm.

If all three factors are identified, there is the potential for a 'contaminant linkage' to be active, which could result in significant harm being caused to the environment or human health.

1.2 Objectives

The objectives of this investigation were as follows:

- Compile a Conceptual Site Model (CSM) and undertake a Preliminary Risk Assessment to evaluate the potential risks the site may pose to human and environmental receptors, both currently and in future.
- Investigate potential contaminant linkages identified through the CSM by means of an Intrusive Investigation and Generic Quantitative Risk Assessment.
- Determine the potential risks posed by the site and make recommendations for further work that may be required, to ensure safe development in accordance with the *Model Procedures for the Management of Land Contamination - Contaminated Land Report 11* and the *National Planning Policy Framework*.
- To collect information on ground conditions and strength in order to make appropriate recommendations for geotechnical design.

1.3 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRA's 'Contaminated Land Statutory Guidance' (2012), BS10175 – 'Investigation of Potentially Contaminated Sites', BS5930:2015 'Code of practice for ground investigations' and BS EN 1997 'Geotechnical Design', the following tasks were undertaken:

Desk Study:

- Collection of site records.
- Study of existing geological, hydrogeological and historic maps of the area.
- Consultation of environmental databases, including records held by the local authority (where available).
- Review of proposed development plans.
- Development of a Conceptual Site Model (CSM) and Preliminary Risk Assessment.

Intrusive Investigation:

- Site walkover, inspection of any visual evidence of contamination at the site, obtaining photographic records.
- Health and safety briefing / site supervision.
- Drilling of five window sample boreholes to a maximum depth of 3.0m below ground level (bgl).
- Recording of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected representative samples.

Reporting:

- Data collection
- Interpretation of data including completion of Generic Quantitative Risk Assessment
- Reporting.

The findings and conclusions of these investigations are presented in the following sections.

1.4 Limitations and Constraints

The purpose of this report is to present the findings of a soil sampling investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and / or trial pits to recover soil and / or groundwater samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface however, ground conditions are naturally variable and it may be possible that the conditions encountered may differ to those found during the investigation.

No visible evidence of Japanese Knotweed was identified during the site walkover. However this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its' presence at certain times of the year. For this reason, EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

This report does not include specific investigation for the presence of Potential Asbestos Containing Material (PACM). Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

The investigation was carried out to assess the significance of contamination resulting from the use of the site as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

2 GEO-ENVIRONMENTAL SETTING

The following section provides a summary of the information collected in relation to the site location and history.

2.1 Site & Location Description

Detail	Description
Location	The site is located at the junction of Station Road/Blyth Road, approximately 620m west of the Southwold Pier.
National Grid Reference	650470, 276590
Topography	Generally flat with an elevation of approximately 7-9m Above Ordnance Datum (AOD).
Description of Site	<p>A walkover was undertaken on the 4th April 2018 to assess the current condition of the site. The study area comprises a generally S-shaped parcel of land, with access gained via Blyth Road.</p> <p>The site comprises a number of individual commercial units including Southwold Cycles & Auto Accessorises, which is accessed from Blyth Road, a small corner shop (Clancy's) and a vehicle repair garage with an associated yard called Breakers Yard. The yard has broken, scarred and raised areas of asphalt and concrete hardstanding with multiple manhole covers throughout. This area is used for parking vehicles that have been brought to the vehicle repair garage. The garage and Southwold Cycles appear to have cladded panelling and roofing (possible Asbestos Containing Materials - ACM).</p> <p>From anecdotal evidence, the yard has seen several tanks installed on two separate occasions, which are not currently in commercial use, however the size and fuel type are unknown, with one tank being used by the garage for waste oil. There is a historic planning application DC/83/0829/FUL, which proposed the removal of public petrol pumps from the front forecourt & installation of private pump in inner forecourt, regarding Belchers Garage in 1983. There could potentially be up to seven tanks, which were identified from manhole covers on site and the position of several vents around the periphery of the yard. A water main near the position of WS04, running north-south, along the edge of the garage building, was replaced during a leak and the scarring can be seen from the concrete hardstanding.</p> <p>Several manhole covers interpreted as drainage, were also identified on site, which were not indicated on utility drawings.</p>
Surrounding Land Use	The use of immediate surrounding area appears to be a combination of commercial and residential, with a large area of land associated with the Southwold Golf Club to the west. To the east is the town of Southwold, beyond which there is the pier, with Buss Creek 275m and Blackwater to the north. The remainder of the surrounding land appears predominantly agricultural in use.

A plan showing the site location is provided as Figure 1, the current site layout is detailed on Figure 2 and an aerial photograph is included as Figure 3. Selected site photographs are included as Appendix A, a proposed development plan is included as Appendix B and relevant extracts of a Landmark Envirocheck report are included as Appendix C.

2.2 Geology & Geological Hazards

Detail	Description																
Geology	Geological maps of the area indicate no superficial deposits with ground conditions consisting of the Crag Group (sand). An historical borehole log with a depth of 13.72m, only describes the geology as the Beccles Formation for the full extent of the borehole. Groundwater was recorded at 12.19m. Information of the site's geological context is included as Appendix D.																
Geological Hazards	<table> <tr> <th>Hazard</th><th>On Site Risk</th></tr> <tr> <td>Mining</td><td>No Hazard</td></tr> <tr> <td>Collapsible Ground</td><td>Very Low</td></tr> <tr> <td>Compressible Ground</td><td>No Hazard (onsite); Moderate (81m NW)</td></tr> <tr> <td>Ground Dissolution</td><td>No Hazard</td></tr> <tr> <td>Landslide</td><td>Very Low</td></tr> <tr> <td>Running Sand</td><td>Low (onsite); Moderate (81m NW)</td></tr> <tr> <td>Shrinking / Swelling Clay</td><td>No Hazard (onsite); Low (81m NW)</td></tr> </table>	Hazard	On Site Risk	Mining	No Hazard	Collapsible Ground	Very Low	Compressible Ground	No Hazard (onsite); Moderate (81m NW)	Ground Dissolution	No Hazard	Landslide	Very Low	Running Sand	Low (onsite); Moderate (81m NW)	Shrinking / Swelling Clay	No Hazard (onsite); Low (81m NW)
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Radon	The BGS and Health Protection Agency (HPA) report entitled ' <i>Indicative Atlas of Radon in England and Wales</i> ' shows the site to lie within a lower probability area, where the percentage of homes above the radon action level is between 0% and 1%. The joint Building Research Establishment Ltd (BRE) report entitled: ' <i>Radon: Guidance on Protective Measures for New Buildings</i> ' reports that no radon protection methods are needed for this area.																

2.3 Hydrology & Hydrogeology

Detail	Description
Hydrogeology	<p>Groundwater vulnerability maps for the area show that the underlying Crag Group (sand) bedrock is classified as a Principal Aquifer. The site does not lie within a Source Protection Zone (SPZ) for local groundwater abstraction. Groundwater vulnerability maps are included as Appendix E.</p> <p>The Envirocheck report lists 14 groundwater abstractions within 1km, the nearest is operated by Mr R F Wilshaw for spray irrigation, located around 371m southwest.</p>
Hydrology	<p>The nearest surface water feature is an unnamed drain located approximately 84m west, which is part of a large network of drains leading to the Buss Creek.</p> <p>The Envirocheck report lists seven discharge consents within 500m. The closest of which is registered with Anglian Water Services Limited, located 168m northwest, functioning as storm sewage overflow.</p>

Detail	Description
Hydrology (continued)	<p>There are four surface water abstractions reported within same search radius. The nearest is operated by Mr A V Tomson for spray irrigation, located around 669m north.</p> <p>Review of the EA Flood Zone Map for the area indicates that the site lies within Flood Zone 1, which is defined as the area with a low potential risk of flooding from fluvial or tidal sources.</p> <p>It should be noted that the EA maps do not take into account the presence of flood defences or flooding from poor drainage, or groundwater. A copy of the flood map for the site and surrounding area is also included within Appendix E.</p>

2.4 Landfill & Waste

- One BGS recorded landfill site reported roughly 546m west, which refers to 'Old Gravel Pits'.
- One historical landfill recorded within 1km, located approximately 509m west ('Blyth Road').
- Two licensed waste management facilities are located within 1km, both located around 570m west referring to a recycling centre.
- Two local authority recorded landfills are located 532m and 544m west, operated by Waveney District Council and Suffolk County Council, respectively.
- Two registered waste transfer sites are located within 1km, both located around 550m west, operated by Suffolk Waste Disposal Co Ltd and Suffolk C. C. for household waste and civic amenity/refuse amenity waste.
- There are 10 records of potentially infilled land (non-water) and seven records of potentially infilled land (water) within 1km with unknown filled ground.

2.5 Industrial Land Use & Pollution

There are 21 sites licensed for industrial activity within the surrounding 1km (two of which are noted to lie within the site boundary), the details of the most pertinent are detailed below.

Land Use	Approximate Distance (Direction)	Status
Southwold Auto Services (Garage Services)	Onsite	Active
Finch Motors (Garage Services)	Onsite	Active
Southwold Service Station Ltd (Garage Services)	105m (north)	Inactive
Wessex Joinery (Joinery Manufacturers)	112m (east)	Inactive

Land Use	Approximate Distance (Direction)	Status
Owlers Craft (Boatbuilders & Repairers)	138m (east)	Inactive
Rachel'S Cleaning & Housekeeping Services (Cleaning Services – Domestic)	253m (east)	Active
Rachel's Cleaning & Housekeeping Services (Cleaning Services – Domestic)	254m (east)	Inactive
Southwold & District Hospital (Hospitals)	281m (east)	Inactive
T Schotte Antiques (Printing Engineering Services)	288m (south)	Active

Nine pollution incidents to controlled waters are reported within 500m. Five of these were recorded as having minor impacts on local surface waters, the closest was situated roughly 240m north west, resulting from inadequate design/ capacity with the pollutant recorded as crude sewage in April 1997. Four pollution incidents were recorded as having a significant impact, with the closest located around 180m north west, resulting from a blocked sewer also in April 1997.

2.6 Sensitive Land Use

The site lies within an Area of Outstanding Natural Beauty (Suffolk Coast & Heaths), and also within an Environmentally Sensitive Area (Suffolk River Valleys (decommissioned)) and Nitrate Vulnerable Zone, where groundwater is identified as being at risk from nitrates leaching from agricultural land.

There are two Sites of Special Scientific Interest located approximately 655m southwest (Minsmere-Walberswick Heaths And Marshes) and 976m northeast (Pakefield To Easton Bavents).

2.7 Site History

A summary of historical map data from 1883 to 2018 is provided below and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix F.

- Early mapping from the 1880s showed the site to be an unoccupied parcel of land, which appeared to be bounded by a fence line. Two small structures were on the wider site area, while a drain was detailed, running north-south, along the western boundary. A train station (Southwold Railway) with associated 'goods shed' existed to the north and a gas works was noted to the south with a pump. An old gravel pit was 80m northwest and a sand pit 145m north. Several wells are noted along Station Road with a 'Smithy' 285m and a timber yard 305m southeast. There was a corn mill 355m south, another 'Smithy' 415m southeast, a brickworks 520m east and further gravel pits 570m southwest and. 780m north.

- Mapping from the early 1900s showed residential housing along Station Road and Blyth Road, partially occupying the study area, with a larger structure to the west of the dwellings. Notable amounts of residential development had occurred around 250m to the south and 600m north, in addition to a Methodist church around 500m southeast up to the brickworks in the east, which had had associated sand pits infilled and been replaced by the Grand Hotel. The corn mill and timber yard were also replaced by residential housing, and the sand pit 145m and gravel pit around 780m north had both been infilled. A water works was present 400m southwest and a sewage outfall works around 500m west.
- By the late 1920s further residential developments were noted to the south and east around 250m and the north from 500m beyond this. During this time both the 'Smithy's' were no longer labelled, the gravel pit 570m southwest had been infilled and the sewage outfall works showed a sewage treatment tank. From the late 1930s residential development was shown along North Road, Pier Avenue, Hotson Road and St Edmund's Road.
- Mapping from the early 1970s showed the site to contain a structure labelled bus station, while the remainder of the site was labelled as a garage. The remaining gas holder from the neighbouring gas works had been removed and replaced by Crick Court, while the 'goods shed', station and rail line had been dismantled, and replaced by a police station and fire station with tanks labelled on site. A factory is shown 80m east, depository's 120m southeast and 195m south (of which one becomes a surgery during the 1980s), and a mattress factory 205m southeast (which becomes a store in the late 1980s). The surrounding area showed notable residential developments between Wangford Road and Lowestoft Road in the north, and north of Three Marsh Lane and Gorse Road. A sand and gravel pit infilled with water was located 700m northwest, with a 'new' sand and gravel pit, within the position of a former gravel pit 570m southwest. The expansion of the sewage works with two sewage treatment tanks was also noted.
- By 1995 the bus station was no longer labelled, and by the early 2000s the sand and gravel pit in the west was no longer present, and the sand and gravel pit in the northwest had been partially infilled, with residential developments, where part of the water filled pit had been retained, while the 'new' street was called Lakeside Park Drive.
- No further significant changes were noted for the remainder of the historical period.

3 CONCEPTUAL SITE MODEL

The following section provides a review of the contaminant linkages that may be active at the site through the process of a Preliminary Risk Assessment, whereby EPS have examined the potential sources that may be present as a result of historic and / or current site activities and where potential interaction between these sources and the identified human / environmental receptors may occur.

3.1 Source Characterisation

The following potential contaminant sources have been identified at the site and in the surrounding area:

Potential Source	Source Description	Principal Contaminants of Concern
Current and Historic Site Use	In-fill material of unknown origin (Made Ground) used to level areas beneath existing / historic buildings and hardstanding.	PAH, Metals, ACM
	Current / historic use of the site as a vehicle repair garage.	TPH, PAH, VOC, Metals, ACM
	Existing underground petrol / diesel storage and waste oil tanks.	BTEX, MTBE, TPH, Metals, SVOC, VOC
	Historic use of the site as a bus station	BTEX, MTBE, TPH, Metals, ACM
Current and Historic Surrounding Land Use	Dismantled railway line (Southwold Railway) and associated goods shed located adjacent to the north of the site	TPH, PAH, Metals, ACM
	Gas works to the south of the site, remained active until the early 1970s	PAH, TPH (Inc. BTEX & Chlorinated Solvents) Metals, Cyanide, ACM, Glycols
	Several historically in-filled pits within 80-780m radius	Landfill Gas (CH ₄ , CO ₂)
	Current / historic industrial land use of the surrounding area	SVOC, VOC, TPH, PAH, Metals

Notes:	PAH	Polycyclic Aromatic Hydrocarbons	ACM	Asbestos Containing Materials
	CH ₄	Methane	CO ₂	Carbon Dioxide
	TPH	Total Petroleum Hydrocarbons	BTEX	Benzene, Toluene, Ethylbenzene, Xylene
	MTBE	Methyl Tert Butyl Ether	SVOC	Semi-Volatile Organic Compounds
	VOC	Volatile Organic Compounds		

3.2 Potential Receptors

A framework for the assessment of risks arising from the presence of contamination in soils has been produced by the Environment Agency and the Department for the Environment, Food and Rural Affairs (DEFRA) and is presented with the report '*Using Science to Create A Better Place: Updated Technical Background to the CLEA Model – Science Report SC050021/SR3*'. This guidance document defines a series of standard land-uses, which form a basis for the development of a Conceptual Site Model.

The proposed development plan includes demolition of existing buildings and redevelopment of the site to create a mixed-use development consisting of flexible office space, retail units, along with two residential flats and potential areas of soft landscaping, although it currently appears that these will be in the form of above ground planters. It has been recognised that there is a residential element to the proposed development, however, given that the office spaces and retail units on the ground floor with a courtyard, any landscaped areas are considered to be associated with the commercial aspect and not for use by future residents. Therefore, the land use has been considered as:

- Commercial

In view of the environmental setting, current and potential future land use of the site and surrounding sites, the potential receptors for any contaminant impact are discussed in the table below:

Receptor	Site Specific Description
Human	Future site users, site workers involved in the site redevelopment, and those working and living in the surrounding area have the potential to be at risk from exposure to potential contaminants of concern (CoCs).
Groundwater	The underlying geology comprises the Crag Group (sand), which is classified by the EA as Principal aquifer. Whilst the site does not lie within a SPZ for nearby groundwater abstraction, the underlying geology is an important groundwater resource and therefore groundwater should be considered as a potential receptor to site derived contaminants.
Surface Water	The nearest surface water feature is an unnamed drain located approximately 84m west, which is part of a large network of drains leading to the Buss Creek. It is possible that site derived contaminants of concern may enter these watercourses by overland flow, migration through unsaturated soils or entering shallow surface drainage / historical land drainage which discharges to these drains, therefore surface waters must also be considered as a sensitive receptor within the conceptual site model.
Flora and Fauna	The proposed development includes the provision of soft landscaping areas. Some of the identified contaminants of concern are known to be phytotoxic and as such, the potential for this impact should be considered.

Receptor	Site Specific Description
Buildings & Infrastructure	Subsurface structures are likely to be present at the site which may be adversely affected by the potential presence of the identified contaminants of concern. These include concrete used in building foundations, buried potable water supply pipes and other service lines and pipes.
Adjacent Land	Adjacent properties including private residential dwellings could also be at risk from potential contaminants found at the site.

3.3 Potential Pathways

Where contaminants may be present in soil, there are a number of potential pathways that enable human receptors to come into contact with or be exposed to them. The most direct pathways, considered under current UK legislation, can be summarised as follows:

- Direct ingestion of contaminated soil
- Ingestion of household dust
- Ingestion of contaminated vegetables
- Ingestion of soil attached to vegetables
- Dermal contact with contaminated soil
- Dermal contact with household dust
- Inhalation of fugitive soil dust
- Inhalation of fugitive household dust
- Inhalation of vapours outside
- Inhalation of vapours inside

Clearly, not all of these potential pathways apply for every standard land-use; the simplest example for exclusions being a commercial / industrial site which is covered by concrete hardstanding. The concrete precludes the direct exposure of humans working at the site to any contaminated soils.

However, in addition to direct exposure pathways, a number of physical transport mechanisms / pathways may also exist at a site that allow remote or less accessible contaminants in soil or groundwater to reach human or environmental receptors both at a site and beyond the site boundary. These include the transport mechanisms listed below.

- Downward and lateral movement of contaminants in soil either by gravity or through being 'leached' by percolating rainwater
- Lateral migration of contaminants dissolved in groundwater.
- Direct seepage or leaching of contaminants from soil into subsurface drains or supply pipework.
- Volatilisation of contaminants from groundwater or unsaturated soils into buildings or outdoor air.

Through examination of the standard land use and environmental setting at each site, the presence of pathways and transport mechanisms described above must be considered when assessing whether a contaminant linkage may plausibly be active, and therefore be included in the conceptual site model.

3.4 Summary of Contaminant Linkages

Considering the site use and environmental setting, and proposed land use, the following plausible contaminant linkages have been identified through this phase I assessment and require further investigation.

Source	Pathway	Receptor
Fuel storage (tanks still present)	Leakage from primary and / or secondary containment	Soil and groundwater
Contaminated soil	Direct contact and inadvertent ingestion by eating or smoking with dirty hands	Construction workers during redevelopment & site users
	Inhalation of fugitive dusts	
	Ingress / diffusion through permeable potable water supply pipes	Site users
	Migration of ground gas to indoor and outdoor air	Site users
	Direct contact	Buried infrastructure
	Leaching of contaminants vertically through unsaturated soils	Groundwater
Contaminated soil / groundwater	Lateral migration of contaminants in soil or groundwater	Surface waters
	Volatilisation of organic compounds to indoor and outdoor air	Site users
	Off-site migration of organic vapours	Adjacent Site Users

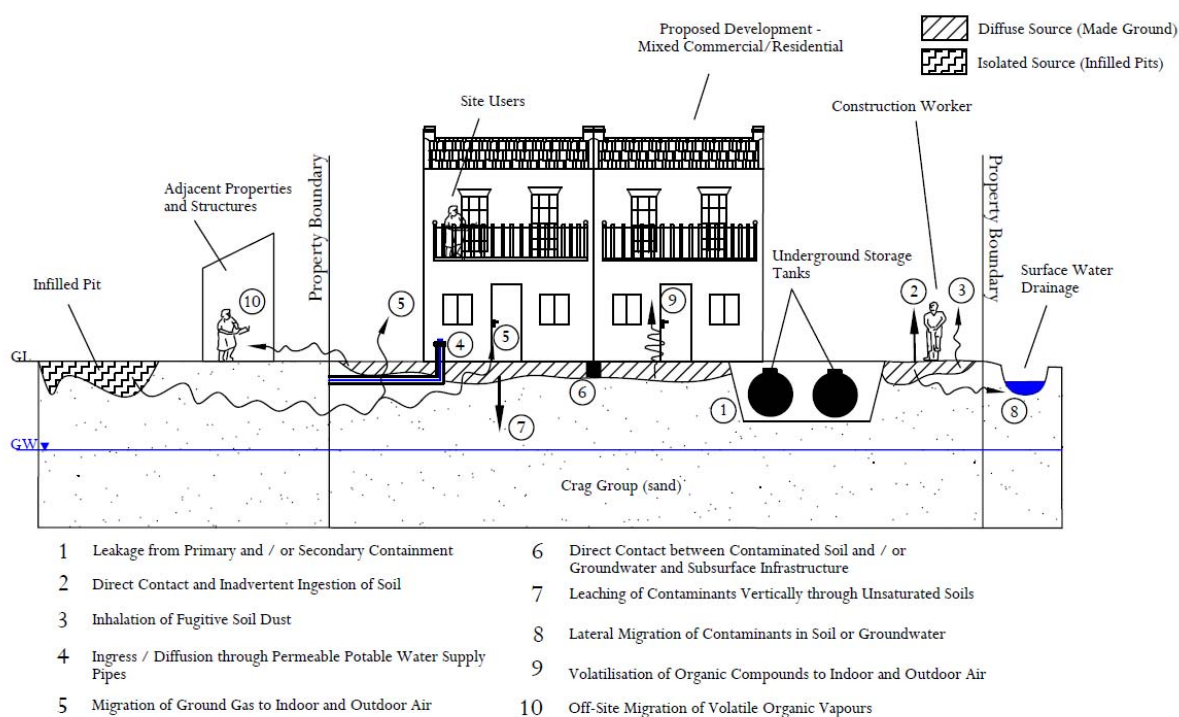
The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' – i.e. through which a significant possibility of significant harm could occur to an identified receptor:

- PAHs and metals have been identified as contaminants of concern associated with the historic onsite infill, however these contaminants are considered to be relatively immobile in the environment by virtue of their very low solubility and volatility. On this basis, plausible pathways by which these potential contaminants could pose a significant risk to the underlying groundwater (or nearby surface watercourses) are not considered to be active.

- Contaminants of concern may be associated with the nearby dismantled railway line, located to the north of the site. However, this feature was located down hydrological gradient of the site and with the current use of land and redevelopment as a police and fire station, the risks are therefore not considered to be present and are not considered as plausible sources of contamination.
- Suspected Asbestos Containing Materials are present on site. These materials need to be removed in accordance with current best practice.

The following diagram provides an illustration of the plausible contaminant linkages that may be active at the site and which may need further investigation or control to ensure safe development:

Illustrative Conceptual Site Model



4 SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive ground investigations were undertaken on the 4th April 2018 in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of all site activities is presented in the following sections:

4.1 Exploratory Hole Locations

Exploratory hole locations were selected through consideration of the potential contaminant linkages identified through the Phase I Desk Study, the proposed development layout, the location of below ground utilities as well as operational and health & safety considerations.

Five window sample boreholes (WS01 – WS05) were drilled at the site to a maximum depth of 3.0m bgl using a track-mounted window sampler rig. However, at position WS05 a possible deep historic groundwater well/chamber was uncovered, after the first 0.0-1.0m bgl core run consisted of 0.50m of brick rubble. The depth of this feature was measured at a depth of 2.60m.

A borehole location plan is presented as Figure 4.

4.2 Field Testing & Soil Sampling

Each borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and the presence of separate phase liquids on a precautionary basis. Borehole logs are presented in Appendix G.

Where potentially volatile organic compounds are suspected, EPS carries a Photoionisation Detector (PID), which can be used to measure the relative concentrations of vapour associated with soil samples collected from different depths and locations at the site.

In these circumstances, soil samples will be placed into plastic bags, sealed, shaken and then allowed to rest for a few minutes to allow time for volatile vapour to accumulate in the air trapped within the bag.

The PID probe will then be used to pierce the bag and sample the air above the soil to measure the concentration of volatile compounds that have accumulated. PID readings are only used to provide EPS with a basic means to quantify areas of volatile organic compound in the field to help guide the investigation. As potentially volatile organic compounds, specifically including petroleum hydrocarbons, were identified in the conceptual site model, PID readings were collected during this intrusive investigation. These readings are included on the borehole logs presented as Appendix G and the results are discussed further in later sections.

A laboratory testing schedule is included as Table 1.

4.3 In-Situ Geotechnical Testing

Standard or cone penetration tests (SPT / CPT) were carried out in all materials using an automatic trip hammer. The number of blows required to advance a standard split spoon, (or solid 60° nose cone for the CPT test) over the final 300mm of a 450mm total drive was recorded and is shown on the borehole records at the penetration resistance (“N” value).

4.4 Laboratory Testing

Samples obtained for analysis of identified contaminants of concern were submitted to Exova Jones Environmental of Flintshire, who hold appropriate UKAS / MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered to the laboratory by approved courier.

Geotechnical testing was undertaken by Soil Property Testing, Huntingdon, a UKAS accredited laboratory. Copies of chain of custody documentation are held by EPS and will be made available on request.

4.5 Soil Gas Monitoring

Two rounds of ground gas monitoring were undertaken following completion of the site works on the 4th April 2018 to measure the presence and concentration of ground gas (including carbon dioxide, oxygen and methane) and organic vapour using a GFM 435 gas analyser, PID and flow meter to provide indicative information on the on-site migration of ground gas and organic vapour.

The results of gas monitoring are presented in Table 3.

5 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the various aspects of the ground investigation.

5.1 Ground Conditions

A total of five window sample boreholes were formed at the site and the ground conditions encountered, from ground level, were found to comprise:

- Made Ground
- Crag Group (sand)

Site specific borehole logs are included as Appendix G and give descriptions and depths of strata encountered. A summary of the general strata encountered across the site is provided in the table below, with more detailed description given in the following sub sections.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Made Ground	1.40	0.55-1.40
Crag Group (sand)	>3.00	>2.45

5.1.1 Made Ground

Made Ground was encountered at all the borehole locations, beneath the concrete hardstanding, which ranged in thickness from 0.07m to 0.19m. Made ground consisted of a dark greyish brown gravelly sand / slightly clayey gravelly sand, with fine to medium brick, concrete, clinker and chalk-fill at WS01, WS02, WS03 and WS04.

At position WS05 during advancement of the borehole, 0.50m of brick fragments were recovered and a well and/or chamber was discovered during the works, with a depth of 2.60m. The width of this feature is unknown.

5.1.2 Crag Group

Brownish orange gravelly sand was recorded beneath the made ground, which has been interpreted to represent the Crag Group (sand). The gravel was recorded as fine to medium flint, quartz and sandstone.

5.2 Groundwater

Groundwater was encountered at position WS05 within the well/chamber at 2.15m, it is unknown whether this water has been pumped into the void by historical means or if the water is under artesian influences, however groundwater was not encountered in any of the other boreholes, which reach depths of 3.0m.

5.3 Physical Evidence of Contamination

Other than the presence of made ground, there was no palpable evidence of contamination, waste or putrefiable material encountered in any of the sampling locations during the investigation. Grey staining was noted in WS01 and WS03, however PID headspace screening of soils did not identify any results above the instrument detection limits.

5.4 Laboratory Analysis – Soil

A laboratory analysis testing schedule is presented as Table 1 and all environmental sample results obtained from the laboratory are included as Appendix H. The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	5	5	3.4	18.5	WS03 (0.8)
Cadmium	5	1	-	0.7	WS03 (0.8)
Chromium III	5	5	13.1	69.9	WS01 (0.4)
Copper	5	4	18	54	WS03 (0.8)
Lead	5	4	69	1958	WS04 (0.4)
Mercury	5	2	0.2	0.3	WS04 (0.4)
Nickel	5	5	5.1	16	WS03 (0.8) & WS04 (0.4)
Selenium	5	1	-	4	WS04 (2.0)
Zinc	5	5	9	466	WS03 (0.8)
Naphthalene	5	2	0.06	0.22	WS03 (0.8)
Benzo[a]pyrene	5	4	0.1	2.43	WS03 (0.8)
Dibenz(ah)anthracene	5	2	0.08	0.37	WS03 (0.8)
PAH (Total of 16)	5	4	0.9	28.4	WS03 (0.8)
VOC	2	0	-	-	n/a
Phenols	5	0	-	-	n/a
MTBE	5	0	-	-	n/a
Benzene	5	0	-	-	n/a
Toluene	5	1	-	0.03	WS04 (0.4)
Ethylbenzene	5	0	-	-	n/a
Xylene	5	1	-	0.222	WS04 (0.4)
TPH	5	3	40	254	WS03 (0.8)
TPH CWG Aromatics (C5-C35)	5	3	40	205	WS03 (0.8)
TPH CWG Aliphatics (C5-C35)	5	1	-	49	WS03 (0.8)
Cyanide	5	1	-	2.4	WS03 (0.8)
pH	5	-	8.3	11.24	WS02 (0.3)
Soil Organic Matter (%)	4	-	<0.2	6.4	WS04 (0.4)
Asbestos (%)	5	1	-	<0.001	WS03 (0.8)

Notes: Contaminant not found above laboratory detection limits

TPH CWG Total Petroleum Hydrocarbons (Criteria Working Group)

PAH

MTBE

Polycyclic Aromatic Hydrocarbons

Methyl tert-butyl ether

- Detectable concentrations of ACM, in the form of chrysotile fibre bundles were identified in shallow soils recovered from WS03. However, upon quantification analysis, percentage of ACM by sample mass was identified at below minimum detection limits (MDL) within WS03 (0.6m).

5.5 Laboratory Analysis – Groundwater

A laboratory analysis testing schedule is presented as Table 2 and all environmental sample results obtained from the laboratory are included as Appendix H. The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (µg/l)		Highest Location
			Min	Max	
MTBE	1	0	-	-	n/a
BTEX	1	0	-	-	n/a
TPH Aromatics (C5-C35)	1	0	-	-	n/a
TPH Aliphatics (C5-C35)	1	0	-	-	n/a

Notes: - Contaminant not found above laboratory detection limits BTEX Benzene, Toluene, Ethylbenzene, Xylene

5.6 Geotechnical Testing

The results of geotechnical laboratory testing are summarised in the table below and all geotechnical sample results obtained from the laboratory are included as Appendix I. The key results of laboratory testing on geotechnical soil samples are summarised below.

Strata	Range of Parameters		
	Soil Fraction (%)		
	Gravel	Sand	Silt/Clay
Crag Group (sand)	21-62	36-60	2-19

Particle Size Distribution was undertaken on three samples of granular material in accordance with BS1377: Part 2: 1990; 9.2.

Sulphate contents and pH values determinations were also carried out by the analytical laboratory, the results of which are summarised in section 6 below.

A laboratory analysis testing schedule is presented as Table 2.

6 GEOTECHNICAL APPRAISAL

The ground conditions have been found to comprise a thickness of made ground, overlying the Crag Group (sand).

6.1 Structural Foundations

6.1.1 Spread Foundations

The ground conditions are considered suitable for the use of conventional spread foundations, either strip footings or pad foundations bearing on the underlying natural granular materials.

A minimum foundation depth of 0.75m, below existing or proposed ground level is considered suitable for the site, subject to the following provisos:-

- a) Foundations should fully penetrate any made ground and should extend a minimum of 150mm in to undisturbed natural strata. It should be noted that Made Ground extended to a depth of at least 0.55m and a maximum of 1.4m and therefore average foundation depths are likely to exceed the advised minimum.
- b) Underground Storage Tanks (USTs) are known to exist beneath the site, the depths of which are unknown, but may well exceed 3m below current ground level. It is recognised that the presence of USTs on site will be considered as a potential risk and it is recommended that these be removed prior to the development. A historical well/chamber was also encountered at position WS05 with a depth of 2.60m, however the width of this feature is unknown. Therefore, any new foundations may well correspond with the positions of these features and could therefore lead to locally relatively deep foundations. It is recommended that the position of the USTs and well/chamber be confirmed in order that the impact on foundations can be more accurately assessed.

Allowable bearing capacities for the remainder of the site are provided in the table below. The allowable bearing capacity is the permissible increase in vertical stress at the level of the underside of the foundation, above existing overburden pressure, which may be calculated on the basis of a soil density of 19kN/m³.

Depth (m bgl)	Allowable Bearing Capacity (kN/m ²)
0.75	85
1.0	105
1.5	140
2.0	175

At the above bearing pressure, total settlements are unlikely to exceed approximately 20mm to 25mm.

Where foundation depths exceed 2.5m, as potentially in the area of the existing USTs, or where structural loads exceed the above allowable bearing pressures or should the structures be sensitive to settlements, piled foundations could be a more appropriate foundation solution. If this option is preferred, then a deep borehole would be required to design piles.

6.2 Ground Floor Construction

Given the depth of made ground the use of suspended floor construction is recommended throughout.

6.3 Groundworks

The stability of unsupported excavations should not be relied upon in any material found on site. Due to the granular nature of the deposits encountered, suitable support should be provided in all excavations.

Heavy plant and stockpiles of materials should not be permitted close to the edges of unsupported excavations.

Further reference may be made to CIRIA Report No. 97 '*Trenching Practice*' 1992.

On the basis of the findings of the ground investigation, significant quantities of groundwater are unlikely to be encountered within shallow excavations for foundations or drainage.

6.4 Concrete Grade

Sulphate contents and pH values determinations were carried out by the analytical laboratory, the results of which are also included within Appendix H. Results for concrete grade are summarised within the following table.

Strata	Water Soluble Sulphate (mg/l SO ₄)		pH	
	Min	Max	Min	Max
Crag Formation	<50	81	8.38	8.77

In accordance with Part 1 of the BRE Special Digest 1 '*Concrete in Aggressive Ground*' 2005, the mean of the highest two water soluble sulphate values has been used. For the Crag Formation, this gives a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1s.

7 ENVIRONMENTAL APPRAISAL

The following section outlines the approach applied to assessing the risks posed to human health and controlled waters through a Generic Quantitative Risk Assessment, then identifies any sample results found by this investigation which warrant further consideration.

7.1 Human Health

7.1.1 Land Use Setting

It is understood that the site will be redeveloped for a mixed-use development consisting of flexible office space, retail units, along with two residential flats and potential areas of soft landscaping, although it currently appears that these will be in the form of above ground planters. In order to screen laboratory data for concentrations of contaminants in soil with potential to cause harm to human health in these soft landscaped areas, relevant generic screening values most applicable to this land use have been utilised. A land use setting of Commercial, has been adopted as it is considered the most representative, at this time. Should the proposed land use or development plans change, then this will need to be reviewed.

The technical framework used to derive DEFRA's Category 4 Screening Levels (Policy Companion Document '*SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*') outlines the relevant factors for determining land use selection in the application of the screening levels and the following key considerations have been taken into account.

7.1.2 Generic Screening – Soils

The technical framework used to derive the assessment criteria and the documents in which they are published are summarised as follows:

- *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- *EA Soil Guideline Value Science Reports*
- *Suitable For Use Levels (S4ULs) for Human Health Risk Assessment* – LQM and CIEH (2015)
- *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL:AIRE (2010)

Category 4 Screening Levels (C4SLs) provide generic suitable for use screening values for common contaminants in a variety of land uses and are also utilised as appropriate generic screening criteria.

In the absence of any commonly accepted UK generic screening values for cyanide in soil, reference to the former Dutch Intervention Value of 20mg/kg has been made.

A summary of the screening criteria and the methodology used to derive them is included in Appendix J.

7.1.3 Assessment of Results

The results of the screening process for on-site human receptors show that generic screening criteria representative of minimal or low risk levels for human health in a commercial setting were not exceeded for any of the contaminants of concern.

7.1.4 Initial Soil Gas Assessment

The results of soil gas monitoring are presented in Table 3 along with calculated gas screening values, set out in CIRIA guidance '*Assessing Risks Posed by Hazardous Ground Gases to Buildings*'.

Results of the ground gas monitoring show that no detectable concentration of methane or hydrogen sulphide were encountered above instrument detection limits across the monitoring period. Minor carbon dioxide concentrations were identified in both of the monitoring wells, with the maximum concentration observed being 0.6% within WS03 during both visits. No flow rates above 0.1l/hr were recorded.

The subsequent gas screening values have been found to fall into the 'very low risk' classification for both Carbon Dioxide and Methane, in line with *CIRIA Guidance document 665 – Assessing Risks Posed by Hazardous Ground Gases to Buildings* (2007) for a gassing regime defined as Characteristic Situation 1. However, although the monitoring regime included two visits at falling barometric pressures and therefore is considered suitably precautionary, the duration and frequency of the monitoring regime is slightly limited within the context of the CIRIA guidance.

No concentrations of volatile organic compounds were identified above the instrument detection limit during any monitoring visit.

7.2 Controlled Waters

7.2.1 Generic Screening

In addition to screening the recorded concentrations of contaminants to pose risks to human health, EPS has also screened both the results of soil and groundwater analysis for potential to cause harm to water resources.

The criteria used for this process were derived by EPS using the following technical guidance

- *Environment Agency Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination.*

Resource Sensitivity of Area	Basis of Tier 1 Criteria
High Groundwater Resource Potential (HGwRP) - Principal aquifers	UK Drinking Water Standards (UKDWS)
Low Groundwater Resource Potential (LGwRP) - Secondary aquifers not being abstracted and Un-productive groundwater strata	UK Environmental Quality Standards (EQS)

Screening criteria for High Groundwater Resource Potential (HGwRP) have been adopted for this site due to the underlying geology being classified as a principal aquifer.

7.2.2 Assessment of Soil Results

Relevant screening criteria protective controlled waters from concentrations of contaminants in soil were exceeded for Benzo(a)pyrene, Naphthalene and Aromatic Petroleum Hydrocarbon Fractions EC12-EC16, EC16-EC21 and EC21-EC35. A summary of the exceedances is provided in the table below.

Contaminant	Screening Criteria (mg/kg)	No. of Exceedances	Highest Exceedance (mg/kg) & Sampling Location (m bgl)
Benzo(a)pyrene	1.44	1	2.43 (WS03 0.8)
Naphthalene	0.02	1	0.22 (WS03 0.8)
Aromatic Hydrocarbon Fraction EC12-EC6	5.5	1	6 (WS03 0.8)
Aromatic Hydrocarbon Fraction EC16-EC21	17.4	1	39 (WS03 0.8)
Aromatic Hydrocarbon Fraction EC21-EC35	138	1	160 (WS03 0.8)

However, the fact that some recorded values exceed those of the screening values does not necessarily indicate that an unacceptable risk to controlled waters exists. The generic screening values are by their very nature, extremely conservative and in the first instance, an exceedance should lead to qualitative consideration of the risks that may be posed given the context of a specific site.

The concentrations of petroleum hydrocarbons and PAH compounds are relatively minor exceedances. In the case of the petroleum hydrocarbons, the exceedances appear to be localised within WS03 and have been identified by the laboratory as possibly lubricating oil, tarmac & bitumen. This would further suggest that the USTs, known to be on site, are unlikely to be the source.. However, it is recognised that the presence of USTs on site will be considered as a potential risk and it is recommended that these be removed prior to the development.

7.2.3 Assessment of Groundwater Results

The results of the screening process for controlled waters showed that screening criteria representative of minimal risk to the underlying groundwater within the Secondary Aquifer (HGwRP) were not exceeded.

This further reinforces the conclusion that contaminants in soils do not currently pose a plausible risk to groundwater.

7.3 Summary of Findings

Laboratory analysis of shallow soils sampled from across the site has identified that the contaminants of concern do not exceed relevant screening criteria protective of future users for a Commercial end land use. However, the shallow made ground materials have been shown to contain marginally elevated concentrations of the heavy metal lead and contain materials which would not necessarily be considered as physically suitable medium for use within proposed landscaped areas in their current state. On this basis, consideration of the provision of cover soils to act as a growing medium for any landscaped areas has been recommended in Section 8.

In terms of risks from soil gas, screening values have been found to fall into the 'very low risk' classification and no further controls measures/ remedial action is recommended.

In terms of risks to controlled waters, EPS has reviewed the nature, distribution and origin of the identified contamination in the context of the site and it is considered that the shallow soils are not considered to represent an unacceptable risk to controlled waters and further control measures / remedial action is not considered necessary.

7.4 Management of Contaminated Land

In accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11), the risks identified by this work will require further assessment unless control measures are implemented. Recommended control measures are outlined in Section 8, below, and a summary of the approach outlined in CLR11, marking the work already completed under the risk assessment phase, is presented as a flow diagram in Figure 5 of this report.

8 RECOMMENDATIONS

8.1 Geotechnical

- a) It is recommended that the precise locations of the historic USTs, well/chamber and on site drainage be established, potentially using ground penetrating radar (GPR) survey techniques, in order that the impact on foundations and services can be more accurately assessed.

8.2 Environmental

- b) It is recommended that a minimum of **300mm** of certified clean imported soil is placed across proposed soft landscaped areas (if these are to be included) for the development (it is recognised that some material may have to be removed to achieve this thickness). Although this recommendation is the not the result of contamination, a nominal thickness such as this would be required to ensure an adequate growing medium and compliance with Building Control/Approved Inspector (NHBC) requirements, so the recommendation should not be seen as onerous but will require verification as outlined below.

All imported topsoil / subsoil for use within areas of soft landscaping should be accompanied by appropriate laboratory analysis to demonstrate its' chemical and physical suitability for use. The analysis should include Total Petroleum Hydrocarbons, Asbestos, Speciated Poly-cyclic Aromatic Hydrocarbons and Metals and should also comply with the relevant physical parameters outlined within the British Standard BS 3882:2015 'Specification for topsoil and requirements for use'.

It is also recommended that once the proposed cover system is in place, verification of the site is undertaken to confirm that the thickness of cover material, as advised in this report, is correctly installed. This verification / Closure process is typically required to satisfy any remaining contamination conditions on the planning permission. EPS can undertake the necessary verification works if required, a proposal for these works will be provided upon request.

- c) It is recommended that when the underground storage tanks (USTs) are appropriately decommissioned and removed, along with any accompanying contaminated soils associated with the USTs, a formal validation of the underlying and surrounding soils is undertaken. The historic USTs precise locations will need to be established, for which ground penetrating radar (GPR) survey techniques may represent a practical way forward, (as an aid to physical investigation with a mechanical excavator, which could damage the tanks with associated health and safety and environmental risks).

The following recommendations are also made in relation to safe development at the site:

- In order to reduce potential risks from linkages associated with ingress of contaminants to underground water supply pipework, aluminium barrier pipework meeting Water Industry Standard 4-32-19 and associated fittings should be used subject to agreement with the local water company. If other pipework is preferable, more detailed testing may be required in accordance with UK Water Industry Research Report 10/WM/03/21 - "Guidance For The Selection Of Water Supply Pipes To Be Used In Brownfield Sites" (2010).

- Should any palpable evidence of unexpected contamination be encountered during the redevelopment work, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out, a method statement for this is provided as Appendix K.
- All waste materials potentially containing asbestos should be disposed of with the appropriate duty of care in accordance with the Control of Asbestos Regulations (2012), prior to any groundworks commencing.

It is recommended that a copy of this report be provided to the Environmental Health Department of Suffolk Coastal and Waveney District Councils so that the information may be incorporated into their land quality records and used to support the current planning application. It is assumed that the Council will require verification for the installation of the recommended control measures prior to discharging the relevant planning condition.

FIGURES



Approximate Site Location

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Title: Site Location Plan

Project: Station Road/Blyth Road,
Southwold,
IP18 6AX

Fig No: 1

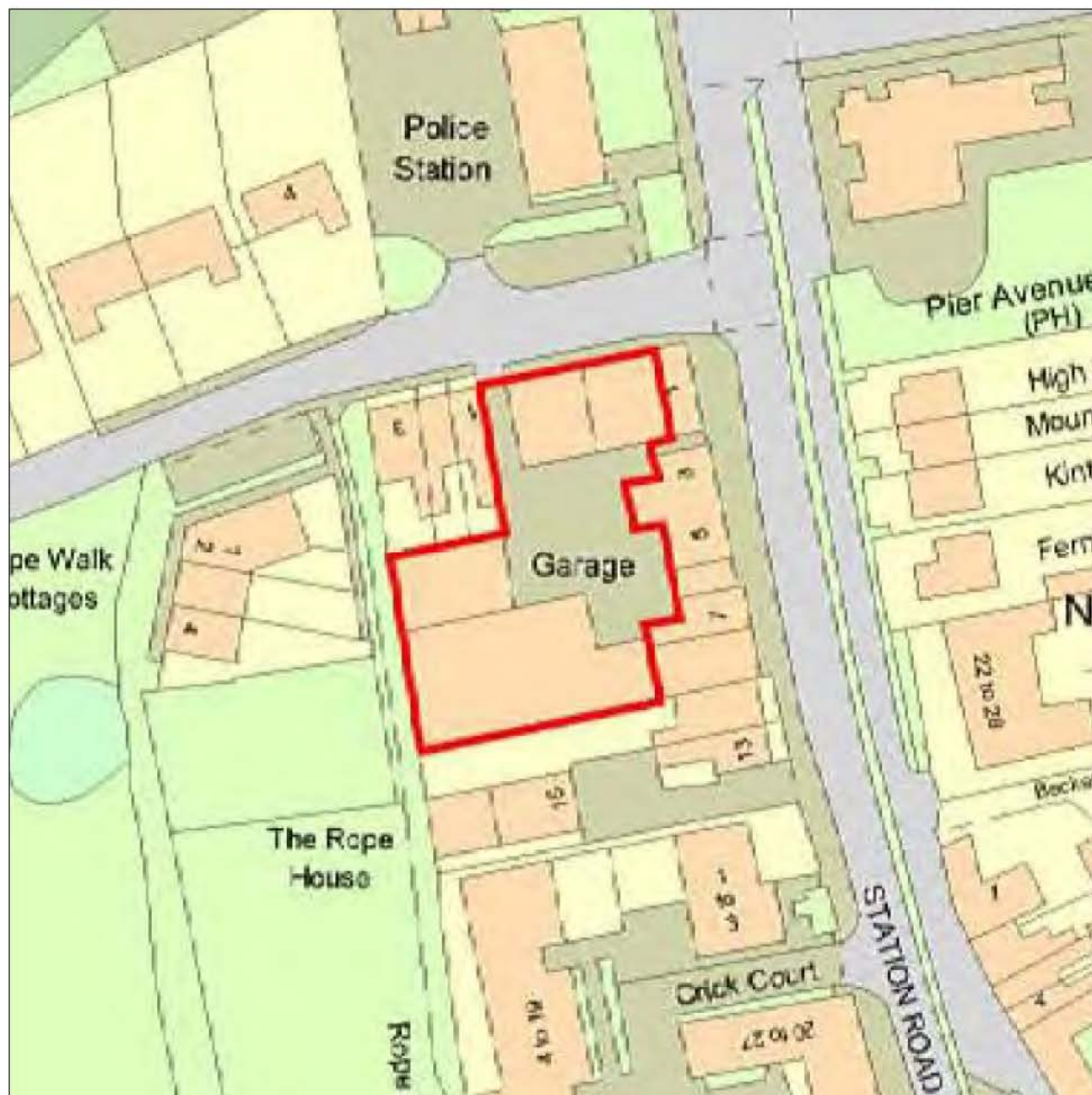
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Drawn By: [Signature] **Approved By:** [Signature]

Job No: UK18 3076

Dwg No: Southwold/0418/01

Date: April 2018



Approximate Site Boundary —

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Title: Current Site Layout

Project: Station Road/Blyth Road,
Southwold,
IP18 6AX

Fig No: 2

Scale: NTS

Drawn By: [redacted] **Approved By:** [redacted]

Job No: UK18 3076

Dwg No: Southwold/0418/02

Date: April 2018



Approximate Site Boundary —

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Title: Aerial Photograph

Project: Station Road/Blyth Road,
Southwold,
IP18 6AX

Fig No: 3

Scale NTS

Drawn By  **Approved By** 

Job No UIK18 3076

Dwg No Southwold/0418/03

Date April 2018



Approximate Site Boundary —

Approximate EPS Borehole Locations WS1

Approximate Location of Possible Well WS1

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Title: Borehole Location Plan

Project: Station Road/Blyth Road,
Southwold,
IP18 6AX

Fig No: 4

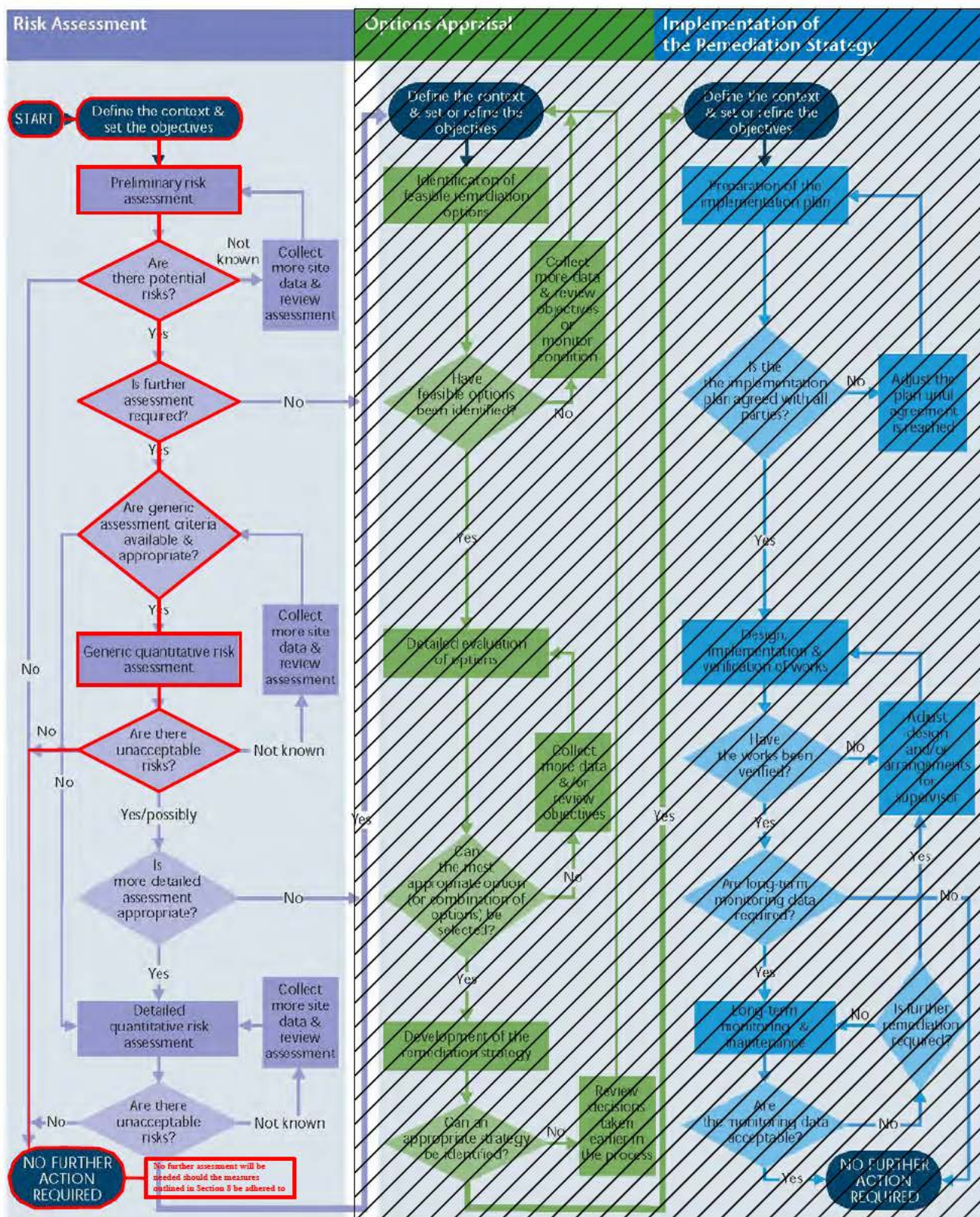
Scale: NTS

Drawn By: [Signature] **Approved By:** [Signature]

Job No: UIK18 3076

Dwg No: Southwold/0418/04

Date: April 2018



Assessment Pathway for Site



Title: Site Context - CLR11

Project: Station Road/Blyth Road,
Southwold,
IP8 6AX

Fig No: 5

Scale n/a

Drawn By

Approved By

Job No

UIK18 3076

Dwg No

Southwold/0418/05

Revision Date

May 2018

TABLES

Table 1 – Laboratory Testing Schedule (Environmental)

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	EPS TPH Suite	VOC	EPS Geotechnical Suite
WS01	0.4	1	1		
WS01	1.0				1
WS02	0.3	1	1		
WS02	1.0				1
WS03	0.8	1	1	1	
WS03	1.6				1
WS04	0.4	1	1		
WS04	1.5			1	
WS04	2.0	1	1		1

Notes

mbgl

1

-

EPS Mini Suite

EPS TPH Suite

VOC

EPS Geotechnical Suite

meters below ground level

Sample Taken

Sample Not Analysed

Organic Matter, Cyanide, Metals, PAH's, Phenols, Asbestos

Total Petroleum Hydrocarbons

Volatile Organic Compounds

Dissolved and Total Sulphates

Table 2 – Laboratory Testing Schedule (Geotechnical)

Sample ID	Sample Depth (m bgl)	Particle Size Distribution
WS01	1.0	1
WS01	1.6	
WS01	2.2	
WS02	0.9	1
WS02	1.5	
WS02	2.3	
WS03	1.5	
WS03	2.0	
WS03	2.8	
WS04	1.5	1
WS04	1.9	
WS04	2.5	

Notes

mbgl

1

-

meters below ground level

Sample Taken

Sample Not Analysed

Table 3 – Gas Monitoring Well Analysis

(18/04/2018)

Sample ID	WS02	WS03	WS04	WS05
CH ₄ (%)	<0.1	<0.1	<0.1	<0.1
CO ₂ (%)	0.1	0.6	0.3	<0.1
O ₂ (%)	20.6	20.2	20.6	20.7
Flow Rate (l/hr)	<0.1	<0.1	<0.1	<0.1
Gas Screening Value (l/hr) (CH ₄)	<0.0001	<0.0001	<0.0001	<0.0001
Gas Screening Value (l/hr) (CO ₂)	<0.0001	<0.0006	<0.0003	<0.0001

Readings collected on 18th April 2018 at an atmospheric pressure of 1029mbar (falling)

(25/04/2018)

Sample ID	WS02	WS03	WS04
CH ₄ (%)	<0.1	<0.1	<0.1
CO ₂ (%)	<0.1	0.6	<0.1
O ₂ (%)	20.6	20.3	20.6
Flow Rate (l/hr)	<0.1	<0.1	<0.1
Gas Screening Value (l/hr) (CH ₄)	<0.0001	<0.0001	<0.0001
Gas Screening Value (l/hr) (CO ₂)	<0.0001	<0.0006	<0.0001

Readings collected on 25th April 2018 at an atmospheric pressure of 1010mbar (falling)

APPENDICES

APPENDIX A

Selected Site Photographs

<p>Photo 1: Photograph of the site, facing south.</p>	<p>Photo 2: Photograph of the site, facing north from WS04.</p>
	
<p>Photo 3: Photograph highlighting six manhole covers with four potential tank locations.</p>	<p>Photo 4: Photograph showing seven manhole covers with three further potential tank locations.</p>
	
<p>Photo 5: WS01 core run 1.0-2.0m.</p>	<p>Photo 6: WS04 core run 0.0-1.0m.</p>
	

APPENDIX B

Proposed Development Plan



Ground Floor Plans



First Floor Plans



View towards Block A at Station Road / Blyth Road junction



View towards the rear of Block A from courtyard



View towards Block B from courtyard

APPENDIX C

Surrounding Land Use



APPENDIX D


Geological Context

Geology 1:50,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	WMGR	Infilled Ground	Artificial Deposit	Cenozoic - Cenozoic
	WGR	Worked Ground (Undivided)	Void	Holocene - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	TFD	Tidal Flat Deposits	Clay and Silt	Holocene - Holocene
	LOFT	Lowestoft Formation	Diamicton	Anglian - Anglian
	LOFT	Lowestoft Formation	Sand and Gravel	Anglian - Anglian
	HPGL	Happisburgh Glacialic Formation	Sand	Pleistocene - Pleistocene
	HEAD	Head	Clay, Silt, Sand and Gravel	Quaternary - Quaternary
	MBD	Marine Beach Deposits	Sand and Gravel	Quaternary - Quaternary
	PEAT	Peat	Peat (Unlithified Deposits Coding Scheme)	Quaternary - Quaternary
	BSA	Blown Sand	Sand	Quaternary - Quaternary

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	CRAG	Crag Group	Sand	Pleistocene - Pliocene
	CRAG	Crag Group	Gravel	Pleistocene - Pliocene
	CRAG	Crag Group	Clay, Silty	Pleistocene - Pliocene



Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.

The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	1
Map Sheet No:	178
Map Name:	Lowestoft
Map Date:	1998
Bedrock Geology:	Available
Superficial Geology:	Available
Artificial Geology:	Available
Faults:	Not Supplied
Landslip:	Not Available
Rock Segments:	Not Supplied

Geology 1:50,000 Maps - Slice A



Order Details:

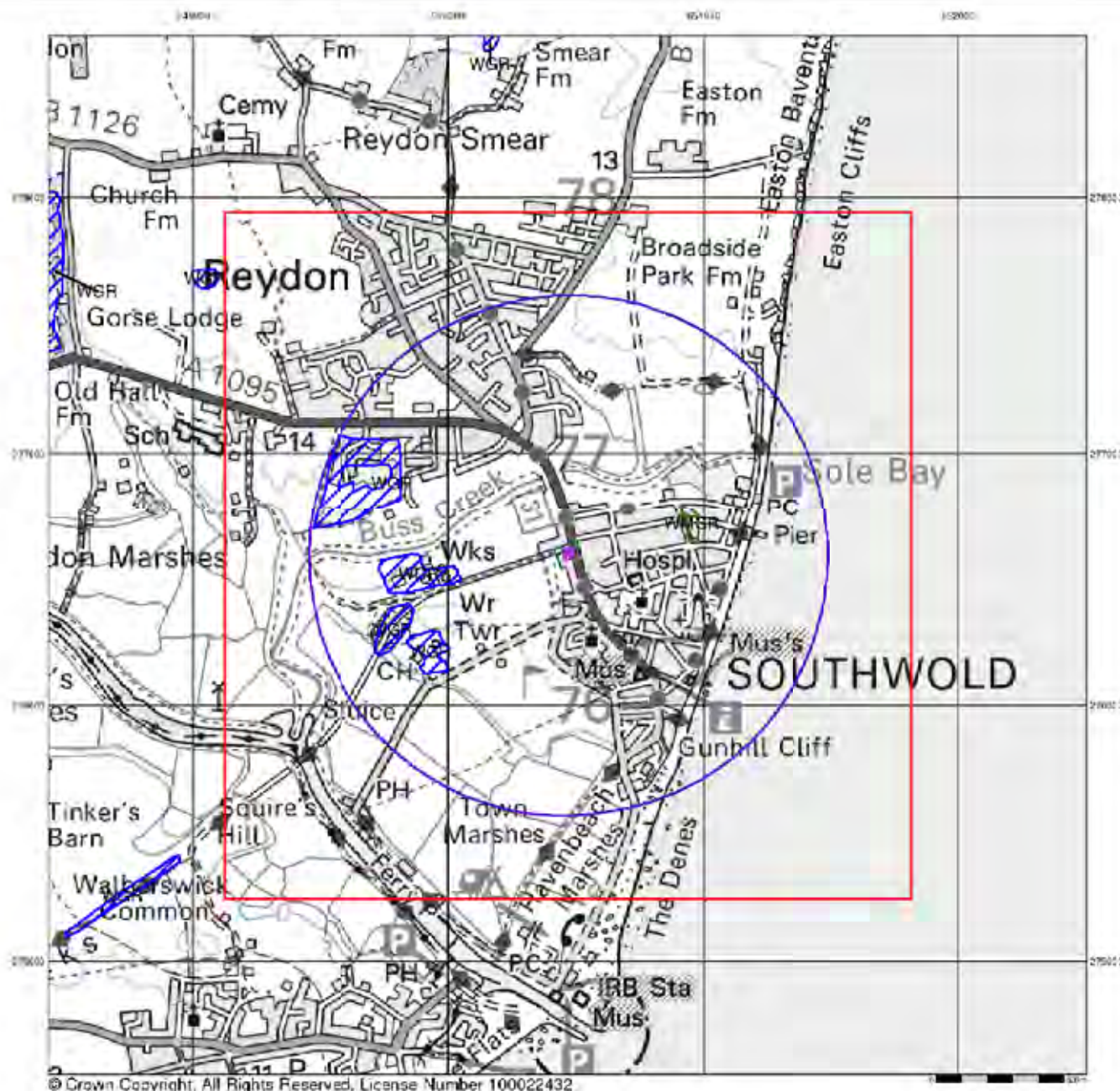
Order Number:	161135276_1_1
Customer Reference:	UK18_3075
National Grid Reference:	650470, 276590
Slice:	A
Site Area (Ha):	0.12
Search Buffer (m):	1000

Site Details:

Site at 650480, 276590

Landmark
INFORMATION GROUP

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Artificial Ground and Landslip

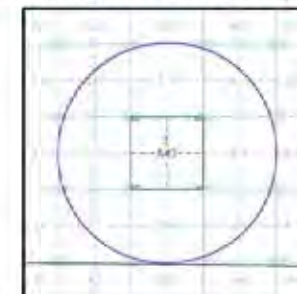
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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

Artificial ground includes:

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

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

Artificial Ground and Landslip Map - Slice A



Order Details:

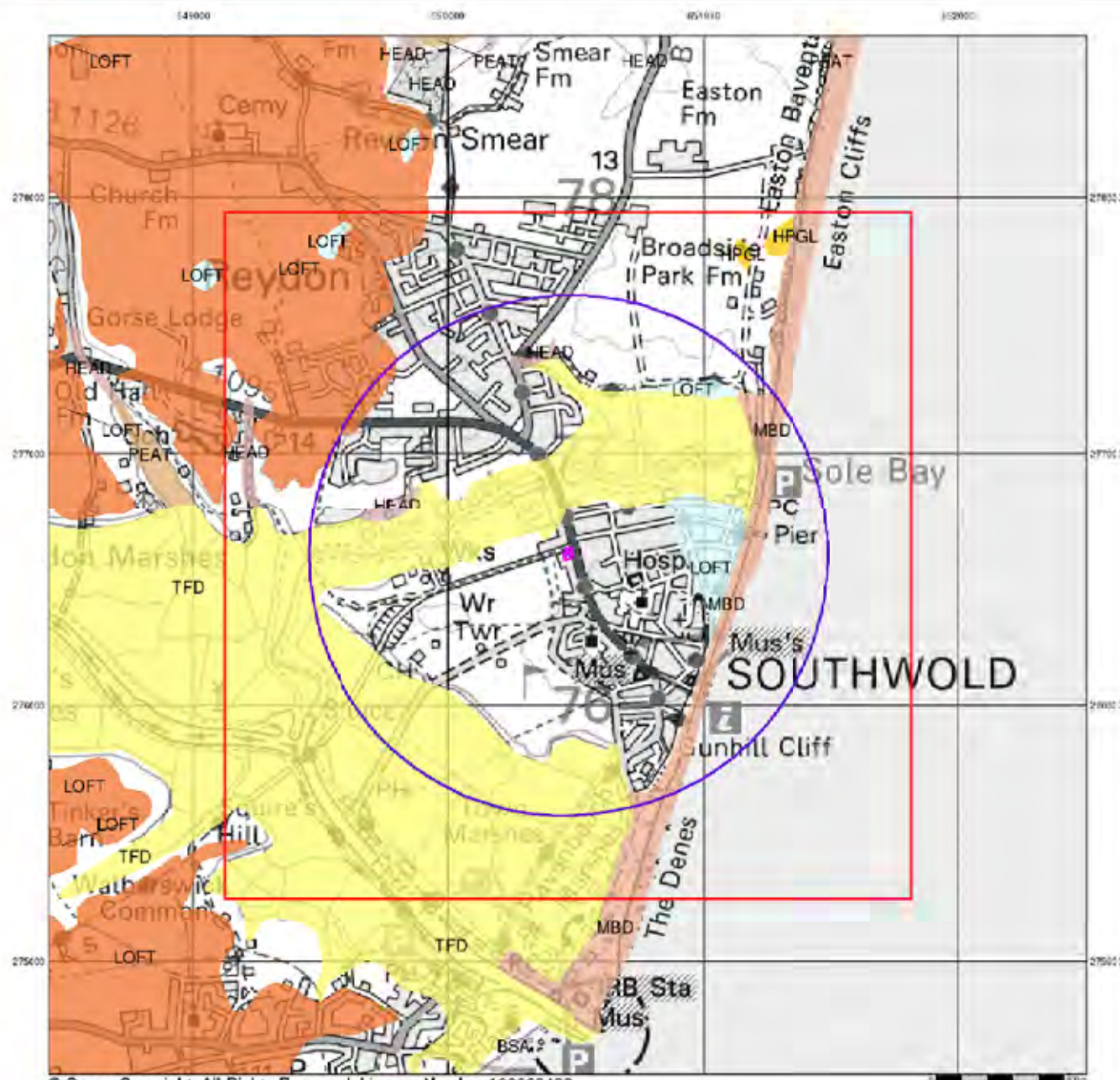
Order Number: 161135276_1_1
 Customer Reference: UK18_3076
 National Grid Reference: 650470, 276590
 Slice: A
 Site Area (Ha): 0.12
 Search Buffer (m): 1000

Site Details:

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Superficial Geology

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

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

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

Superficial Geology Map - Slice A



Order Details:

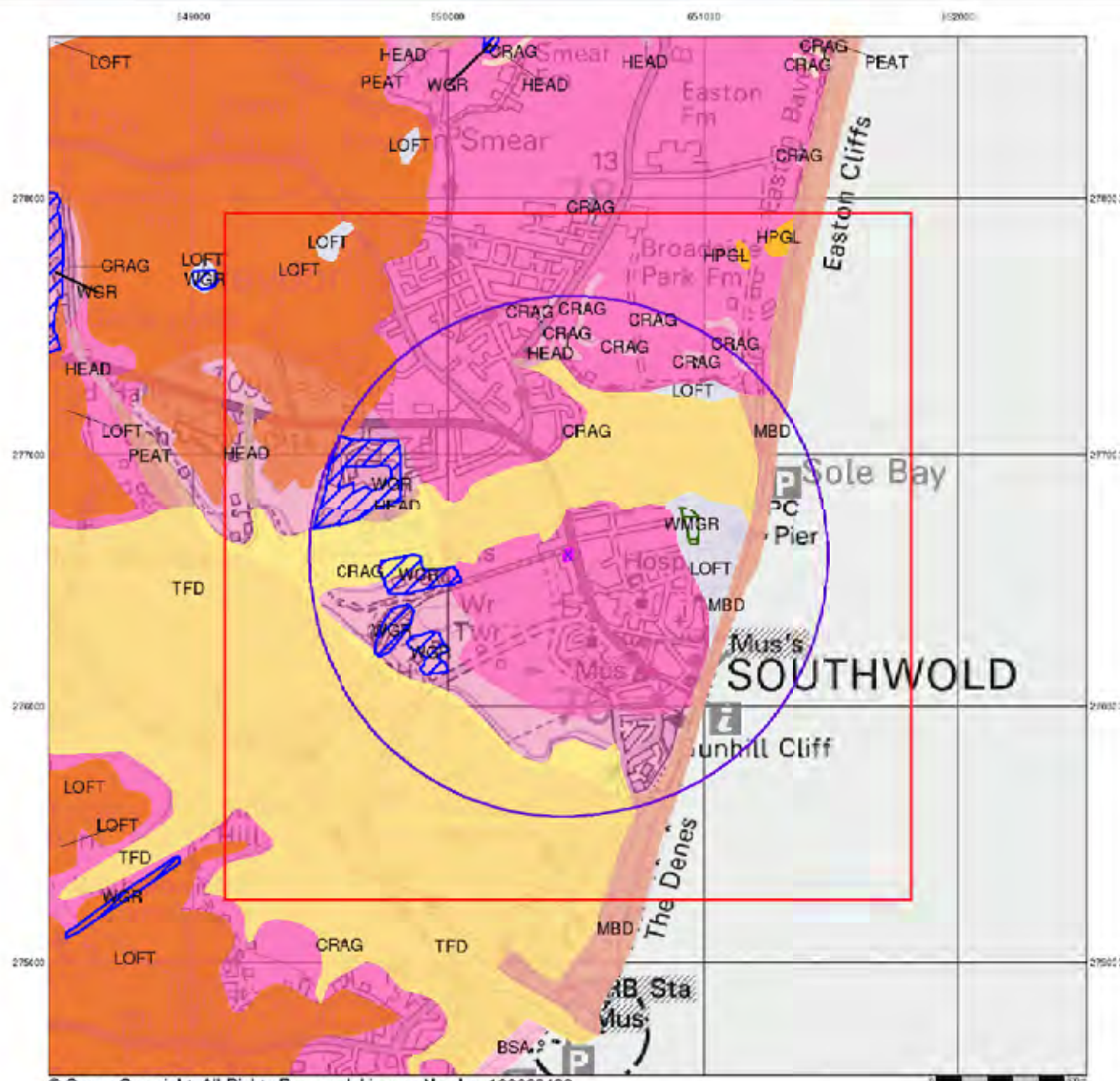
Order Number: 161135276_1_1
Customer Reference: UK18.3076
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details:

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Combined Surface Geology

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

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

Additional Information

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

Contact

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

Combined Geology Map - Slice A



Order Details:

Order Number: 161135276_1_1
Customer Reference: UK18.3076
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details:

Site at 650480, 276590

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v1.50 29-Mar-2018

Page 5 of 5

Tm 50817614

TM57/1

176
9**Southwold.**

(Ordn. Map 176, N.S.; Geol. Map 49 N.W.)

1. MARKET PLACE.

Sunk and communicated by Mr. J. DADZ.

Sand and gravel [Pebbly Series] 45 feet; with about 5 feet of water.

British Geological Survey

British Geological Survey

Diam. of well: 6 ft

R.W.L. 40 ft down

o.d. ca. 40 ft.

Yield unknown

Date of sinking: 1872

Inf. from J.S. Hurst, Esq., Borough Surveyor of Southwold in letter dated 5. ix. 40 in 5509/176
 also on "L" Coll. No. 29 SW (Emergency Ed.)

Suffolk 29 SW-5.

not flooded.

British Geological Survey

British Geological Survey

British Geological Survey

Site visited. Pump removed J.H.B. 31.8.60.

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

Water Supply of
 Suffolk,

British Geological Survey

British Geological Survey

British Geological Survey

TM57/1

176/9

Beccles Formation

45'

British Geological Survey

CW
3/81

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

British Geological Survey

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British Geological Survey

British Geological Survey

APPENDIX E

Groundwater Vulnerability and Flood Maps








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Groundwater Vulnerability

General

-  Specified RB
-  Specified Buffer
-  Bearing Reference Point
-  Site
-  Map

Agency and Hydrological

Geological Classes

Major Aquifer
(Highly Permeable)

Minor Aquifer
(Variably Permeable)

Non Aquifer
(Negligibly Permeable)

Water or Sea

Drift Depress

Soil Classes

High (1, 2, 3, 4)
Intermediate (1, 2)
Low

High (1, 2, 3, 4)
Intermediate (1, 2)
Low

High (1, 2, 3, 4)
Intermediate (1, 2)
Low

High (1, 2, 3, 4)
Intermediate (1, 2)
Low

Site Sensitivity Context Map - Slice A



Order Details

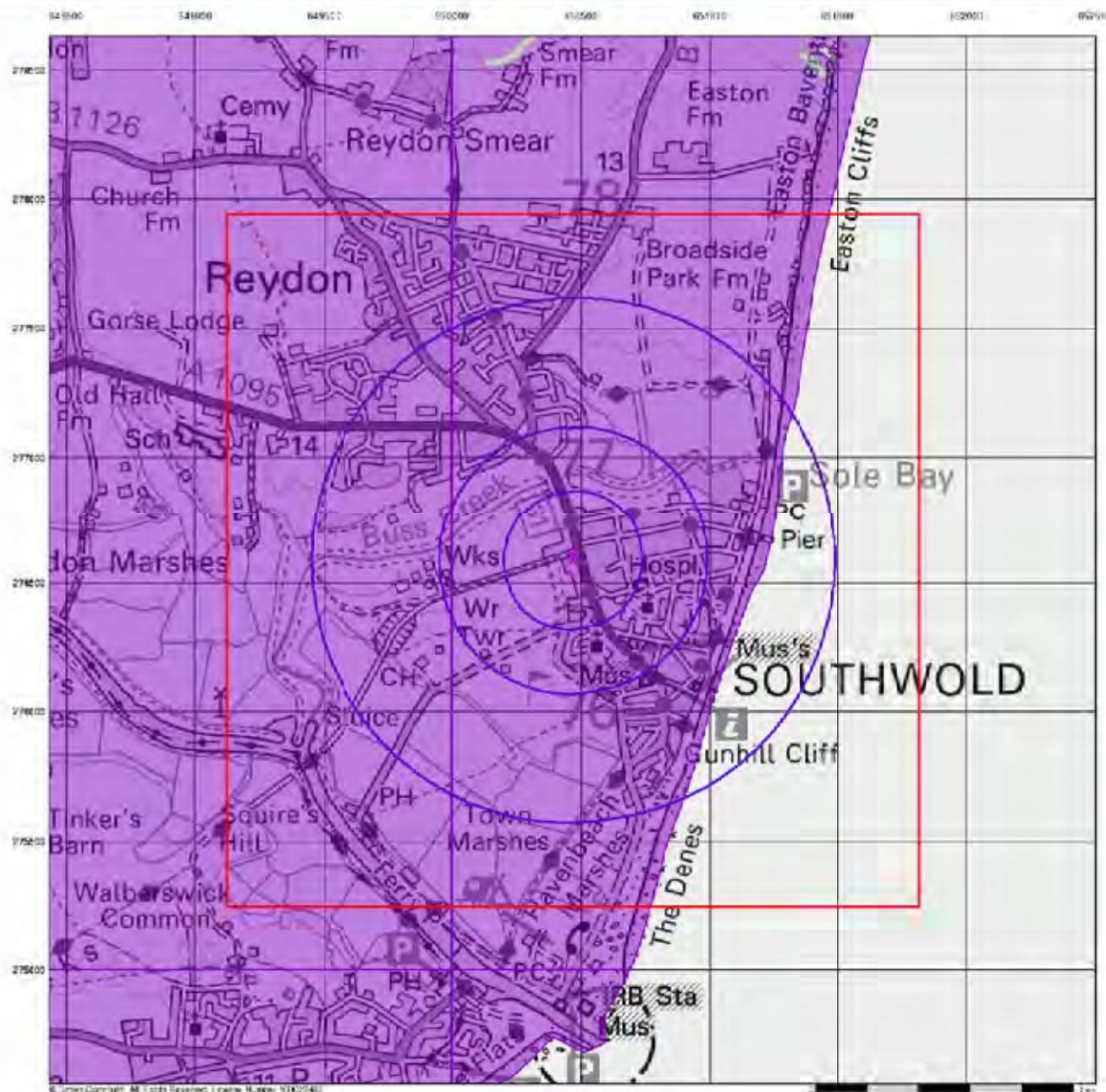
Order Number: 161135276_1_1
Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details

Site at 650480, 276590

Landmark
INFORMATION GROUP

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Fax: 0844 944 9901
Web: www.landmark.co.uk



Bedrock Aquifer Designation

General

- Specified BQ
- Specified Buffer (m)
- Bearing Reference Point
- Site
- Map(s)

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

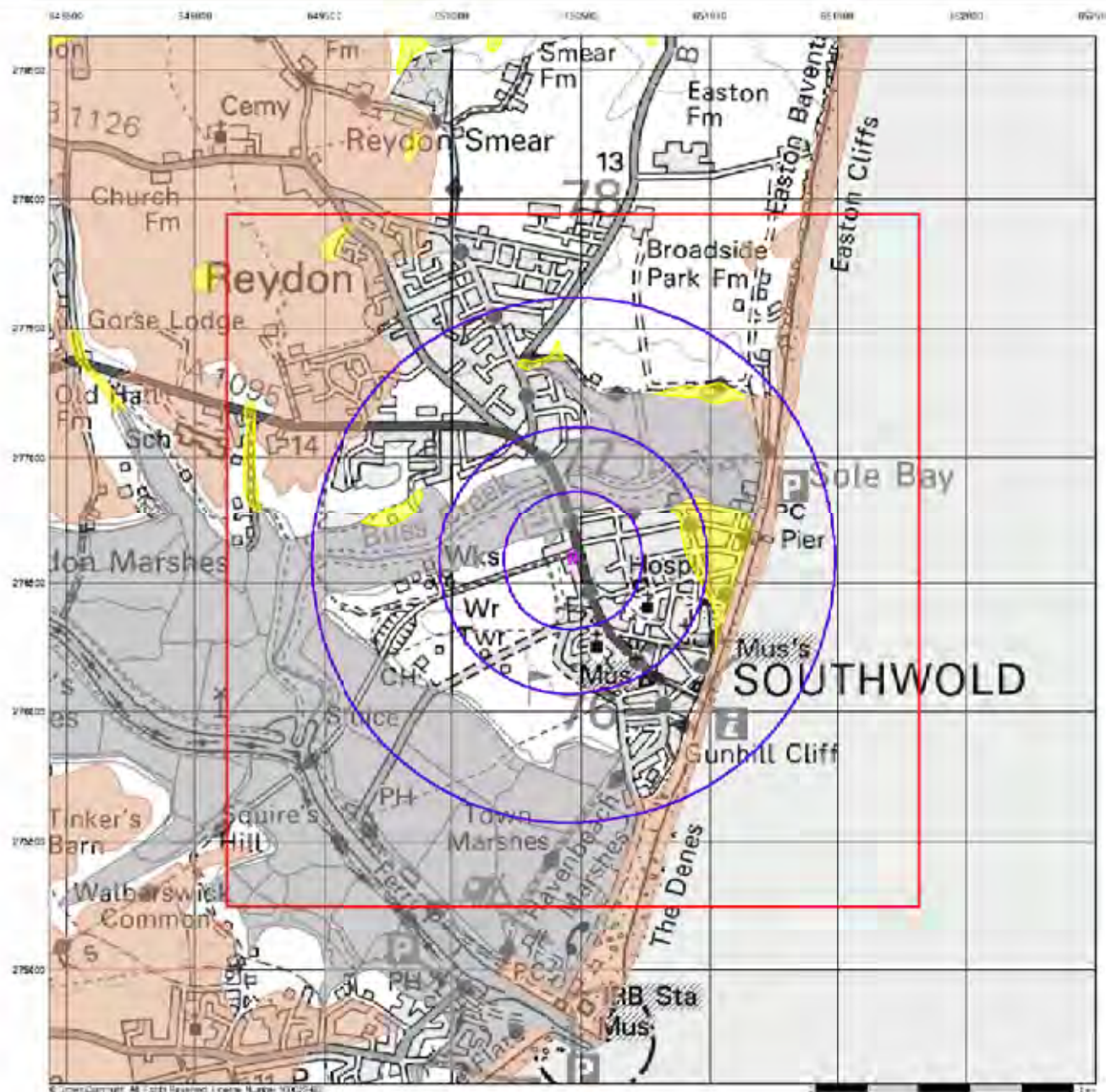
Order Number: 161135276_1_1
 Customer Ref: UK18.3076
 National Grid Reference: 650470, 276590
 Slice: A
 Site Area (Ha): 0.12
 Search Buffer (m): 1000

Site Details

Site at 650480, 276590

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 Fax: 0844 544 0801
 Web: www.landmark.co.uk



Superficial Aquifer Designation

General

- Specified BQ
- Specified BQ
- Bearing Reference Point
- Site
- Map

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

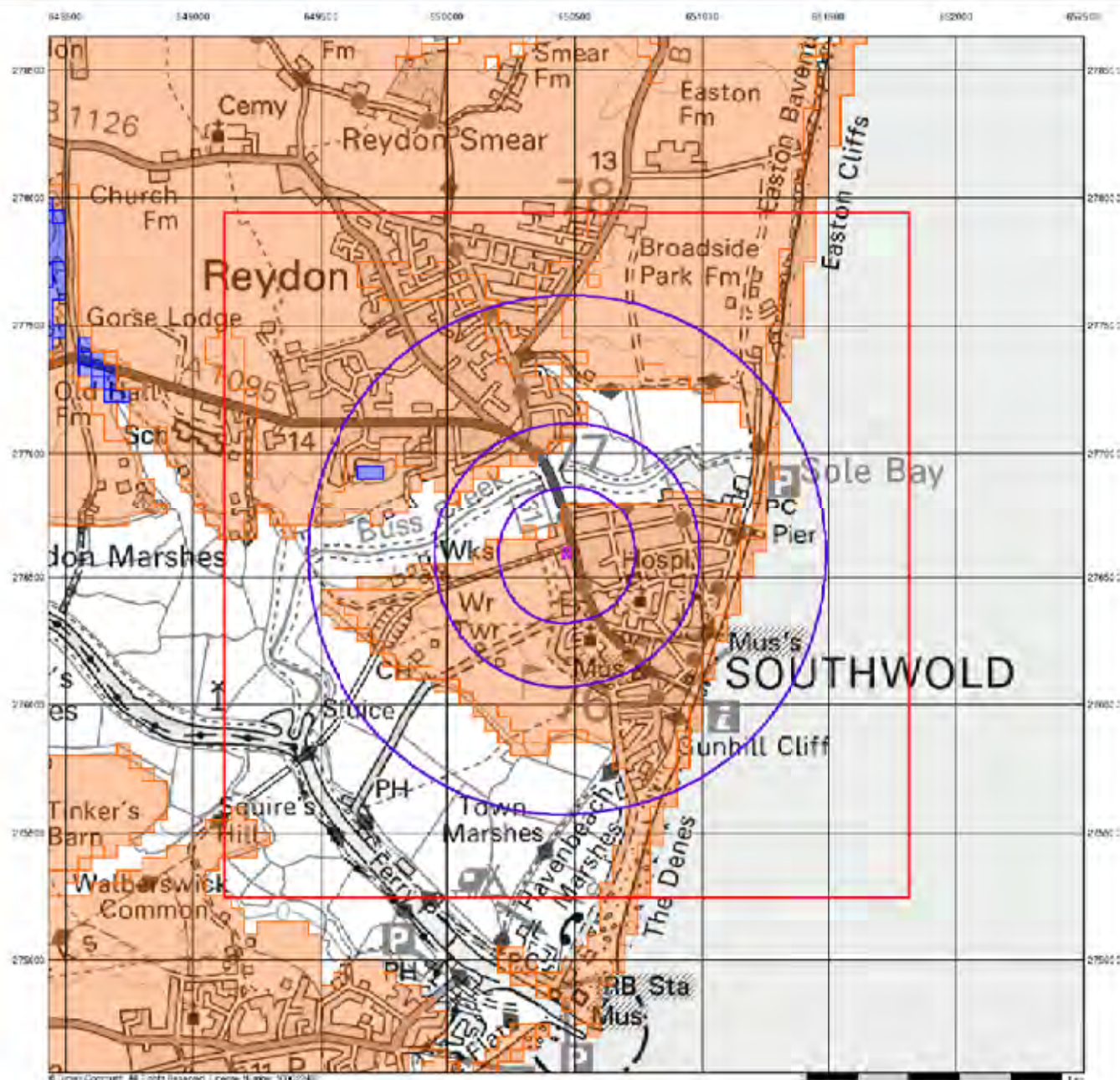
Order Number: 161135276_1_1
 Customer Ref: UK18.3076
 National Grid Reference: 650470, 276590
 Slice: A
 Site Area (Ha): 0.12
 Search Buffer (m): 1000

Site Details

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BGS Flood GFS Data

General

- Specified Data
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



Order Details

Order Number: 161135276_1_1
 Customer Ref: UK18_3076
 National Grid Reference: 650470, 276590
 Slice: A
 Site Area (Ha): 0.12
 Search Buffer (m): 1000

Site Details

Site at 650480, 276590

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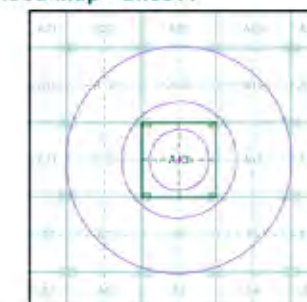
General

- Specified Site
- Search Buffer
- Source Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from River or Sea without Defences (Zone 2)
- Flooding from River or Sea without Defences (Zone 3)
- Area Excluded from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



Order Details

Order Number: 161135276_1_1
Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details

Site at 650480, 276590

Landmark
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APPENDIX F

A Selection of Historic Maps



Suffolk

Published 1883 - 1884

Source map scale - 1:10,560

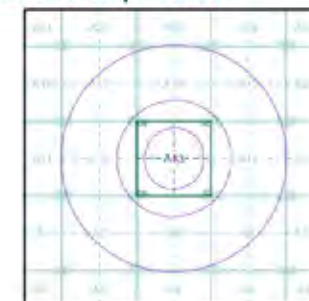
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some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

Map Name(s) and Date(s)

OS SW
1883
1:10,560

OS NW
1884
1:10,560

Historical Map - Slice A



Order Details

Order Number: 181135278_1_1
Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details

Site at 650480, 276590

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INFORMATION GROUP

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



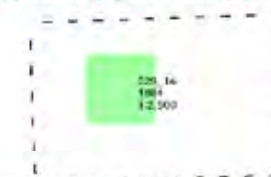
Suffolk

Published 1884

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1899 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1939, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

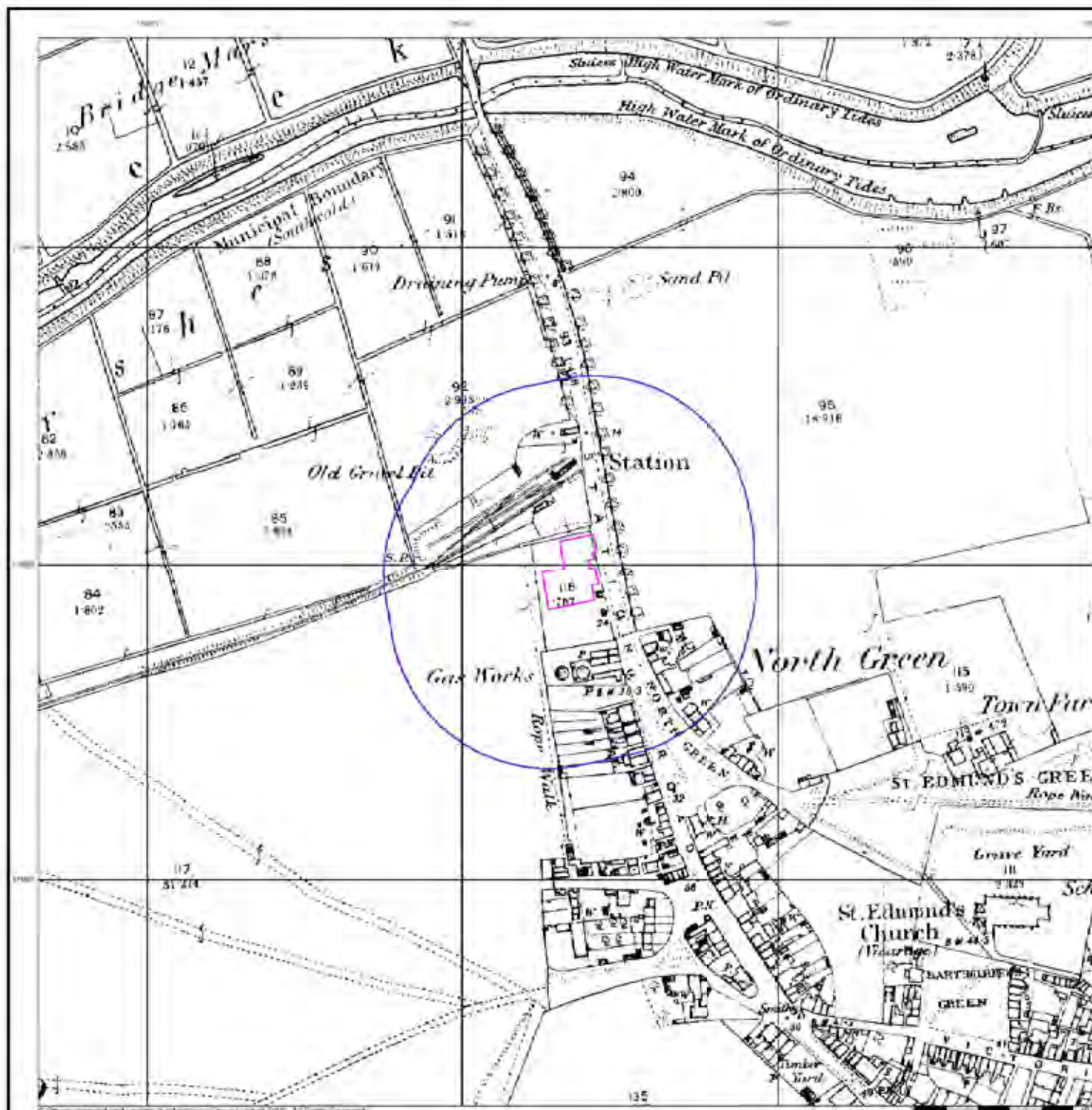
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Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Site: A
Site Area (Ha): 0.12
Search Buffer (m): 100

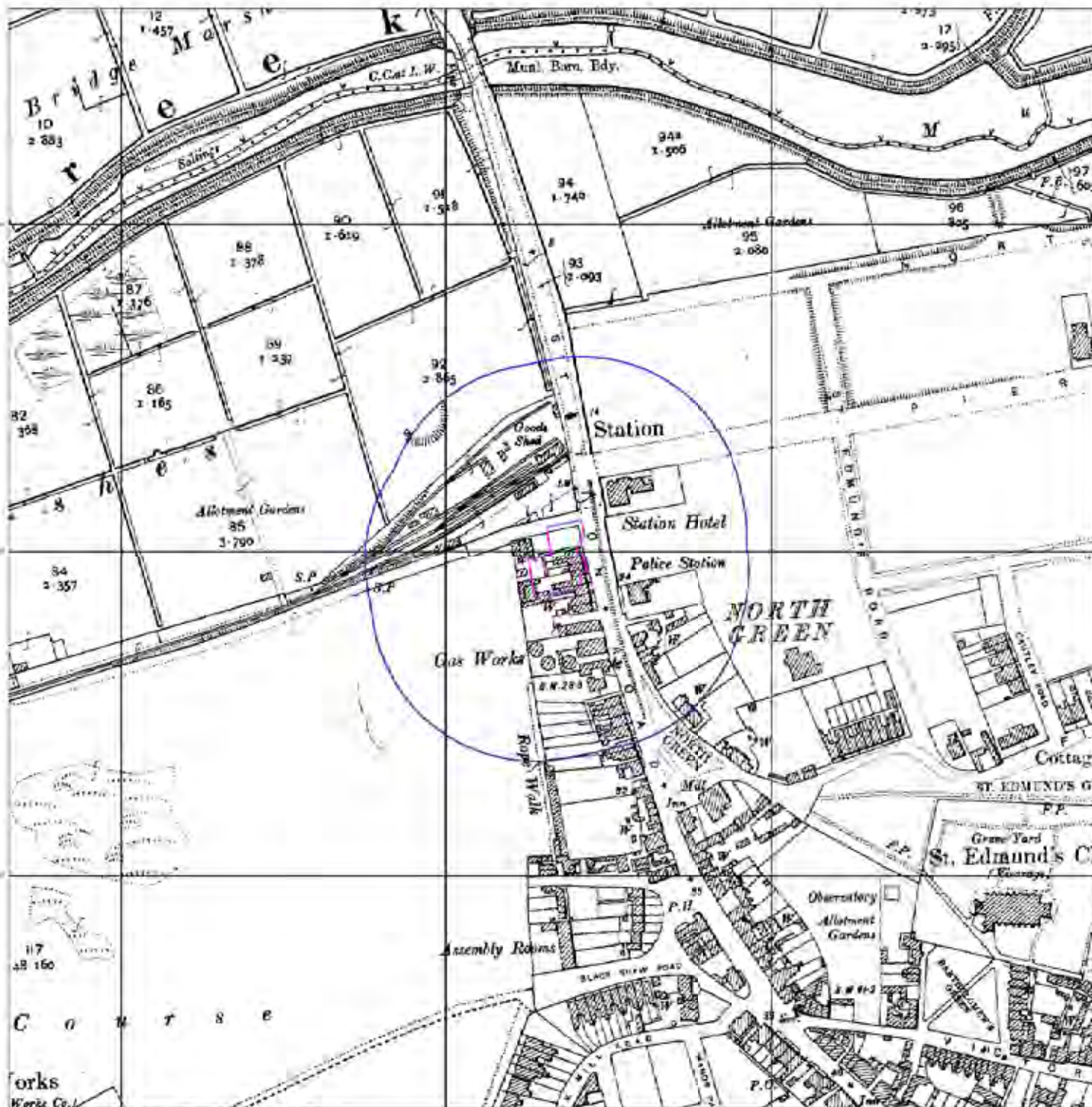
Site Details

Site at 650480, 276590

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INFORMATION GROUP

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





Suffolk

Published 1904

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1899 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1939, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 161135276_1_1
 Customer Ref: UK18.3076
 National Grid Reference: 650470, 276590
 Slice: A
 Site Area (Ha): 0.12
 Search Buffer (m): 100

Site Details

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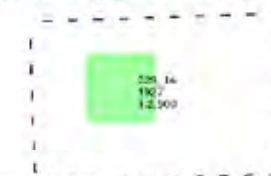
Suffolk

Published 1927

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1899 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1939, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 161135276_1_1
Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Site: A
Site Area (Ha): 0.12
Search Buffer (m): 100

Site Details

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Suffolk

Published 1938

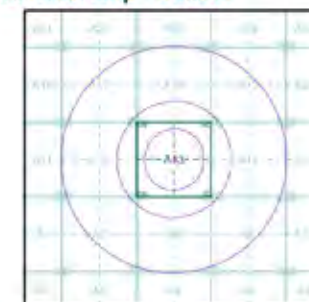
Source map scale - 1:10,560

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

Map Name(s) and Date(s)

OS SW
1938
1:10,560

Historical Map - Slice A



Order Details

Order Number: 181135278_1_1
Customer Ref: UK18.3078
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details

Site at 650480, 276590

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Web: www.landmark.co.uk



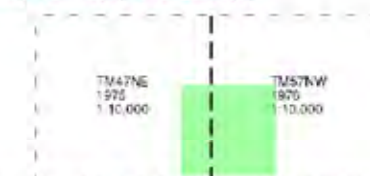
Ordnance Survey Plan

Published 1975 - 1976

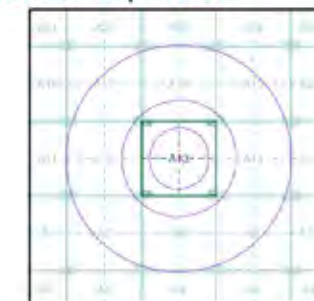
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 181135278_1_1
Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details

Site at 650480, 276580

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Web: www.landmarkcheck.co.uk



Additional SIMs

Published 1987

Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:12,500 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

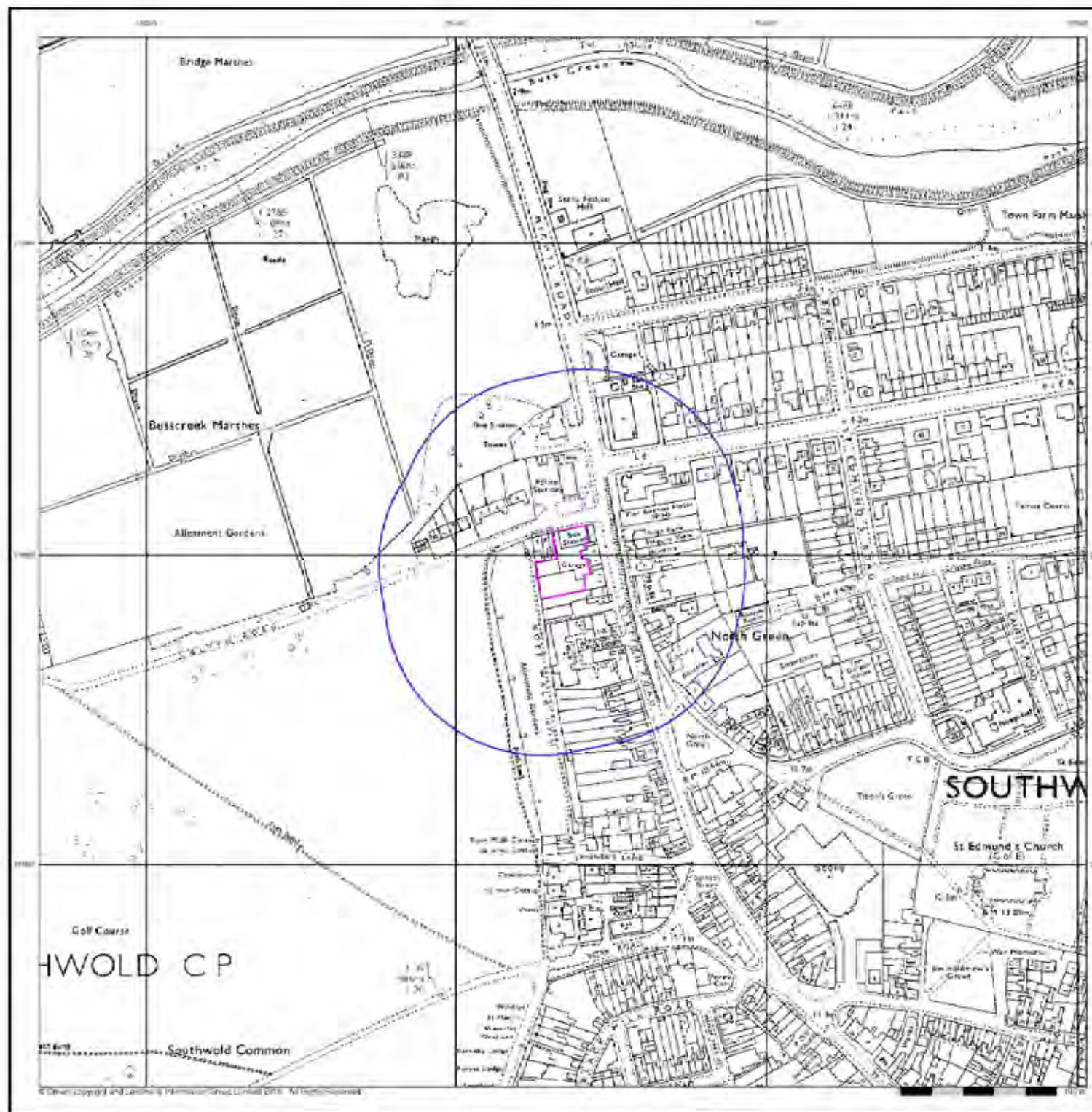
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Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Site: A
Site Area (Ha): 0.12
Search Buffer (m): 100

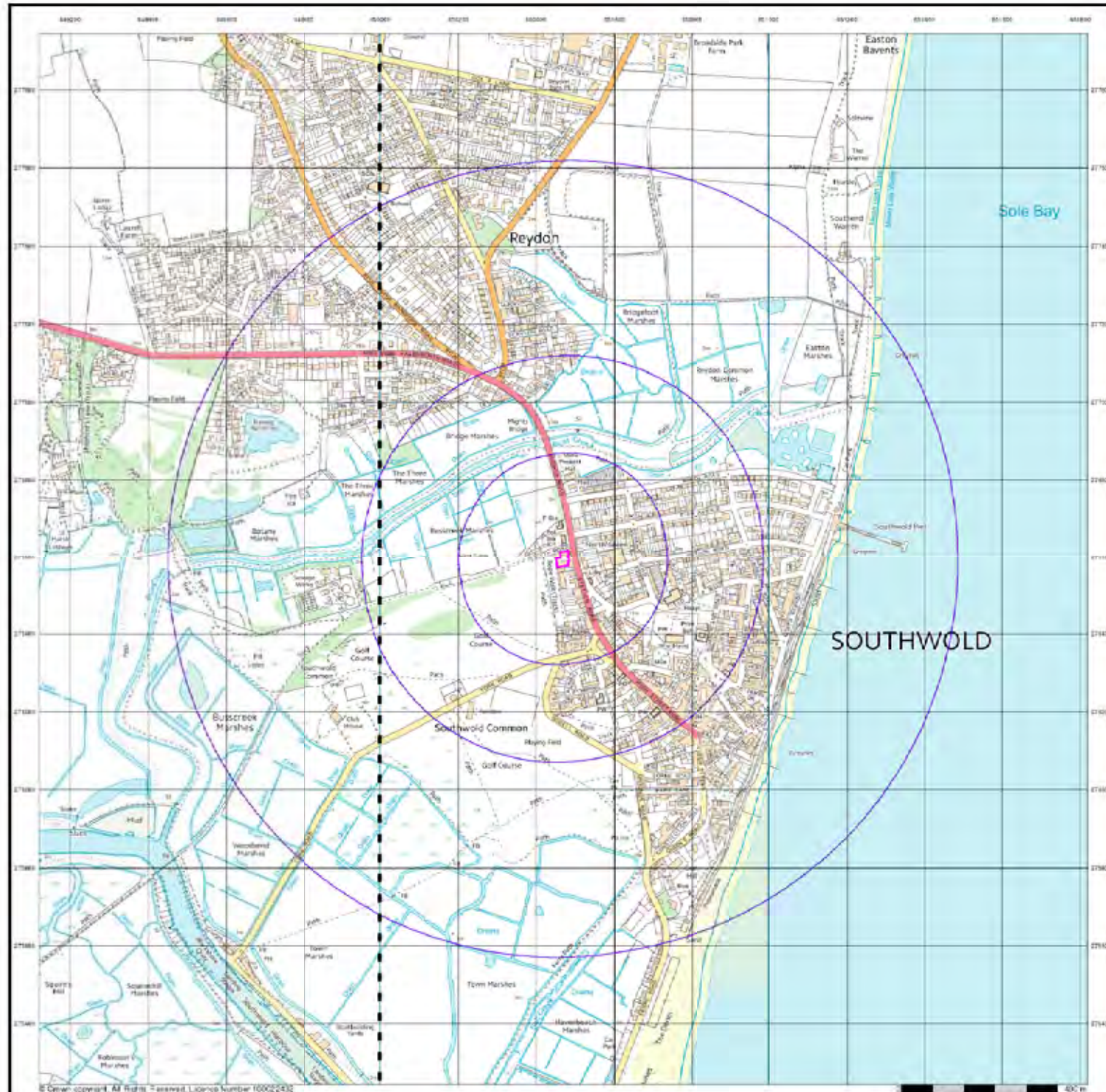
Site Details

Site at 650480, 276590

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INFORMATION GROUP

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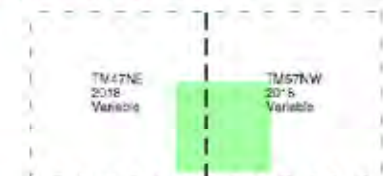
VectorMap Local

Published 2018

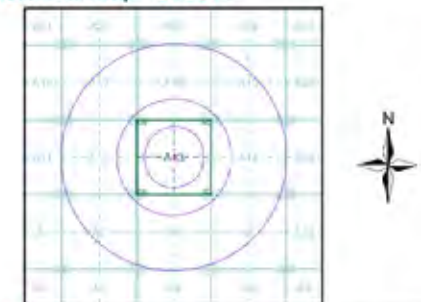
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'background' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:250 scale (covering major towns and cities), 1:2500 scale (smaller towns, villages and developed rural areas), and 1:10,000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 161135276_1_1
Customer Ref: UK18.3076
National Grid Reference: 650470, 276590
Slice: A
Site Area (Ha): 0.12
Search Buffer (m): 1000

Site Details

Site at 650480, 276590

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Landmark
INFORMATION GROUP

Tel: 0844 844 9652
 Fax: 0844 844 9651
 Web: www.emvinscheck.co.uk

APPENDIX G

Site Specific Borehole Logs



Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: Station Road/Blyth Road

Project No.
UK18.3076

Co-ords: -

Hole Type
WLS

Location: Southwold

Level:

Scale
1:21

Client: Ingleton Wood

Dates: -

Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.16			CONCRETE	
		0.40	ES	PID=0				MADE GROUND - Greyish brown gravelly SAND. Gravel is fine to medium rounded to sub-rounded clinker, chalk-fill and sandstone. Grey/black staining noted.	
					0.75				
		1.00 1.00 1.00	D ES	N=26 (11,/6,7,6,7) PID=0				Brownish orange gravelly medium dense SAND. Gravel is fine to medium rounded to sub-rounded flint, quartz and sandstone.	1
		1.60	D					.....very gravelly. .....gravelly. Gravel is fine to coarse rounded to angular.	
		2.00		N=52 (14,/11,15,14,12)				.....dense.	2
		2.20	D					.....very gravelly.	
					3.00			End of borehole at 3.00 m	3
									4

Remarks





Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Station Road/Blyth Road

Project No.
UK18.3076

Co-ords: -

Hole Type
WLS

Location: Southwold

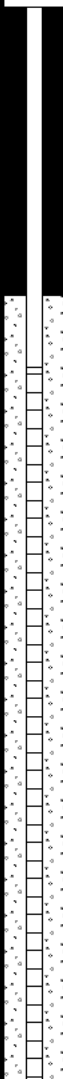


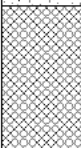
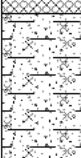
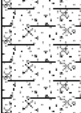
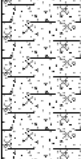
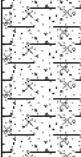
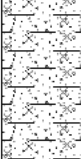
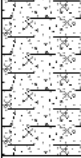
Level:

Scale
1:21

Client: Ingleton Wood

Dates: -

Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.12			CONCRETE	
		0.30	ES	PID=0	0.55			MADE GROUND - Brick and concrete rubble.	
		0.90	D					Dark greyish brown slightly clayey gravelly medium dense SAND. Gravel is fine to medium rounded to sub-rounded flint.	
		1.00	ES	N=16 (2,/3,4,4,5) PID=0				.....no clay noted.	1
		1.00						.....brownish orange colour. Gravel is fine to coarse rounded to angular flint.	
		1.50	D						
		2.00		N=32 (12,/8,8,9,7)				.....very gravelly and dense.	2
		2.30	D						
					3.00				
								End of borehole at 3.00 m	3
									4

Remarks





Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Station Road/Blyth Road

Project No.
UK18.3076

Co-ords: -

Hole Type
WLS

Location: Southwold

Level:

Scale
1:21

Client: Ingleton Wood

Dates: -

Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.19			CONCRETE	
					0.50			MADE GROUND - Brick and concrete rubble with a greyish brown sand matrix (wet).	
		0.80	ES	PID=0				MADE GROUND - brownish orange slightly gravelly SAND. Gravel is fine to medium rounded to sub-rounded clinker, brick, concrete and chalk-fill. Grey staining noted.	
		1.00		N=5 (3,/1,1,1,2)					1
					1.40			Orange slightly gravelly medium dense SAND. Gravel is fine to medium rounded to sub-rounded flint.	
		1.50	D	PID=0					
		1.60	ES						
		2.00	D	N=24 (10,/6,5,6,7)				....very gravelly.	2
		2.00						Gravel is fine to coarse rounded to angular flint.	
		2.80	D						
					3.00			End of borehole at 3.00 m	3
									4

Remarks





Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Station Road/Blyth Road

Project No.
UK18.3076

Co-ords: -

Hole Type
WLS

Location: Southwold

Level:

Scale
1:21

Client: Ingleton Wood

Dates: -

Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.07			0.07			CONCRETE	
		0.40	ES	PID=0				MADE GROUND - dark greyish brown slightly clayey gravelly SAND. Gravel is fine to medium sub-rounded to angular brick, concrete, clinker, chalk and flint (wet).	
		0.75			0.75				
		1.00		PID=0 N=2 (1/1,1,0,0)				Dark greyish brown gravelly loose SAND. Gravel is fine to coarse rounded to angular flint.	1
		1.50 1.50	D ES	PID=0					
		1.90 2.00 2.00	D ES	PID=0 N=18 (8,4,5,4,5)				.....orange in colour. Cobbles noted. Gravel is rounded to sub-rounded flint. Medium dense.	2
		2.50	D					...very gravelly.	
		3.00			3.00			End of borehole at 3.00 m	3
									4

Remarks





Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Station Road/Blyth Road

Project No.
UK18.3076

Co-ords: -

Hole Type
WLS

Location: Southwold



Level:

Scale
1:21

Client: Ingleton Wood

Dates: -

Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.07			CONCRETE Poor recovery	
					0.45			MADE GROUND - brownish red brick rubble.	
					1.00			Void	1
					2.60			End of borehole at 2.60 m	3
									4

Remarks



APPENDIX H

Laboratory Results – Environmental

EPS Ltd
7B Caxton House
Broad Street
Cambourne
Cambridgeshire
CB23 6JN

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel. +44 (0) 1244 833780
Fax +44 (0) 1244 833781



Attention :	
Date :	17th April, 2018
Your reference :	UK17-3076
Our reference :	Test Report 18/5124 Batch 1
Location :	Station Rd Southwold
Date samples received :	7th April, 2018
Status :	Final report
Issue :	2

Nine samples were received for analysis on 7th April, 2010 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By

Project Manager

Client Name: EPS Ltd
 Reference: UK17.3076
 Location: Station Rd Southwold
 Contact: [REDACTED]
 JE Job No.: 18/5124

Report: Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-4	5-8	9-11	12-13	14-17	18-21	22-25	26	27-29	Please see attached notes for all abbreviations and acronyms		
Sample ID	W001	W001	W002	W002	W003	W003	W004	W004	W004			
Depth	0.4	1.0	0.3	1.0	0.6	1.6	0.4	1.5	2.0			
COC No / misc												
Containers	V J T B	V J T B	V J B	V J	V J B	V J B	V J B	V	V J B			
Sample Date	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1			
Date of Receipt	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018			
										LOD/LOR	Units	Method No.
Arsenic ^{***}	9.0	-	5.2	-	-	-	16.7	-	3.4	<0.5	mg/kg	TM30/PM15
Cadmium ^{***}	<0.1	-	<0.1	-	-	-	<0.1	-	<0.1	<0.1	mg/kg	TM30/PM15
Chromium ^{***}	69.9	-	43.4	-	-	-	50.6	-	48.7	<0.5	mg/kg	TM30/PM15
Copper ^{***}	10	-	50	-	-	-	33	-	<1	<1	mg/kg	TM30/PM15
Lead ^{***}	69	-	102	-	-	-	1958	-	<5	<5	mg/kg	TM30/PM15
Mercury ^{***}	<0.1	-	<0.1	-	-	-	0.3	-	<0.1	<0.1	mg/kg	TM30/PM15
Nickel ^{***}	9.3	-	7.8	-	-	-	16.0	-	5.1	<0.7	mg/kg	TM30/PM15
Selenium ^{***}	<1	-	<1	-	-	-	<1	-	4	<1	mg/kg	TM30/PM15
Sulphur as S	-	<0.01	-	<0.01	-	<0.01	-	-	<0.01	<0.01	%	TM30/PM15
Total Sulphate as SO4 ^{***}	547	53	1022	69	-	81	497	-	<50	<50	mg/kg	TM50/PM29
Zinc ^{***}	25	-	66	-	-	-	65	-	9	<5	mg/kg	TM30/PM15
Arsenic	-	-	-	-	18.5	-	-	-	-	<0.5	mg/kg	TM30/PM62
Cadmium	-	-	-	-	0.7	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	-	13.1	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper	-	-	-	-	54	-	-	-	-	<1	mg/kg	TM30/PM62
Lead	-	-	-	-	437	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury	-	-	-	-	0.2	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	-	16.0	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	-	<1	-	-	-	-	<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	-	-	-	504	-	-	-	-	<50	mg/kg	TM50/PM29
Zinc	-	-	-	-	466	-	-	-	-	<5	mg/kg	TM30/PM62
PAH MS												
Naphthalene ^{***}	0.06	-	<0.04	-	0.22	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.17	-	<0.03	-	0.45	-	0.05	-	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene ^{***}	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene ^{***}	<0.04	-	<0.04	-	0.09	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene ^{***}	0.29	-	0.06	-	2.21	-	0.24	-	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene [*]	0.15	-	<0.04	-	0.55	-	0.07	-	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene ^{***}	0.68	-	0.11	-	5.10	-	0.40	-	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene [*]	0.62	-	0.10	-	4.11	-	0.35	-	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [*]	0.49	-	0.11	-	2.25	-	0.40	-	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene ^{***}	0.50	-	0.10	-	2.68	-	0.35	-	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene ^{***}	0.78	-	0.19	-	4.66	-	0.65	-	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [*]	0.40	-	0.10	-	2.43	-	0.28	-	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{***}	0.22	-	0.07	-	1.63	-	0.14	-	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(a,h)anthracene [*]	0.08	-	<0.04	-	0.37	-	<0.04	-	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [*]	0.23	-	0.08	-	1.62	-	0.14	-	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	4.7	-	0.9	-	26.4	-	3.1	-	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.56	-	0.14	-	3.36	-	0.47	-	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.22	-	0.05	-	1.30	-	0.18	-	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	97	-	98	-	96	-	90	-	96	<0	%	TM4/PM8
Methyl Tertiary Butyl Ether ^{***}	-	-	-	-	<6	-	-	-	-	<6	ug/kg	TM15/PM10

Client Name: EPS Ltd
 Reference: UK17.3076
 Location: Station Rd Southwold
 Contact: [REDACTED]
 JE Job No.: 18/5124

Report: Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-4	5-8	9-11	12-13	14-17	18-21	22-25	26	27-29	Please see attached notes for all abbreviations and acronyms		
Sample ID	W001	W001	W002	W002	W003	W003	W004	W004	W004			
Depth	0.4	1.0	0.3	1.0	0.6	1.6	0.4	1.5	2.0			
COC No / misc												
Containers	V J T B	V J T B	V J B	V J	V J B	V J B	V J B	V	V J B			
Sample Date	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1			
Date of Receipt	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	LOD/LOR	Units	Method No.
Benzene SM	-	-	-	-	<5	-	-	-	-	<5	ug/kg	TM15/PM10
Toluene SM	-	-	-	-	<3	-	-	-	-	<3	ug/kg	TM15/PM10
Ethylbenzene SM	-	-	-	-	<3	-	-	-	-	<3	ug/kg	TM15/PM10
p/m-Xylene SM	-	-	-	-	<4	-	-	-	-	<4	ug/kg	TM15/PM10
o-Xylene SM	-	-	-	-	<4	-	-	-	-	<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	-	-	-	84	-	-	-	-	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	-	-	-	68	-	-	-	-	<0	%	TM15/PM10
TPH CWG												
Aliphatics												
>C5-C6 SM	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 SM	<0.1	-	<0.1	-	<0.1	-	0.1	-	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	-	<0.1	-	<0.1	-	0.1	-	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 SM	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	<0.2	mg/kg	TM36/PM12
>C12-C16 SM	<4	-	<4	-	<4	-	<4	-	<4	<4	mg/kg	TM36/PM12
>C16-C21 SM	<7	-	<7	-	<7	-	<7	-	<7	<7	mg/kg	TM36/PM12
>C21-C35 SM	<7	-	<7	-	49	-	<7	-	<7	<7	mg/kg	TM36/PM12
Total aliphatics C5-35	<19	-	<19	-	49	-	<19	-	<19	<19	mg/kg	TM36/PM12
Aromatics												
>C5-EC7 SM	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 SM	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 SM	<0.1	-	<0.1	-	<0.1	-	0.2	-	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 SM	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	<0.2	mg/kg	TM36/PM12
>EC12-EC16 SM	<4	-	<4	-	6	-	<4	-	<4	<4	mg/kg	TM36/PM12
>EC16-EC21 SM	<7	-	<7	-	39	-	<7	-	<7	<7	mg/kg	TM36/PM12
>EC21-EC35 SM	40	-	<7	-	160	-	63	-	<7	<7	mg/kg	TM36/PM12
Total aromatics C5-35 SM	40	-	<19	-	205	-	63	-	<19	<19	mg/kg	TM36/PM12
Total aliphatics and aromatics(C5-35)	40	-	<38	-	254	-	63	-	<38	<38	mg/kg	TM36/PM12
MTBE SM	<5	-	<5	-	-	-	<5	-	<5	<5	ug/kg	TM31/PM12
Benzene SM	<5	-	<5	-	-	-	<5	-	<5	<5	ug/kg	TM31/PM12
Toluene SM	<5	-	<5	-	-	-	30	-	<5	<5	ug/kg	TM31/PM12
Ethylbenzene SM	<5	-	<5	-	-	-	<5	-	<5	<5	ug/kg	TM31/PM12
m/p-Xylene SM	<5	-	<5	-	-	-	57	-	<5	<5	ug/kg	TM31/PM12
o-Xylene SM	<5	-	<5	-	-	-	165	-	<5	<5	ug/kg	TM31/PM12
Total Phenols HPLC	<0.15	-	<0.15	-	<0.15	-	<0.15	-	<0.15	<0.15	mg/kg	TM26/PM21
Natural Moisture Content	10.3	-	20.6	-	-	-	21.4	11.6	5.6	<0.1	%	PM4/PM0
Natural Moisture Content	-	-	-	-	24.8	-	-	-	-	<0.1	%	PM4/PM0
Hexavalent Chromium SM	<0.3	-	<0.3	-	<0.3	-	<0.3	-	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) SM	0.0505	0.0050	0.0462	<0.0015	-	0.0152	0.0173	-	0.0017	<0.0015	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext)	-	-	-	-	0.0201	-	-	-	-	<0.0015	g/l	TM38/PM20

Client Name: EPS Ltd
 Reference: UK17.3076
 Location: Station Rd Southwold
 Contact: [REDACTED]
 JE Job No.: 18/5124

Report: Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

JE Sample No.	1-4	5-8	9-11	12-13	14-17	18-21	22-25	26	27-29		Please see attached notes for all abbreviations and acronyms		
Sample ID	W001	W001	W002	W002	W003	W003	W004	W004	W004				
Depth	0.4	1.0	0.3	1.0	0.6	1.6	0.4	1.5	2.0				
COC No / misc													
Containers	V J T B	V J T B	V J B	V J	V J B	V J B	V J B	V	V J B				
Sample Date	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018	07/04/2018				
											LOD/LOR	Units	Method No.
Chromium III	69.9	-	43.4	-	NDP	-	50.6	-	48.7		<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	-	13.1	-	-	-	-		<0.5	mg/kg	NONE/NONE
Total Cyanide ^{III}	<0.5	-	<0.5	-	2.4	-	<0.5	-	<0.5		<0.5	mg/kg	TM59/PM45
Organic Matter	0.9	-	0.3	-	NDP	-	6.4	-	<0.2		<0.2	%	TM21/PM24
pH ^{III}	9.70	8.77	11.24	8.62	8.99	8.38	8.30	-	8.74		<0.01	pH units	TM73/PM11
Sample Type	Sand	Sand	Sand	Sand	NDP	Sand	Clayey Sand	Sand	Sand			None	PM13/PM0
Sample Colour	Dark Grey	Medium Brown	Medium Grey	Dark Brown	NDP	Medium Brown	Dark Brown	Dark Brown	Medium Brown			None	PM13/PM0
Other Items	stones	stones, glass	stones, brick	darker stones	NDP	stones	stones	none	none			None	PM13/PM0

Please see attached notes for all abbreviations and acronyms.

Client Name: EPS Ltd
 Reference: UK17 3076
 Location: Station Rd Southwold
 Contact: [REDACTED]

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

[REDACTED] Jones Environmental Laboratory

Asbestos Team Leader

J E Job No	Batch	Sample ID	Depth	J E Sample No	Date Of Analysis	Analysis	Result
18/5124	1	WS01	0.4	4	10/04/2018	General Description (Bulk Analysis)	Soil/Stones
					10/04/2018	Asbestos Fibres	NAD
					10/04/2018	Asbestos Fibres (2)	NAD
					10/04/2018	Asbestos ACM	NAD
					10/04/2018	Asbestos ACM (2)	NAD
					10/04/2018	Asbestos Type	NAD
					10/04/2018	Asbestos Type (2)	NAD
					10/04/2018	Asbestos Level Screen	NAD
18/5124	1	WS02	0.3	11	10/04/2018	General Description (Bulk Analysis)	Soil/Stones
					10/04/2018	Asbestos Fibres	NAD
					10/04/2018	Asbestos Fibres (2)	NAD
					10/04/2018	Asbestos ACM	NAD
					10/04/2018	Asbestos ACM (2)	NAD
					10/04/2018	Asbestos Type	NAD
					10/04/2018	Asbestos Type (2)	NAD
					10/04/2018	Asbestos Level Screen	NAD
18/5124	1	WS03	0.6	17	10/04/2018	General Description (Bulk Analysis)	Soil/Stones
					10/04/2018	Asbestos Fibres	Fibre Bundles
					10/04/2018	Asbestos ACM	NAD
					10/04/2018	Asbestos Type	Chrysotile
					10/04/2018	Asbestos Level Screen	less than 0.1%
					17/04/2018	Total ACM Gravimetric Quantification (% Asb)	<0.001 (mass %)
					17/04/2018	Total Detailed Gravimetric Quantification (% Asb)	<0.001 (mass %)
					17/04/2018	Total Gravimetric Quantification (ACM + Detailed) (% Asb)	<0.001 (mass %)
					17/04/2018	Asbestos PCOM Quantification (Fibres)	<0.001 (mass %)
18/5124	1	WS04	0.4	25	17/04/2018	Asbestos Gravimetric & PCOM Total	<0.001 (mass %)
					10/04/2018	General Description (Bulk Analysis)	Soil/Stones
					10/04/2018	Asbestos Fibres	NAD
					10/04/2018	Asbestos Fibres (2)	NAD
					10/04/2018	Asbestos ACM	NAD
					10/04/2018	Asbestos ACM (2)	NAD
					10/04/2018	Asbestos Type	NAD
					10/04/2018	Asbestos Type (2)	NAD
					10/04/2018	Asbestos Level Screen	NAD

Client Name: EPS Ltd
Reference: UK17 3076
Location: Station Rd Southwold
Contact: [REDACTED]

[illegible]

Client Name: EPS Ltd
Reference: UK17.3076
Location: Station Rd Southwold
Contact: [REDACTED]

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.



Exova Jones Environmental

Exova Jones Environmental Limited, Unit 3 Deeside Point, Deeside Industrial Park, Deeside, CH5 2UA

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

EPS Ltd
7B Caxton House
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Cambridgeshire
CB23 6JN

Tel: +44 (0) 1244 833780
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Attention :	[REDACTED]
Date :	27th April, 2018
Your reference :	UK18.3076
Our reference :	Test Report 18/6008 Batch 1
Location :	Station Road/Blyth Road Southwold
Date samples received :	21st April, 2018
Status :	Final report
Issue :	1

One sample was received for analysis on 21st April, 2018 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:



[REDACTED]
Project Manager

Please see attached notes for all abbreviations and acronyms.

Client Name: EPS Ltd
Reference: UK18.3076
Location: Station Road/Blyth Road Southwold
Contact: [REDACTED]

Matrix : Liquid

[illegible]

Client Name: EPS Ltd
Reference: UK18.3076
Location: Station Road/Blyth Road Southwold
Contact: [REDACTED]

Reference: UK18.3076
Location: Station Road/Blyth Road Southwold
Contact: [REDACTED]

Location: Station Road/Blyth Road Southwold
Contact: [REDACTED]

Contact: [REDACTED]

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/6008

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10.1 ZERO Headspace VOC test has been carried out, a 10.1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2. ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory.

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No. T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/6008

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/6 ANAS)	MCERTS (UK sole only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM31	Modified USEPA 8015B. Determination of Methylterbutyl ether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			

APPENDIX I

Laboratory Results – Geotechnical



TEST REPORT
ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 20/04/2018



0998

Contract	UK18.3076 - Station Road, Southwold		
Serial No.	S32912		
Client: Environmental Protection Strategies Ltd Unit 7 Caxton House Broad Street Great Cambourne Cambridge CB23 6JN		Soil Property Testing Ltd 15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG Tel: 01480 455579 Email: enquiries@soilpropertytesting.com Website: www.soilpropertytesting.com	
Samples Submitted By: Environmental Protection Strategies Ltd Samples Labelled: UK18.3076 - Station Road, Southwold		Approved Signatories: <input checked="" type="checkbox"/> [Redacted] Technical Director <input type="checkbox"/> [Redacted] Quality Manager <input type="checkbox"/> [Redacted] Materials Lab Manager <input type="checkbox"/> [Redacted] Operations Manager [Redacted]	
Date Received: 06/04/2018		Samples Tested Between: 06/04/2018 and 20/04/2018	
Remarks: For the attention of Christine Cowey Your Reference No: UK18.3076 Your Order No: 19377			
Notes: <ol style="list-style-type: none">1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.2 (a) UKAS - United Kingdom Accreditation Service (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.			



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 20/04/2018



Contract		UK18.3076 - Station Road, Southwold																		
Serial No.		S32912										Target Date		20/04/2018						
Scheduled By		Environmental Protection Strategies Ltd																		
SCHEDULE OF LABORATORY TESTS																				
Schedule Remarks																				
Bore Hole No.	Type	Sample Ref.	Top Depth	PSD by Wet Sieve: BS1377																Sample Remarks
WS01	D	1	1.00	1																
WS02	D	4	0.90	1																
WS04	D	10	1.50	1																
Totals				3															End of Schedule	



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 20/04/2018



0998

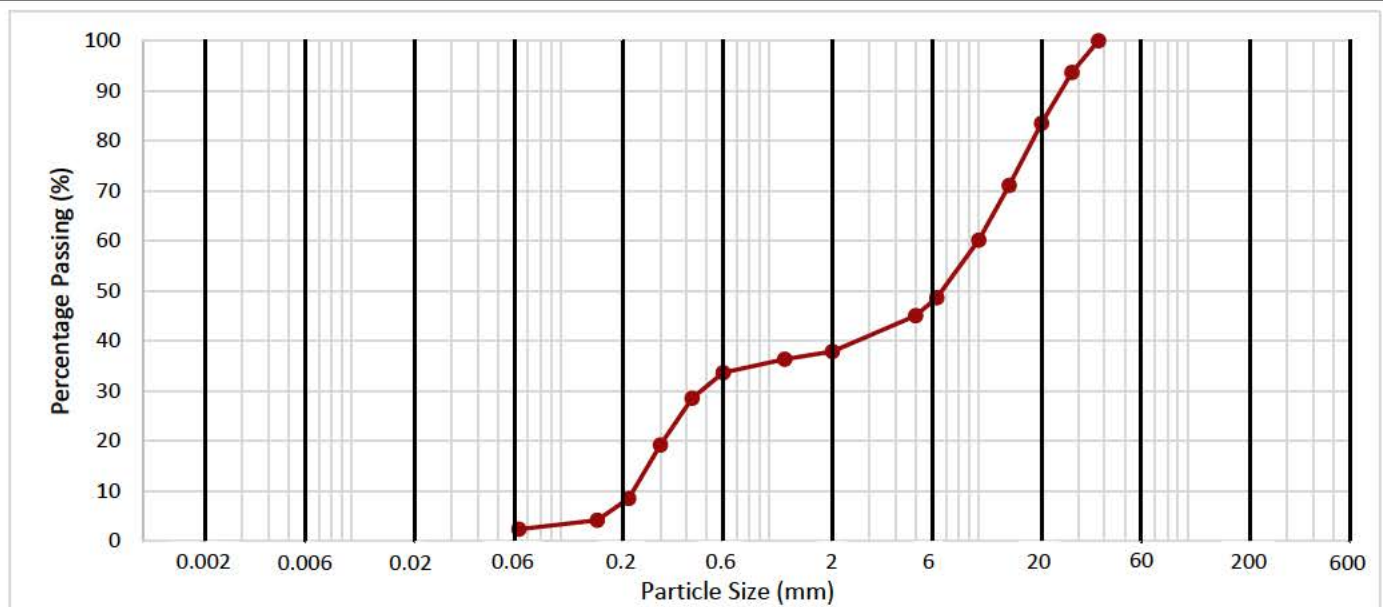
Contract	UK18.3076 - Station Road, Southwold
Serial No.	S32912

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
WS01	1.00	D	1	Black, brown and white slightly silty very sandy subangular and subrounded flint GRAVEL. Sand is orangish brown	Dry mass of sample required 2kg. Mass of sample submitted 1.5kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3.

Method of Test: **Wet Sieve**

Method of Pretreatment:

Not Required

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	Particle Size (mm)	Passing (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	38	36
1.18	36	
0.600	34	
0.425	29	
0.300	19	
0.212	8	
0.150	4	
0.063	2	

Fines By Dry Mass (%)	
<0.063mm	2

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		62
125		
90		
63		
50		
37.5	100	
28	94	
20	83	
14	71	
10	60	
6.3	49	
5	45	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5

Method of test: BS1377: Part2: 1990: 9.2

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments:



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 20/04/2018



0998

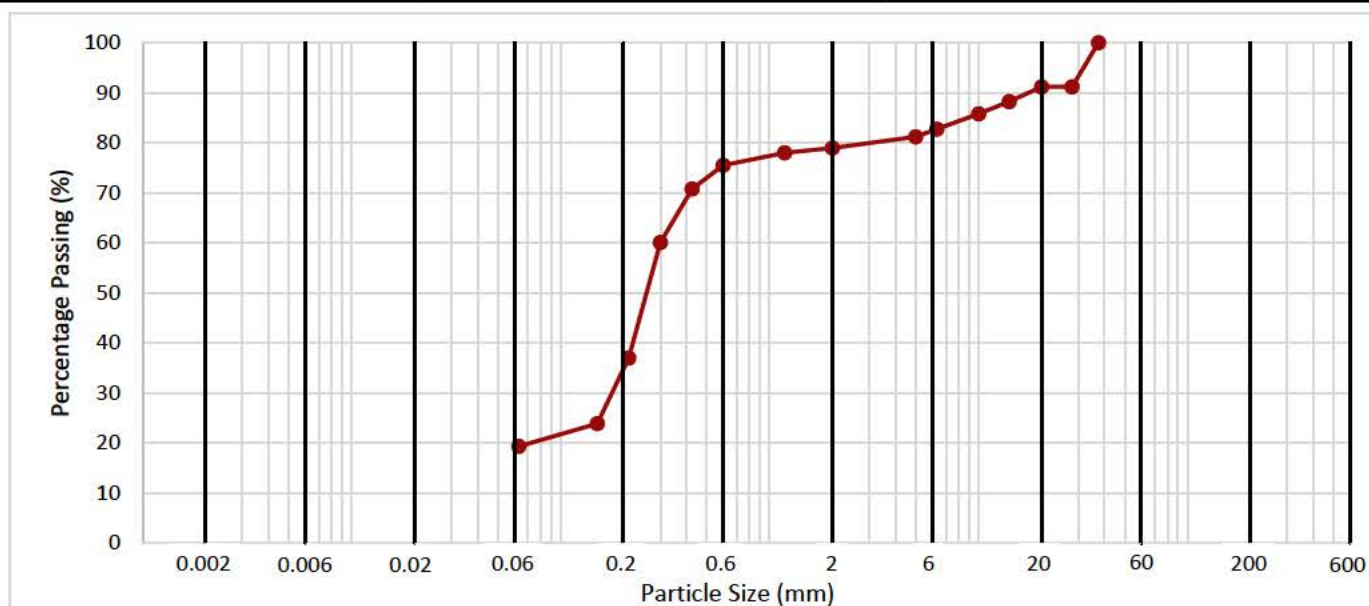
Contract	UK18.3076 - Station Road, Southwold
Serial No.	S32912

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
WS02	0.90	D	4	Dark brown clayey silty very gravelly SAND. Gravel is brown and white subangular and subrounded flint	Dry mass of sample required 1kg. Mass of sample submitted 0.8kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3.

Method of Test: **Wet Sieve**

Method of Pretreatment:

Not Required

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	Particle Size (mm)	Passing (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	79	60
1.18	78	
0.600	75	
0.425	71	
0.300	60	
0.212	37	
0.150	24	
0.063	19	

Fines By Dry Mass (%)	
<0.063mm	19

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		21
125		
90		
63		
50		
37.5	100	
28	91	
20	91	
14	88	
10	86	
6.3	83	
5	81	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5

Method of test: BS1377: Part2: 1990: 9.2

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments:



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 20/04/2018



0998

Contract	UK18.3076 - Station Road, Southwold
Serial No.	S32912

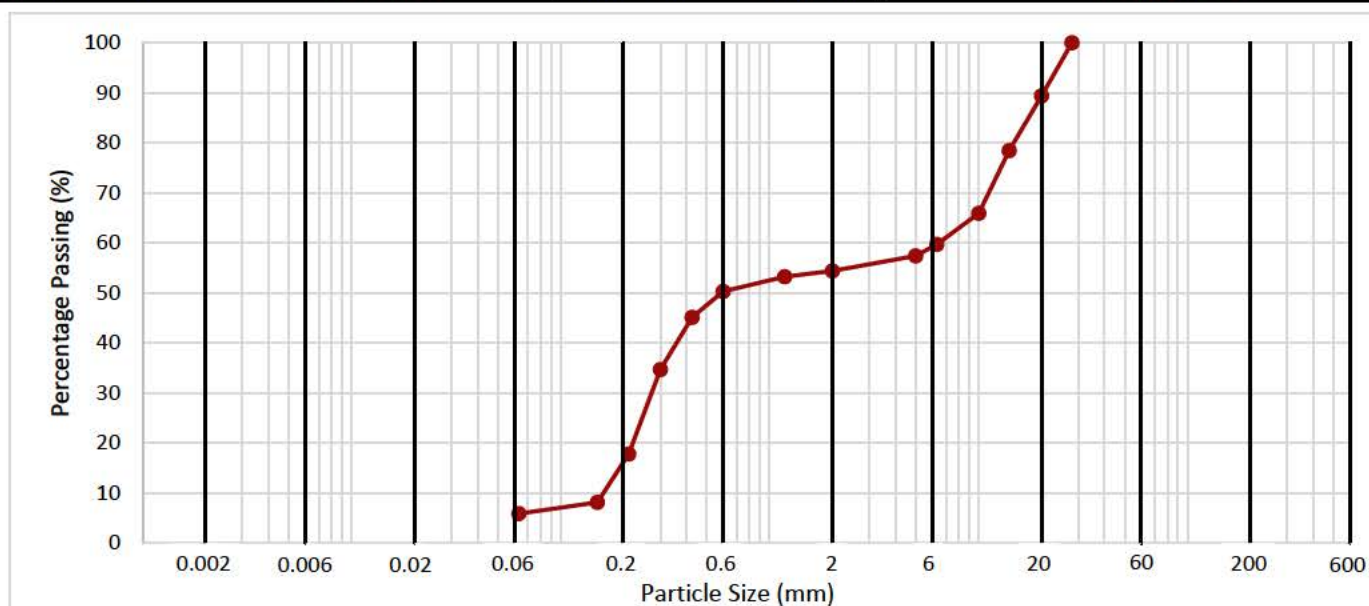
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
WS04	1.50	D	10	Brown silty SAND and black, white and brown subangular and subrounded flint GRAVEL	Dry mass of sample required 2kg. Mass of sample submitted 1kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3.

Method of Test: Wet Sieve

Method of Pretreatment:

Not Required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	Particle Size (mm)	Passing (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	54	48
1.18	53	
0.600	50	
0.425	45	
0.300	35	
0.212	18	
0.150	8	
0.063	6	

Fines By Dry Mass (%)	
<0.063mm	6

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		46
125		
90		
63		
50		
37.5		
28	100	
20	89	
14	78	
10	66	
6.3	60	
5	57	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5

Method of test: BS1377: Part2: 1990: 9.2

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments:

APPENDIX J

Generic Screening Criteria

EPS Generic Quantitative Risk Assessment

Minimal Risk Generic Screening Criteria - Residential Land Use (without homegrown produce)

Contaminant	Soil Targets			Groundwater Targets	
	Human Health	Controlled Waters		Controlled Waters	
		LGwRP	HGwRP	LGwRP	HGwRP
Unit		mg/kg		ug/l	
Arsenic	40	n/c	n/c	50	10
Cadmium	85	n/c	n/c	5	5
Chromium III	910	n/c	n/c	250	50
Chromium VI	6	n/c	n/c	n/c	n/c
Copper	7100	n/c	n/c	28	28
Mercury (elemental)	1.2	n/c	n/c	1	1
Nickel	180	n/c	n/c	200	50
Lead	NA	n/c	n/c	250	10
Selenium	430	n/c	n/c	10	10
Zinc	40000	n/c	n/c	500	500
Benzene	0.38	0.252	0.008	30	1
Toluene	880 (869)*	1.17	1.17	50	50
Ethylbenzene	83	15.0	10.0	300	200
Xylene (para)	79	0.885	0.885	30	30
MTBE#	73	0.138	0.0276	75	15
Benzo(a)Pyrene	3.2	10	1.44	0.7	0.1
Naphthalene	2.3f	0.934	0.02	10	0.1
Dibenz(ah)anthracene	0.31	n/c	n/c	n/c	n/c
Aliphatic C5-C6	42	5.27	1.05	50	10
Aliphatic C6-C8	100	23.2	4.64	50	10
Aliphatic C8-C10	27	175	35.1	50	10
Aliphatic C10-C12	130(48)*	1380	276	50	10
Aliphatic C12-C16	1100(8.48)**	27500	5490	50	10
Aliphatic C16-C35	65000 (8.48)**	3.46E+06	6.91E+05	50	10
Aromatic C8-C10	47	8.74	1.75	50	10
Aromatic C10-C12	250	13.8	2.76	50	10
Aromatic C12-C16	1800	27.5	5.5	50	10
Aromatic C16-C21	1900f	86.9	17.4	50	10
Aromatic C21-C35	1900f	690	138	50	10

Notes:

LGwRP - Low Groundwater Resource Potential

HGwRP - High Groundwater Resource Potential

f = Oral, dermal and inhalation exposure compared with oral HCV N/C = Not Calculated

* = S4UL exceeds vapour saturation limit (in brackets)

** = S4UL exceeds solubility saturation limit (in brackets)

Soil Targets

Targets for Human Health have been taken from 'S4ULs Suitable For Use Levels for Human Health Risk Assessment' – LQM and CIEH (2014) derived using standard sandy loam soil with 1% SOM, except (#) = EIC/AGS/CL:AIRE GAC 'Soil Generic Assessment Criteria' (2010). For sites where ground conditions differ significantly from sandy loam or site-specific SOM and pH are available, the generic human health targets may be revised.

Targets for Controlled waters have been derived using EA Remedial Targets Worksheet (v3.1) - using standard Sandy Loam ground conditions as described in Science Report SC050021/SR3, assuming no degradation for a 10m compliance distance with criteria of EQS or UKDWS for LGwRP and HGwRP respectively (see notes for GW targets).

Groundwater Targets

For LGwRP, targets have been taken as Freshwater EQS where available. For Ethylbenzene and BaP the WHO Health limit has been used and for MTBE and individual TPH fractions a 5 times multiplier of taste threshold and UKDWS has been taken respectively.

For HGwRP, targets have been taken as UKDWS where available, with the exception of Copper and Zinc where the EQS is lower than the DWS and therefore the EQS has been used as the groundwater target. For Ethylbenzene the upper WHO ATO limit has been used. For Toluene and Xylene, the WHO ATO limit is higher than the EQS and so the lower value has been taken. For MTBE the taste threshold has been taken.

Work carried out to calculate generic screening criteria for concentrations of contaminant in groundwater with respect of risks to Human Health has generally found that criteria far exceed (by at least 2 orders of magnitude) those listed for the protection of either LGwRP and HGwRP receptors. On this basis, the above Groundwater criteria are also considered protective of human health and further evaluation of these risks should be considered alongside any detailed quantitative risk assessments carried out for groundwater on a site specific basis.



EPS Generic Quantitative Risk Assessment

Low Risk Generic Screening Criteria - All Land Uses

	Soil Targets					
Contaminant	Residential		Allotments	Commercial	Public Open Spaces	
	With Home Grown Produce	Without Home Grown Produce			Residential	Parks
Unit	mg/kg					
Arsenic	37	40	49	640	79	168
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5	5.3	5.7	76	10	21
Cadmium	26	149	4.9	410	220	880
Chromium (VI)	21	21	170	49	23	250
Lead	200	310	80	2330	630	1300

Notes:

Targets for Human Health have been taken from available Category 4 Screening Levels (C4SLs) for assessment of land affected by contamination issued by DEFRA in December 2013.

APPENDIX K

Method Statement for Encountering Unexpected Contamination




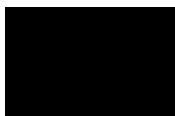
METHOD STATEMENT

ACTIONS TO BE TAKEN IN THE EVENT OF DISCOVERING UNEXPECTED CONTAMINATION DURING INTRUSIVE GROUNDWORKS

If at any point during intrusive groundworks at a site, evidence of unforeseen contamination is encountered in the form of significant noxious odours, discolouration, or instability within soils or sheen/ discolouration in groundwater, the following actions will be taken:

- Intrusive works in the immediate area of the impacted ground will be suspended and the continuation of work in other areas of the site will be considered within the context of the site specific health & safety plan.
- Environmental Protection Strategies Ltd (EPS) will be contacted and appraised of the situation so that arrangements can be made to characterise the impact and determine what action may be necessary in addition to the scheduled site works. Where possible / health & safety plan permits, digital photographs of the impacted ground will be taken and emailed to EPS at the address below to assist in the initial assessment.
- It may well be necessary for EPS to attend site to undertake visual inspection and obtain samples for field and/or laboratory analysis, although the actions taken will be dependent on the nature of what is encountered.
- In cases where EPS consider the unforeseen contamination likely to pose a significant risk of significant harm to adjacent site users or local environmental receptors, the local authority and the Environment Agency will be informed of the situation and the actions being taken.
- Once appropriate action has been agreed and undertaken, a written summary will be produced by EPS for submission to the Local Authority, (and where relevant, the Environment Agency) in accordance with planning requirements. The submission will include details of work undertaken, analytical results of investigative and validation samples obtained and conclusions and recommendations for any further actions considered necessary.
- Where regulatory bodies have been involved, site works should only recommence following their agreement and in all cases should only recommence when the site manager considers it safe to do so within the context of the site specific health & safety plan.

EPS Contact Details:

	Director	Tel:	
	Director	Tel:	
	Director	Tel:	

Email: info@epstrategies.co.uk (Automatically forwarded to the above and office based personnel.)